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Ecosystem

The world is changing every day. One trend in precision engineering is that different companies are working more extensively together on projects. Increasing numbers of companies are collaborating on new business programmes without the significant guidance of major OEMs, and more and more examples of this are emerging. This is a positive trend for the Dutch high-tech systems industry, as it will increase the added value of the partners in the chain. It will change the chain from a supply chain to a design and production one. The customer base will be more global and the supply chain will be international. Brainport Industries can play an important role in the Dutch industrial ecosystem managing these trends to enable international growth for high-tech suppliers in a much more open market when compared to one that is dictated only by the big OEMs.

We need to establish how our different companies can work together and still have their own development systems. If not, we will have to define standard ways of working for all collaborating parties. For example, if we are unable to deal with each party having their own CAD system, we will need to standardise our business and create one CAD system. We will also need to standardise several other systems.

I believe, however, that this is not feasible. In fact, I witnessed the impossibility of this at one big company, namely Philips in the 1990s. Therefore, we need to prepare how to work together without giving up our own development systems (i.e. CAD systems, standardisation databases, ways of working, ways of designing, system architectures, design principles, logistic systems, integration of modules into the final systems, etc.). This will be a major, yet rewarding challenge.

Let us create a new way of working for our multi-system ecosystem and find a way to collaborate without needing to rigidly standardise our different companies. And what better opportunity to discuss this, than at the Precision Fair 2011?

Dr Hans Krikhaar
President of DSPE
In industry, every day millions of products are picked up in one location and placed at another location. Automation of this process is straightforward when these products are of roughly the same shape and size, and when their position and orientation are known. However, when the products are very diverse in size, shape, position and orientation, robotic grasping becomes complicated and expensive. Inspired by the human hands and their grasping capabilities, Delft University of Technology has developed simple yet versatile robotic hands based on a force-directed design method. This design method and the results are presented in this article.

- Cory Meijneke and Gert Kragten

Robust, adaptive robotic hands that can easily and safely grasp a large variety of products are still a research and design challenge. Grasping can be approached from roughly two perspectives: motion and forces. On the one hand, the fingers have to make different motions to conform to the shape of various objects and to achieve different kinds of grasp postures. On the other hand, the fingers have to apply contact forces to the objects in order to achieve stable grasp equilibrium and to hold the objects. Conventionally, adaptive hands are designed from the perspective of motion. Many motors and sensors are applied to let the fingers make all the desired motions and to prevent the contact forces from exceeding threshold values. Amazing results have been achieved following this approach, but the effort to control these hands is generally too high for application in industry. Furthermore, the large number of motors and sensors makes these hands vulnerable and expensive. The motion-directed design approach does not seem to converge to solutions that

Authors’ note

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satisfy the need for simple, cheap and reliable adaptive hands.

**Force-directed design**
Design directed by forces is still a rather unexplored but promising perspective. For grasping, there is no need to fully control the motion of all phalanges. Basically, the phalanges or fingers need to apply forces to the object such that it is stably grasped and held. Passive mechanisms that distribute a single driving force to multiple phalanges are sufficient for this task. The application of this paradigm has led to a special class of robotic hands that are underactuated, i.e. having more degrees of freedom than actuators. At Delft University of Technology, several prototypes of underactuated hands with three fingers and only one motor have been built (see Figure 1). These prototypes demonstrate that the force-directed design approach yields adaptive hands that are simple to control, relatively cheap to build and maintain, and robust and reliable to grasp a large variety of products.

The objective of this article is to demonstrate the application of the force-directed design approach to the development of adaptive hands. It will be shown that different grasp behaviours can be achieved by a judicious choice of the dimensions of the finger phalanges, the distribution of the actuation force to the phalanges, and the placement of mechanical stops and return springs.

**Delft Hand Generations**
Three generations of underactuated hands have been built in the past three years at Delft University of Technology. In each generation, the force-directed design method has been applied to enhance its simplicity, versatility and robustness.

**Delft Hand 1**
A prerequisite for grasping is that the objects as well as the fingers are in stable equilibrium, while the fingers apply compressive contact forces to the objects. In the development of the first generation, the Delft Hand 1 (DH1), the design was mainly driven by the requirement to obtain grasp equilibrium for a large range of object sizes. It was assumed that the hand should consist of three fingers, each having two phalanges of equal length and moving in parallel planes. Cylindrical objects with various diameters were taken as model objects. This allowed simple planar...
mechanism determines that the finger starts to rotate about the first joint, while the second joint starts to rotate when the first phalanx is in contact with the object. All fingers are driven by one motor, of which the torque is distributed by a cable mechanism to each of the fingers (more details can be found in [2]). The performance of this hand can be watched in movie [3].

**Delft Hand 2**

The distribution of the motor torque to the fingers was further studied and simplified in the second generation of the Delft Hand. The distribution of the motor torque by a cable mechanism in the DH1 frequently required maintenance because of breaking end plugs of the cable or cables running off the pulleys. The force-directed design method was applied by drawing free-body diagrams of the driving (i.e. the motor) and driven components (i.e. the fingers). Investigating all moments and reaction moments led to the idea to apply the reaction moment generated by the stator of the motor to drive the finger at one side of the palm, while the moment generated by the shaft of the motor is applied to drive the fingers at the other side of the palm. This caused a major simplification of the interface between motor and fingers. It allowed incorporating the motor in the palm of the hand, and driving the fingers via belt transmission and gears. This resulted in a compact and robust design.

The dimensions of the fingers and the four-bar mechanism that drives the phalanges were also modified based on force analysis to calculate the torques that have to be applied to the phalanges by some actuation mechanism in order to achieve stable equilibrium.

**Delft Hand 3**

To allow grasping small and slender objects by the Delft Hand, it was needed to extend the grasp types the hand can make. The Delft Hand 1 and 2 were designed to envelope all kinds of objects by the fingers, which leads to stable grasps of objects of moderate and large sizes, which can be watched in [3]. Only one motor and no sensors were needed to achieve this performance. However, objects that were too small to be enveloped by the fingers could not be grasped by this hand.

The fingers in the DH1 are driven by a four-bar linkage mechanism (see Figure 1a), which was inspired by the SARA Hand [1]. The length of the linkages is dimensioned such that a (non-constant) torque ratio $T_2/T_1$ is applied to the phalanges that allows grasp equilibrium for a large range of object sizes. The return spring in the mechanism determines that the finger starts to rotate about the first joint, while the second joint starts to rotate when the first phalanx is in contact with the object. All fingers are driven by one motor, of which the torque is distributed by a cable mechanism to each of the fingers (more details can be found in [2]). The performance of this hand can be watched in movie [3].

**Figure 2.** Free-body diagram of a two-phalanged finger in contact with a cylinder.

Analysis of the force and moment balances shows that equilibrium is not limited to a specific torque ratio of $T_2$ with respect to $T_1$, but is already achieved when $T_2/T_1$ is within certain limits. For instance, when the diameter of the object is equal to the length of a finger ($D = 2L$), it can be shown that $3/8 < T_2/T_1 < 5/11$. Indeed, these limits are different for other object sizes. Nonetheless, the lesson learnt is that a precise control of the actuation torques is not necessary to grasp objects. Furthermore, there is no need to apply a separate motor in each joint to generate the actuation torques. A passive mechanism that distributes the torques to the phalanges according to the calculated limits is sufficient to actuate the fingers.

The fingers grasped by the DH2 were automatically pulled towards the palm while the fingers enveloped the objects. This resulted in stable and robust grasps for all kinds of objects of moderate and large sizes, which can be watched in [3]. Only one motor and no sensors were needed to achieve this performance. However, objects that were too small to be enveloped by the fingers could not be grasped by this hand.
Designing adaptive grippers

parallel four-bar mechanism, which is very suitable for a limited range of motion as in a robotic hand.

Discussion and conclusions

This article shows the application of a force-directed design method to create adaptive hands. In this method, the desired contact forces applied by the fingers to the objects are taken as a starting point. Then a mechanism is designed primarily based on the desired moment transmission and distribution from the motor to the fingers, to obtain the desired contact forces. This method has led to robotic hands that can grasp various objects in different grasp configurations without the necessity to actively control all motions and individual contact forces of the phalanges. In fact, each Delft Hand has six independent degrees of freedom, driven by only one motor, which makes it underactuated.

Underactuated robotic hands are designed from a force perspective. The fingers adapt themselves to the shape of the object. The contact forces follow from the configuration in which the object and fingers together achieve grasp equilibrium. This behavior leads to delicate grasps, where the fingers are always in contact with the object and where the contact forces are always within the desired range. Underactuation does not allow the manipulation of the objects, where the orientation of the object within the hand can be actively controlled by the fingers. However, underactuation has the 'power' to yield simple robotic hands that can easily grasp and hold many different objects in a reliable and robust way.

This line of development has led to sufficient interest from industry for starting a spin-off company called Lacquey [4], devoted to developing commercial versions of the Delft Hand for picking & placing fruits and vegetables. Because these kinds of products can not all be approximated by a planar cylinder, e.g. an apple is better approximated by a sphere, Lacquey also concentrates on the question how to orient the fingers in three-dimensional space. It is expected that future research efforts will be directed towards extending the knowledge gained through planer models to three dimensions.

A further simplification in the construction of the DH3 is the 1:1 coupling between the motor torque and the torque applied to the fingers. This is achieved via an additional force-directed design approach resulted in the Delft Hand 3 (DH3), of which the fingers are still driven by only one motor and no sensors, but have the capability to grasp objects either in a precision grasp or enveloping grasp, also shown in [3].

A schematic representation of the two-fold grasp behaviour of Delft Hand 3.

Observation of the fingers of the DH1 showed that precision grasps were possible when every finger acts as one rigid body. In other words, when the distal phalanges can not rotate with respect to the proximal phalanges, objects can be grasped in a pinch grasp. Force analysis was applied to the fingers to obtain the following behaviour, purely based on action and reaction forces and moments: when the tips of the fingers make contact to the object, the distal phalanges remain against their mechanical opening limits. When the initial contact point with the object is somewhere else on the contact surface of the fingers, the phalanges start to envelop the objects to obtain an enveloping grasp like the fingers of the DH1 and DH2. This behavior is explained by the drawings in Figure 3.

Figure 3. Schematic representation of the two-fold grasp behaviour of Delft Hand 3.

grasp small or slender objects, it is required to allow the fingers to grasp objects between the distal phalanges only in a so-called precision or pinch grasp. Delft Hand 1 was significantly better in performing this grasp type than Delft Hand 2, which led to researching how to obtain this two-fold grasp behaviour, without the need for additional motors, sensors or mechanisms. Analysing this behaviour with the force-directed design approach resulted in the Delft Hand 3 (DH3), of which the fingers are still driven by only one motor and no sensors, but have the capability to grasp objects either in a precision grasp or enveloping grasp, also shown in [3].

A further simplification in the construction of the DH3 is the 1:1 coupling between the motor torque and the torque applied to the fingers. This is achieved via an additional parallel four-bar mechanism, which is very suitable for a limited range of motion as in a robotic hand.

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phalanges can significantly influence grasp performance. The shape of the contact surface can also be made adaptive by adding compliance. This means that the rough adaptations are still achieved by an underactuation mechanism in the finger, but the fine adaptation is now facilitated by reshaping the surface of the phalanges.

In recent years, a framework of design guidelines, performance metrics and application examples was made for the implementation of underactuated mechanisms in adaptive robotic hands [5]. This has provided a basis for further research and commercial implementations in the future, which will hopefully lead to a next step in automation.

References
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Engenia intends to set up courses which are unique within the Benelux and which are innovative. To manage this process Engenia has set up an Advisory Board. This Advisory Board consists of nine Benelux professors and they will meet once a year. The first meeting will be on the second day of the Precision fair; the 1st of December 2011. The meeting will be held every year under another presidency.

This year’s president will be:
Dr.ir. Egbert-Jan Sol
Director of Innovation
High-Tech Systems and Materials
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A large-stroke planar positioning stage for vacuum environments

The growing demand from industry for high-precision systems introduces new challenges for positioning mechanisms. High accuracy and repeatability down to the sub-micron scale are not uncommon. This is often combined with extreme environments, like high UV light sources, electron beams or vacuum. This article focuses on the flexure mechanism for a large-stroke planar XY-positioning system. Applications can be found in for example lithography, micromachining or microscopy.

Authors’ note

Ger Folkersma is a Ph.D. student in the field of micro-assembly for optical systems in the group of Mechanical Automation and Mechatronics at the University of Twente, Enschede, the Netherlands. The work described in this article was part of his Master’s thesis at the same university. Steven Boer is a Ph.D. student in the field of multi-body modeling of dynamic systems, also in the group of Mechanical Automation and Mechatronics. Dannis Brouwer is assistant professor in the same group and project manager at DEMCON, based in Oldenzaal, the Netherlands. Just Herder is professor in the same group and associate professor at Delft University of Technology, Delft, the Netherlands. Herman Soemers is professor in the Twente group of Mechanical Automation and Mechatronics and Technology Manager Mechatronics at Philips Innovation Services in Eindhoven, the Netherlands.

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2-DoF flexure-based vacuum environments

Mechanism layout
The specifications for this mechanism state a square workspace of 100 x 100 mm², and a maximum size for the complete mechanism of 500 x 500 x 85 mm³. For high-precision applications, the stiffness of the stage is important, which translates to a minimum natural frequency of 100 Hz, with blocked actuators. Without actuators, this is the third natural frequency of the mechanism, since the first two modes are the desired X and Y planar translations of the end-effector.

A conceptual layout is shown in Figure 1. The mechanism is a parallel kinematic machine (PKM), where two parallelograms in series (E-C-G and G-F-D) restrict the in-plane rotation of the end-effector. An actuator is placed at hinge 2. The remaining degree of freedom (DoF) is restricted by arm-pair A-B, with an actuator at hinge 1. This approach allows placement of the actuators at the base, which reduces the negative effect of the weight of the actuator on the third natural frequency.

The hinge positions are optimised by an algorithm that minimises the total mechanism size and constrains the rotation of the hinges to be within the material stress limits.

Cross hinges
Cross hinges (also known as cross-flexural hinges) consist of multiple-leaf springs mounted perpendicular to each other. Having only one degree of freedom, these elements function like regular hinges, albeit with some travel of the instantaneous centre of rotation. The simplest cross hinge consists of two leaf springs; see Figure 2.

Figure 1. Schematic layout of the mechanism. Flexure hinges are indicated by numbers, connecting arms by letters.

Figure 2. Various configurations of cross hinges.
(a) 2-leaf.
(b) 5-leaf.

Figure 3 shows the stiffness versus the hinge rotation, for the two variations of a cross hinge. The dimensions of the leaf springs are listed in Table 1. The stiffness is calculated in the geometrical center of the cross hinge, with the directions orientated as indicated by the local axes in the figure, where for example CRx denotes the rotational stiffness about the X-axis.
Mechanism design

The mechanism is designed to be exact constraint, which means that there are no over- or underconstraints in the complete mechanism. Overconstraint mechanisms usually have internal stresses due, for instance, to manufacturing imperfections or aligning problems. These internal stresses can influence the dynamics of the system [4], resulting in an undeterministic design and loss of supporting stiffness. Underconstraints lead to internal vibration modes at relatively low frequencies. In exact constraint design, the overconstraints are released at pre-defined locations. Therefore misalignment does not lead to a large internal stress. This ensures the mechanism exhibits deterministic behaviour, even when parts are misaligned.

To examine the over- and underconstraints in this mechanism, at first it is assumed that each arm is rigid, and each hinge releases one DoF. Now each pair of upper and lower arms (AB, CD, EF, see Figure 1) with three hinges (1-4-9, 2-6-10, 3-5-11) releases three DoFs: translations in X- and Y-direction, and one rotation about the Z-axis, see Figure 4.

Without arm G, the end-effector therefore has the same three released DoFs. With the X- and Y-translation actuated, the rotation about the Z-axis should be constrained by arm G. This means this arm should only fix one DoF to be exactly constrained. This is accomplished by a combination of leaf springs, sprites and notch flexures; see Figure 5.

Table 1. Dimensions of analysed cross hinges.

<table>
<thead>
<tr>
<th>Type</th>
<th>H (mm)</th>
<th>L (mm)</th>
<th>T (mm)</th>
<th>Leaf spring height (top to bottom) (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-leaf</td>
<td>85</td>
<td>50</td>
<td>0.5</td>
<td>42; 42</td>
</tr>
<tr>
<td>5-leaf</td>
<td>85</td>
<td>50</td>
<td>0.5</td>
<td>15; 10; 33; 10; 15</td>
</tr>
</tbody>
</table>

Ideally, the stiffness is high in all directions except for the desired hinge rotation CRz, where a low stiffness is desired. This desired situation is best satisfied in the neutral position (zero deflection as shown in Figure 2). However, with increasing deflection the stiffness in all directions, except for rotation about the Z-axis and translation along the Z-axis, drops considerably. This will result in reduction of the lowest unwanted natural frequency of the mechanism when it moves outside the nominal position.

To optimise the supporting stiffness, the leaf springs are divided in multiple parts (see Figure 2b). The rotational stiffnesses around the X- and Y-axis are now higher over the full hinge rotation. This comes at the price of losing translational stiffness in the Z-direction. However, since the expected dominant load at the cross hinges is a moment around the X- and Y-axis, this is of low influence. As a result of the nonsymmetrical geometry, the rotational stiffness of the optimised cross hinge is higher around the Y-axis as compared to the X-axis. This difference is taken into account in the mechanism design, by rotating the cross hinges in such a way that the maximum supporting stiffness is in the direction of the maximum expected load.

Figure 3. SPACAR simulation of stiffness vs. hinge deflection $\phi$, for the two cross-hinge variations.
supposed to be stiff and lightweight. This can be achieved by creating a closed ‘box’ structure [5]. The lower arms (B, D, F) connect hinges 4-9, 6-10 and 5-11. As analysed, two compliances need to be added in these arms. It is chosen to realise a torsion-compliant beam by creating a T-shaped cross section. The other compliance is added with a notch-flexure at one end; see Figure 6.

Actuation and feedback

As indicated in Figure 1, the mechanism is actuated by rotating arms A and C about hinges 1 and 2, respectively. Actuators that introduce friction or backlash are not suitable, and in order to do experiments with the mechanism a direct-drive actuator is required. This actuator delivers a force in one direction, while small motions in the other directions are possible. This allows for modal measurements on the mechanism, without coupling to the fixed world through the actuators. For this purpose, linear ironless motors are modified to have an arc-shaped trajectory by redesigning the magnet yokes; see Figure 7 #7. The (standard) coil units are fixed to the arm. Per arm two motors are used, which makes sure the force is distributed symmetrically about the length axis, and prevents an unnecessary torque on the cross hinges; see Figure 7 #1.

The position of the arm is measured directly at the actuators by optical linear encoders. The steel measuring scale is bent along the same arc as the actuators. This
from the FEM model, the higher modes are mostly vibrating in a direction almost perpendicular to the measurement direction of the encoders and to the actuation direction of the motors. Since the encoders cannot measure the motion of the third mode precisely enough, an additional sensor is needed. An inductive sensor is placed at hinge #9 (see Figure 1) to measure the relative movement of the end-effector in the Z-direction at this point. Also the actuators cannot excite those modes with enough energy to get a good measurement signal. To get a better signal, the mechanism is excited by means of a simple hammer, striking in the same position and direction as the inductive sensor. This measurement is repeated in a grid over the workspace of the end-effector. The third natural frequency is plotted for each position in Figure 11. Maximum frequency of this mode is 105 Hz and it is located in the center of the workspace. This result is close to the simulated natural frequencies from Ansys and SPACAR. Outside the center this frequency drops fast, due to the decreasing supporting stiffness of the cross hinges.

**Conclusion**

In this article the design and evaluation of a 2-DoF elastic stage is discussed. The specification of a third natural frequency higher than 100 Hz has only been met around the central position of the end-effector. Outside this central position, the supporting stiffness of the cross hinges decreases, and therefore the third natural frequency of the mechanism decreases. Ansys FEM and SPACAR models show good agreement on mode shapes and frequencies, but with the current models it is difficult to do accurate modal analysis outside the central position. While this result is not satisfactory according to the specifications, this behaviour was expected beforehand and confirms the theory. The results can be used to get a better insight in the behaviour
For more information and some movies of the mechanism, go to http://goo.gl/HUV6i.

References
Some people might think that modern CNC cutting technology would make old-fashioned craftsmanship redundant, considering that even a child could put a well-made computer program into a CNC machine to start an automatic cutting cycle with the aim of creating a precision product. Nothing is further from the truth, however, given the unpredictable factors that could influence the ideal cutting process, e.g. when trying to achieve a wall thickness of no more than 100 µm, resulting in deformation. Bakker Fijnmetaal in Son, near Eindhoven, the Netherlands, makes full use of the craftsmanship of experienced cutting specialists to overcome the problems that are inherent when deviating from the ideal process.
perfection

New management

As a logical consequence of the new Bakker Fijnmetaal philosophy, a young, inventive and ambitious managing director called Dirk Dona was appointed. As the son of former Philips Research inventor Rine Dona, creating and manufacturing precision technology products is in his genes; see Figure 2. He states that Bakker Fijnmetaal concentrates on cutting technology, in particular milling and turning. Precision honing is a rather new process in the firm, especially for improving the accuracy of long and narrow borings.

Dona: "We want to offer unique solutions for cutting problems. Crossing the boundaries of our precision technology, we create products that seem to be impossible to manufacture. For our medical clients we manufacture products on our precision machines, and finish them by hand using microscopes. We have no qualms about using a wooden stick with abrasive paste to remove nearly invisible burrs that might impact the application. Therefore, it is mostly women doing this work with their keen eyes and perceptive fingers (see Figure 3).

We also have some slightly older, experienced craftsmen, who instruct younger cutting machine operators. They teach them to make small adjustments to the ideal cutting process of CNC programs. Deviations from that process might be due to material deformations by cutting tool forces and generated heat. Other problems we tackle in this way are related to the use of ‘difficult & complex materials’ like oxygen-free copper, titanium, special steels, etc.”

Figure 1. Latest investment at Bakker Fijnmetaal, the Swiss-type automatic turning machine Cincom.

Figure 2. Bakker Fijnmetaal’s director Dirk Dona showing a precision product in the firm’s measuring room with a Zeiss computer-aided measuring microscope.
Co m p a n y  p r o f i l e  B a k k e r  F i j n m e t a a l

Design together
A fine example of a manufacturer and a designer collaborating – in this case Bakker Fijnmetaal and K.U. Leuven University (Belgium) – is the design and manufacture of the frame for a metrological AFM (Atomic Force Microscope). The drawing made by Leuven University of the upper plate of the frame shows position tolerances of 20 µm for most of the borings. Figure 4 shows the final product according to that drawing.

For Bakker, this manipulation stage is a ‘one-off’. However, most of Bakker’s products are manufactured in small or medium-sized batches. The company is fully equipped to work in a 24/24 operation, see the loading robot of Figure 5. The rough blanks of Figure 6 are provided with a kind of dovetail for fixing them on the robot carrousel. Figure 7 shows a CNC lathe, which may also function in connection with an automatic loading and unloading mechanism.

Figure 3. One of the women at Bakker Fijnmetaal packing very small medically applied needles. She is also very experienced in finishing products by hand.

Figure 4. A final workpiece of the AFM frame.

Figure 5. A System R loading robot for feeding rough blanks into a milling machine and taking out the milled products.
As you might expect, information regarding many of the products manufactured by Bakker Fijnmetaal is confidential. Nevertheless, to the interested precision engineer, the pictures in Figures 8 and 9 tell their own story.

**More examples**

As you might expect, information regarding many of the products manufactured by Bakker Fijnmetaal is confidential. Nevertheless, to the interested precision engineer, the pictures in Figures 8 and 9 tell their own story.

Figure 8. Samples of Bakker Fijnmetaal’s areas of expertise.
(a) Automotive parts with a small wall thickness made from brass.
(b) A small part for electronic components.
(c) Milling a product with aluminium cooling fins does not impose any problem.
To conclude

Should craftsman- or womanship really be deemed old-fashioned? Strictly speaking, no. That’s why it’s better to regard Bakker Fijnmetaal’s skilled finishers as an essential addition to modern sophisticated CNC cutting machinery, rather than unjustly viewing their work as old-fashioned.

**Information**

www.bakkerfm.nl
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Precision in Performance
Rapid developments in additive manufacturing

The application areas of additive and 3D technologies are growing rapidly, both in industry and in consumer markets. Major applications can already be found in medical devices, the dental industry, design, art, the jewel industry, machinery, tooling, automotive, aerospace, construction and model architecture. These technologies are also used whenever prototyping, low-volume manufacturing, mass customisation and a shorter time to market play an important role. Access to these techniques for consumer applications is on the verge of a breakthrough. The growing variety of applicable materials, increasing accuracy, larger building volumes and lower costs have improved commercial availability.

However, not enough people are aware of these rapid developments, which enable wider applications of additive manufacturing and other 3D technologies. RapidPro, therefore, is bringing industry and science together to inform visitors about the latest developments and possibilities of the various technologies. RapidPro is the annual event for the entire chain of rapid product development, rapid prototyping and rapid production.

RapidPro visitors include designers, prototyping specialists, technical directors, developers, product managers, purchasing officers, consultants, R&D people and other specialists working in the application areas mentioned above and in other relevant markets. RapidPro 2012 will be held on Wednesday, 25 and Thursday, 26 January 2012 at the NH Conference Centre Koningshof in Veldhoven, the Netherlands.

www.rapidpro.nl

Engenia Advisory Board

Engenia provides academic courses for companies in the high-tech or processing industry. Engenia is part of Mikrocentrum and is situated at the High Tech Campus in Eindhoven, the Netherlands. It runs open registration courses as well as in-company ones all over the Benelux. Engenia’s aim is to run unique and innovative courses within the Benelux. To oversee course development, Engenia has set up an Advisory Board, members of which include Prof. Fred van Houten, Chair in Design Engineering, University of Twente; Prof. Bert Lauwers, Division Production Engineering, Machine Design and Automation, K.U.Leuven University, Belgium; Prof. Daniel Rixen, Department Precision and Microsystems Engineering, Delft University of Technology; and Ir Herman Soemers, Mechatronics Technology Manager, Philips Innovation Services. The board will appoint a new president every year. This year’s president is Dr Egbert-Jan Sol, Director of Innovation, High-Tech Systems and Materials, TNO.

www.engenia.nl

Impression of RapidPro 2011.
In the past, the Swiss were famous for precision in mechanical systems, watch making. Today, the Dutch play a world-class role in precision in High Tech Systems. ‘Dutch Precision’, is the slogan with which the Netherlands wants to claim this leading role in the world. The ‘Dutch Precision’ slogan attracts Singapore, the most competitive country in Asia, to come to the Netherlands and find R&D, technology, manpower and business partners in the Dutch precision engineering sector.

On 14 October, a roundtable discussion was held between SPRING Singapore-Precision Engineering division and the Dutch Society for Precision Engineering (DSPE). This meeting also included the Enterprise Europe Network, Syntens, the Chamber of Commerce The Hague, and other sector-related companies. SPRING Singapore is the enterprise development agency for growing innovative companies and fostering a competitive SME sector.

DSPE

Hans Krikhaar, president of DSPE, welcomed the representatives from Singapore and shared the latest sector developments in the Netherlands by emphasising: “DSPE is the joint effort of a precision engineering community, SMEs, institutes and universities. We aim to promote technology, innovation and knowledge transfer, leading to a professional network with peer recognition”. DSPE is actively promoting the Dutch precision engineering sector via multiple channels, like the Young Precision Network, Supply Chain Program, Summer school, Certification Program and the informative magazine Mikroniek. Hans Krikhaar invited SPRING Singapore’s companies to join the summer school programme for knowledge exchange. SPRING Singapore also welcomed the shipping of Mikroniek magazines to the precision engineering community in Singapore.

Brainport

Hans Krikhaar highlighted the Brainport industries in the Eindhoven region, which was recently appointed the “Intelligent Community of the Year” by the Intelligent Community Forum. Precision engineering and other high-tech clusters are well facilitated in this region. The Brainport industries provide a powerful supply chain base for a worldwide high tech network. Ernst Treffers, Director Business Development of Eindhoven-based Xpress Precision Engineering, presented a case study on his company. Xpress is unique in focusing on probing systems for ultra-precision metrology. It started in December 2007 as a spin-off from Eindhoven University of Technology and has customers in Europe, Asia and the USA. The company is very open to cooperation with Singaporean business partners.

SPRING Singapore

In addition to highlighting the industry trends and developments in Singapore, SPRING Singapore’s Centre Director (Europe) Yee Teck Tan, as well as Manager (Precision Engineering) Michelle Lee also shared on the many common areas of interest and focuses in the precision engineering industries between the Netherlands and Singapore. They also presented the businesses on behalf of ten Singaporean enterprises from the precision engineering sector to the Dutch participants.
Singapore’s geographical location, connectivity to other parts of Asia, as well as its diverse supplier base and well-established R&D infrastructure makes it an attractive location for market access and partnerships. We are a key hub for precision engineering and complex equipment manufacturing, supporting not only the manufacturing sector in Asia but also the global market. Our companies in the precision engineering field have strong engineering and manufacturing capabilities, and are keen to explore partnerships with Dutch companies with strong technologies and design capabilities to jointly serve the Asian and European marketplace.” In view of the increasing activities for the engineering and manufacturing industries in South-East Asia, there are opportunities for Dutch-Singapore business and technology collaborations. SPRING Singapore will follow up with DSPE to explore link-ups with its 300 member companies.

Holland Gateway
This event was organised and facilitated by Holland Gateway. The network point for international business founded by the Dutch government as well as private parties, aims to help creating an environment that is conducive to doing international business, as well as a dialogue for international governmental organisations, knowledge institutions and enterprises.

(report by Kaikai Jing of Holland Gateway)

www.spring.gov.sg, tan_yee_teck@spring.gov.sg
www.hollandgateway.nl

DSPE president Hans Krikhaar addresses the Singaporean delegation.
Upcoming events

29 November 2011, Delft (NL)
Zuid-Holland Instrumentation Event

The focus of the event will be on sensor technology innovation. See also the article on Holland Instrumentation Delta in the previous Mikroniek issue.

www.tno.nl, zie@fme.nl (information)

30 November - 1 December 2011, Veldhoven (NL)
Precision Fair 2011

Eleventh edition of the Benelux premier trade fair on precision engineering. Some 200 specialised companies and knowledge institutions will be exhibiting in a wide array of fields, including optics, photonics, calibration, linear technology, materials, measuring equipment, micro-assembly, micro-connection, motion control, surface treatment, packaging, piezo technology, precision tools, precision processing, sensor technology, software and vision systems. The Precision Fair is organised by Mikrocentrum, with the support of DSPE, NL Agency and media partner Mikroniek.

See the official fair catalogue in this issue.

www.precisiebeurs.nl

30 November - 1 December 2011, Bremen (DE)
Lamdamap 10th International Conference and Exhibition

Event focused on laser metrology, machine tool, CMM and robotic performance.

www.lamdamap.com

25-26 January 2012, Veldhoven (NL)
RapidPro 2012

The annual event for the total additive manufacturing, rapid prototyping and rapid tooling chain. See also the Mikrocentrum page in this issue.

www.rapidpro.nl

27-28 March 2012, Nieuwegein (NL)
Fotonica Event

The sixth edition of the Photonics Event is organised by Mirocentrum and Photonics Cluster Netherlands. The event forms the bridge between new technologies (such as LEDs, microscopy and lasers) and innovative applications, and is targeted at researchers, scientists, entrepreneurs, CEOs, policy makers and science students. Conference themes include Health & Life Science, Information & Communication Technology, Photonics in Daily Life, Lighting, Industrial Photonics, and Solar.

www.fotonica-evenement.nl
**29 March 2012, Veldhoven (NL)**
**Hightech Mechatronica 2012**

Techwatch, publisher of Bits&Chips and Mechatronica Magazine, organises the sixth edition of this event. Research, development and implementation of mechatronic systems are the main themes of the conference and exhibition.

www.hightechmechatronica.nl

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**4-7 June 2012, Stockholm (SE)**
**euspen 12th International Conference and Exhibition**

Conference topics will include:
- Precision Engineering of Plastic based Electronics and Optronics
- Scandinavian Precision Engineering and Nanotechnology
- Nano & Micro Metrology
- Ultra Precision Machines & Control
- High Precision Mechatronics
- Ultra Precision Manufacturing & Assembly Processes
- Important/Novel Advances in Precision Engineering & Nano Technologies

www.stockholm2012.euspen.eu

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**25-28 September 2012, Besançon (FR)**
**Micronora 2012**

The biennial microtechnology and precision trade fair features multiple activities – from assembly, engineering and machining to metrology and nanotechnology – for markets with high technological value, including aerospace, (bio)medical, microelectronics and telecommunications. The event includes conferences and a European technology brokerage event on micro- and nanotechnology. Micronora 2010 attracted over 14,000 visitors and 565 direct exhibitors (200 from abroad), with a further 300 firms or brands represented.

www.micronora.com

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Impression of the euspen 11th International Conference and Exhibition, May 2011 in Italy. (Photo courtesy euspen)

Delft University of Technology, the Netherlands, and previously worked at Philips and ASML. Georg Schitter is professor in Industrial Automation at Vienna University of Technology, Austria, specialised in the control and design of extremely fast precision motion systems. Jan van Eijk is the Delft professor in Advanced Mechatronics and an industrial advisor with experience at Philips.

An in-depth review will be published in the forthcoming issue of Mikroniek.


www.dupress.nl

TNO supports NTS-Group’s developments toward precision

As a system supplier, the Dutch NTS-Group not only provides engineering and assembly services but also produces critical components, using such techniques as precision machining. For that reason, the recently acquired Schaijk-based machining company GMZ Precision was merged with NTS Marts in Bergeijk. Having since moved to Eindhoven, the newly created NTS Precision meets all the precision machining needs of the OEM’s.

To speed up the further development of this precision machining competence, the NTS-Group entered into a joint venture with TNO.

TNO has years of experience with high-precision machining, for which it has its own dedicated machines. TNO’s high-precision Hembrug machine will be moved to NTS Precision, where TNO will instruct employees on its use. The resulting knowledge transfer is very much in line with TNO’s objective. At the same time, the machine will still be available for TNO to carry out research into machining of new materials, for example, keeping TNO’s options open to share the resulting knowledge with other SMEs.

www.nts-group.nl
www.tno.nl
Measuring changes in length in the order of 1/1000 of an atom

TNO researchers have developed a fibre-optic strain sensor that can detect a change in strain in the order of pico-strain. This extremely sensitive sensor is based on fibre laser technology. For a 30mm fibre laser, for example, one pico-strain corresponds to a change in length of one billionth of 30 mm. This is approximately 1/1000 of an atom.

Possible applications for this ultra-sensitive sensor technology can primarily be found in the markets for lithography, space travel, astronomy, defence and the oil & gas industry. In the lithography market, a fibre laser strain sensor system could determine the slightest distortion of critical parts of a lithography machine, thereby ensuring that an even more precise design can be made for better and quicker computer chip production. When developing instruments for space travel and astronomy, there is a constant demand for more stable and fixed instruments such as telescopes. With the aid of the fibre laser strain sensor, distortion can be measured in a significantly better manner and, therefore, also be corrected. By using a fibre laser in a hydrophone array, which would enable submarines to be tracked for example, it is possible to significantly reduce the dimensions and weight of the array whilst maintaining system sensitivity. There is also interest in a hydrophone system for monitoring oil fields.

TNO has a long tradition of developing fibre sensor systems based on fibre interferometry and fibre Bragg grating (FBG) technology. An FBG contains a grating, or screen, that reflects a certain wavelength. When that screen is stretched, the wavelength shifts somewhat. That shift is an indicator for the strain. TNO has developed a detection system for FBG with which subnano-strain can be measured. Along with a specially designed mechanical construction, sensors can be produced for other derived parameters, such as pressure and acceleration. For example, recently TNO presented the smallest FBG pressure sensor in a series for measuring blood pressure in blood vessels, the heart and the brain. However, an even higher sensitivity is required for many other applications, for which fibre laser sensor development was launched in 2010. With the aid of this new fibre laser technology, sensors that are 100 times more sensitive than a standard FBG sensor can be developed and built.

www.tno.nl

TNO’s extremely sensitive sensor is based on fibre laser technology.
Mitutoyo showcased an innovation in the field of optical measurement during the international measurement technology trade fair Control 2011 in Stuttgart – a first for the European market. It combined optical measurement with a ‘white light interferometer’.

The Quick Vision optical systems have been designed for automatically checking medium to large series of products in metrological laboratories and production environments. They produce clearer images with effective border detection. A special projection method enables focusing on surfaces with little contrast. In addition to the optical system, the Quick Vision Hyper WLI model is equipped with a ‘white light interferometer’, a sensor that is capable of recording surfaces with a very high resolution with a single move of the instrument. This makes it possible to recognise, move and turn microstructures and microgeometries on the workpiece surface. The white light interferometer is used for contact-free measurement of the topography of workpieces with a high spatial depth resolution. It can also measure multi-stage surfaces or even rough ones. A measurement accuracy in the order of a few nanometers is possible for smooth surfaces. The combination of a white light interferometer with optical measurement offers major advantages in comparison with stand-alone white light interferometers, as the image recording position can be determined and achieved with high precision. Individually recorded images or scatter plots can be easily combined at a later stage.

www.mitutoyo.nl

Optical measurement system with white light interferometer

Miniature Drive Systems for Aerospace and Aviation
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Solution for difficult-to-measure silicone samples

American company FMI produces molded silicone components for medical applications. Intricate features and key dimensions of tiny silicone prototype and (pre-)production parts are measured optically using a Nikon Metrology iNexiv system. According to FMI engineers investigating parts under Nikon optics and illuminations results in superior digital imaging that guarantees high accuracy, despite the typical light glow covering the transparent silicone material. Automatic iNexiv inspection (based on intelligent search capabilities and pattern recognition, and using fast stage controls) triples measurement productivity and eliminates human error, so Nikon Metrology claims.

Over the years, the complexity of the parts has increased tremendously. FMI invests in state-of-the-art processes and equipment to deliver the sophisticated ultra-clean silicone product required for surgical implantation. “High precision and process validation is key in the medical device business, to make sure critical silicone parts can be confidently incorporated into lifesaving medical devices and state-of-the-art laboratory equipment”, remarks Harold Sant, Engineering Manager for FMI.

www.nikonmetrology.com

The Nikon Metrology iNexiv system generates high-quality images of difficult-to-measure silicone samples.
Long Trace Profilometer

Following the success of similar systems in European synchrotrons, Q-Sys recently secured the contract to supply a Long Trace Profilometer bench to Brookhaven National Laboratory (BNL) in New York, NY, USA. BNL are in the process of constructing NSLS II, a new state-of-the-art light source as a successor to the existing 30-year old facility at the historic Long Island site.

The mirrors used in a light source of this size and power must all be characterised precisely to ensure their performance in steering and focussing the beam. The Q-Sys optical metrology bench is a key tool in this measuring process. The mirrors can be anything up to a meter or more in length with a mass of up to 150 kg. The bench carries the mirror on its lower slide, which enables it to be positioned precisely before each longitudinal scan. Then the specially designed upper carriage scans a pentaprism along the length of the mirror to enable laser instruments to record the surface profile. The solid granite structure ensures a stiff and stable relationship between the two axes and produces a system with a high resistance to minor thermal variations.

The length of travel required dictates a long optical path, meaning that the precision of the motion platform is critical, particularly with regard to angular errors. The system has to measure both flat and curved mirror surfaces in the nanometer range with superb stability and repeatability.

www.q-sys.eu

High-quality laser cutting and engraving

Kern Lasers, a leading manufacturer of large-format laser cutting and engraving equipment, has adapted their systems for the European market. Kern offers a laser system with 150 W laser power, that can cut both acryl and wood (up to 19 mm thick) as well as steel (RVS 1.9 mm and soft steel 2.5 mm thick). The system ensures high-performance markings/engravings with photo-quality. The vast number of 3D functions in the software allow very precise depth control. The systems combine fast engraving speeds and consistent beam power and beam quality over the entire table top for laser cutting and laser engraving.

For Laser 2000, specialised in the distribution of lasers, laser-based systems and other optical equipment, this is a welcome addition to the existing line of laser cutters from Universal Laser Systems.

www.laser2000.nl
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Since almost 25 years, Technolution provides innovative design solutions to major high-tech companies, specialising in the development of innovative and cost-effective technology for complex problems.

Technolution invests time and effort in order to find the path to success for our clients and to help them follow it. Our ambition is to create lasting partnerships with our clients based on joint success. The development of solutions is organised in projects. Clear agreements are made in advance regarding functionality, performance, costs and planning. If desired, we offer feasibility studies and analysis of requirements and specifications. Technolution can also arrange the entire supply chain for the products developed, as well as performing life cycle management.

Passion for technology
Technolution’s employees are technically gifted and have a passion for technology. They like to dig right down to bit level, they work as a team and they are constantly developing new skills. Integrated project management of multidisciplinary teams, including partner companies, is embedded in our development approach. This is the key success factor in devising high-quality solutions to challenging problems within the high-tech industry.

Competences
Solutions developed by Technolution can be found in many market segments, including medical imaging and treatment solutions, semiconductor equipment, professional printing machines, laboratory equipment and utility machines. The applications focus on high-speed data acquisition and data processing, motion control and complex power supplies. We possess years of expertise in complex and innovative designs that require digital data processing using high-speed data paths, mixed-signal electronic designs and high-efficiency power drives.

Motion-control platforms
For the development of high-performance motion-control platforms, Technolution combines its analog-electronics expertise in high-efficiency power stages with its knowledge of position, proximity and velocity sensors. The innovative approach to digital signal processing combines flexibility of model-based software-development tools with the performance and reliability of hard-wired solutions. This way, clients can achieve best-in-class control performance at minimal development costs. Technolution’s solutions can be applied for all sorts of motor drives, including piezo motors. The medical-grade motion-control platforms comply with the most stringent safety standards and are used in treatment systems.

Technolution headquarters in Gouda, the Netherlands.

Information
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Precision Fair 2011

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Trade fair & Conference

30 November and 1 December 2011

NH Conference Centre Koningshof, Veldhoven, Netherlands

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* Image generated from test sample manufactured to have a specific, known lead for purpose of demonstrating the capabilities of the NPFLEX-LA System.
Fast and accurate

**Precision Fair 2011**
Organised by Mikrocentrum, the eleventh edition of the Precision Fair (or Precisiebeurs, in Dutch) will be held in NH Conference Centre Koningshof in Veldhoven, the Netherlands, on 30 November and 1 December 2011. The Precision Fair has grown into the event on precision technology and has already acquired an international reputation.

**Lecture programme**
This year, ‘Fast and accurate’ will be the recurring theme of the main lectures. The set-up of the lecture programme has been changed to accommodate highly topical subjects. Besides lectures by exhibitors, four topics will be covered by renowned keynote speakers: overactuation/actuators, haptic systems, micromanufacturing, and a selection of IOP projects (IOP is the recently finished Innovation-oriented Research Programme Precision Technology, funded by Agentschap NL).

**Technology Hotspot**
For the fifth consecutive year, Mikrocentrum is organising the ‘Technology Hotspot’ at the Precision Fair. Universities, universities of applied sciences and research institutions from the Netherlands, Belgium and Germany will be presenting their research in the field of precision technology and related areas. Scientists will also play a crucial role in the lecture programme. The Technology Hotspot will be supported by Agentschap NL.

**Brokerage Event for SMEs**
For the third year, a Brokerage Event for SMEs from all over Europe will be organised.

**Largest Benelux precision trade fair**
During the trade fair, some 200 specialised companies and knowledge institutions from the Netherlands, Belgium, Germany and other countries will be exhibiting in a wide array of fields: optics, photonics, precision etching, high-precision mechanics (micron range), nanotechnology, micro-systems technology (MST), mechatronics, embedded software, micro-assembly, micro-laser processing, micro-connection, sensor technology, motion control, vision systems, materials (composites, ceramics), precision machining, measuring machines, and piezo technology.

**Date**
Wednesday 30 November and Thursday 1 December 2011 from 9.30 a.m. to 5.00 p.m.

**Location**
NH Conference Centre Koningshof
Entrance Beneluxhal
Locht 117
5504 R M Veldhoven (near Eindhoven)
The Netherlands

**Visitor registration**
You can register for this event and the congress via www.precisiebeurs.nl. After receiving your registration, a confirmation letter will be sent including your badge.

**Free at the Precision Fair 2011**

**Organisation and Information**
Mikrocentrum
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Tel. +31 (0)40 - 296 99 22
events@mikrocentrum.nl
www.mikrocentrum.nl
www.hightechplatform.nl

Visitor information: Jolanda van de Vorst
Exhibitor information: Hans Houdijk
BRANCHE ORGANISATION
61 DSPE
148 DUTCH PRECISION TECHNOLOGY (DPT)
46 FMI PRECISION BV
165 HOLLAND INNOVATIVE BV
65 STICHTING APPLIED PIEZO
190 SYSTEMS / ENTERPRISE EUROPE NETWORK NETHERLANDS
79 WTS BENELUX BV

CALIBRATION
121 CARL ZEISS INDUSTRIAL METROLOGY
54 D&M VACUUMSYSTEMEN BV
50 FARO BENELUX BV
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136 IRMATO
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121 W.J. ROEOFS MEETINSTRUMENTEN BV
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14 ALL MEPP BV
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25 BRANDT FIJNMECHANISCHE INDUSTRIE BV
100 CCM CENTRE FOR CONCEPTS IN MECHATRONICS BV
120 CERATEC TECHNICAL CERAMICS BV
23 CUSTOM SPECIAL TOOLS BV
23 CZL TILBURG BV
54 D&M VACUUMSYSTEMEN BV
114 DOEKO BV
113 DYMATO BV
58 EMMC CC
116 ERTEC BV
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46 FMI PRECISION BV
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6 GERMEFA BV
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172 GILEON TECHNICAL COMPONENTS
49 GREENTech ENGINEERING BV
65 HEINMADE BV
101 HEMBRUG MACHINE TOOLS
6 HFI BV
58 HIPRECISION

HIGH-PRECISION MECHANICS
39 HITECH GROUP BV
164 IAI INDUSTRIAL SYSTEMS BV
129 IBS PRECISION ENGINEERING
111 IGS GEBOJAGEMA
65 IMOTEC BV
179 IPS TECHNOLOGY
136 IRMATO
65 JANSEN PRECISION ENGINEERING
47 KMWVE PRECISION SYSTEMS & PRECISION COMPONENTS BV
10 KUGLER GMBH
55 KUSTERS METAALBEWERKING OSS BV
43 LEMO CONNECTORS BENELUX
156 LEUVEN AIR BEARINGS
162 LEVES METAAL BV
134 MA3 SOLUTIONS BV
167 MAAN GROUP
182 MAGNETIC INNOVATIONS BV
60 MAKE-MACHINING TECHNOLOGIE
38 MARTEK BVBA
169 MASEVON TECHNOLOGY BV
24 MECHA-PHYSICS BV
6 MFK BV
182 MI-PARTNERS
7 MITUTOYO NEDERLAND BV
6 MOGEA BV
163 MTS TECHNOPower
119 MYTRI BV
65 NANOMOTION LTD
175 NEWWAYS TECHNOLOGIES BV
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16 NORMA
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26 NTS-GROUP BV
11 PHILIPS INNOVATIVE APPLICATIONS NV
65 PIEZOMECHANIK GMBH
85 PM-BEARINGS BV
180 PRODUTEC BV
78 QIOPTIQ PHOTONICS GMBH & CO KG
103 Q-SYS BV
160 RENISHAW BENELUX BV
186 RODRIGUEZ GMBH
155 ROMÉDES ENGINEERING BV
158 SARIX SA
75 SCHAFER NEDERLAND BV
187 SIGMACONTROL BV
74 SMARACT GMBH
82 TECHNOBIS GROUP
6 TECHNOLOGY TWENTE BV
134 TEGEMA GROUP
97 TER HOEK VONKEROSIE RIJSSEN BV
57 THE HOUSE OF TECHNOLOGY
107 TRIOS PRECISION ENGINEERING
45 VACUTECH BV
102 WENZEL BENELUX

HIGH-PRECISION MECHANICS
39 HITECH GROUP BV
164 IAI INDUSTRIAL SYSTEMS BV
129 IBS PRECISION ENGINEERING
111 IGS GEBOJAGEMA
65 IMOTEC BV
179 IPS TECHNOLOGY
136 IRMATO
65 JANSEN PRECISION ENGINEERING
47 KMWVE PRECISION SYSTEMS & PRECISION COMPONENTS BV
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182 MAGNETIC INNOVATIONS BV
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103 Q-SYS BV
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186 RODRIGUEZ GMBH
155 ROMÉDES ENGINEERING BV
158 SARIX SA
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187 SIGMACONTROL BV
74 SMARACT GMBH
82 TECHNOBIS GROUP
6 TECHNOLOGY TWENTE BV
134 TEGEMA GROUP
97 TER HOEK VONKEROSIE RIJSSEN BV
57 THE HOUSE OF TECHNOLOGY
107 TRIOS PRECISION ENGINEERING
45 VACUTECH BV
102 WENZEL BENELUX
INNOVATION SUPPORT

6 AALBERTS INDUSTRIES INDUSTRIAL SERVICES
80 ACE STOBDAMPFER GMBH
151 BAKKER FJINMETAAL
117 BKL ENGINEERING BV
100 CCM CENTRE FOR CONCEPTS IN MECHATRONICS BV
54 D&M VACUUMSYSTEMEN BV
124 DEMCON
58 EMCMCC
126 ENERGIEONDERZOEK CENTRUM NEDERLAND
116 ERTEC BV
46 FMI PRECISION BV
185 FRAMO MORAT BV
6 GERMFA BV
49 GREENTECH ENGINEERING BV
65 HEINMADE BV
58 HIPRECISION
39 HITTECH GROUP BV
65 IMOTEC BV
179 IPS TECHNOLOGY
136 IRMATO
65 JANSSEN PRECISION ENGINEERING
47 KMWE PRECISION SYSTEMS & PRECISION COMPONENTS BV
10 KUGLER GMBH
146 LARSEN PREMIUM PRECISION PARTS
133 LASER 2000 BENELUX CV
6 LEMO CONNECTORS BENELUX
6 LEUVEN AIR BEARINGS
162 LEVES METAAL BV
90 LM SYSTEMS BV
130 LOUVERS & HANIQUE
134 MA3 SOLUTIONS BV
167 MAAN GROUP
182 MI-PARTNERS
6 MIFA ALUMINIUM
104 MOLENAAR OPTICS VOF
163 MTS4 TECHNOPOWER
119 MYTRI BV
71 NEITRACO GROUP
175 NEWAYS TECHNOLOGIES BV
30 NIJDRA GROEP (FMI)
65 NOLIAC A/S
16 NORMA
65 NPOINT INC.
26 NTS-GROUP BV
99 OPTIWA BV
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85 PI-M BEARINGS BV
180 PRODUCET BV
78 QIOPTIQ PHOTONICS GMBH & CO KG
103 Q-SYS BV
142 RELANCE PRECISION MECHATRONICS
160 RENISHAW BENELUX BV
155 ROMÈDES ENGINEERING BV
75 SCHAEFFLER NEDERLAND BV
40 SCHNEEBERGER GMBH
42 SCHUT PRECISIONPARTS BV
118 ST Instruments BV
159 STT PRODUCTS BV
82 TECHNOSIS GROUP
6 TECHNOLOGY TWENTE BV
145 TECNOTION BV
52 TESSING SUBMICRON TECHNOLOGY
134 TEGEMA GROUP
97 TER HOEK YONKEROSIE RIJSSEN BV
57 THE HOUSE OF TECHNOLOGY
107 TRIOS PRECISION ENGINEERING
45 VACUTECH BV
102 WENZEL BENELUX
18 WILTING
### LINEAR TECHNOLOGY
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- AEROTECH 87
- ALIO INDUSTRIES 173
- BOTECH BV 103
- CCM CENTRE FOR CONCEPTS IN MECHATRONICS BV 100
- CERATEC TECHNICAL CERAMICS BV 120
- FESTO BV 141
- FRAMO MORAT BV 185
- GLEON TECHNICAL COMPONENTS 172
- HEIDENHAIN NEDERLAND BV 33
- HIWIN GMBH 73
- IEF WERNER GMBH 4
- IKO NIPPON THOMPSON EUROPE BV 127
- IMOTEC BV 65
- IRMATO 136
- LEUVEN AIR BEARINGS 156
- LM SYSTEMS BV 90
- MAGNETIC INNOVATIONS BV 182
- MARTEK BVBA 38
- MASEVON TECHNOLOGY BV 169
- MAXON MOTOR BENELUX BV 2
- MIJNSBERGEN BV 91
- MI-PARTNERS 182
- PM-BEARINGS BV 85
- PROMIS ELECTRO-OPTICS BV 139
- Q-SYS BV 103
- RELIANCE PRECISION MECHATRONICS 142
- RENISHAW BENELUX BV 160
- RODRIGUEZ GMBH 186
- SCHAEFFLER NEDERLAND BV 75
- SCHNEEBERGER GMBH 40
- SICK BV 5
- SKF NEDERLAND 123
- SMARACT GMBH 74
- STAPHUIS LINEAIRTECHNIEK BV 170
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- VARIO DRIVE AANDRIFT EN BESTURINGSTECHNIEK BV 115
- VHE INDUSTRIAL AUTOMATION BV 17
- WENZEL BENELUX 102
- WIJDEVEN POWER SUPPLIES & INDUCTIVE TECHNOLOGY BV 72
- WILTING 18

### MATERIALS (COMPOSITES, CERAMICS, GLASS)
- ACE STOBDAMPFER GMBH 80
- BOTECH BV 103
- CCM CENTRE FOR CONCEPTS IN MECHATRONICS BV 100
- CERATEC TECHNICAL CERAMICS BV 120
- ENEERGEOIDERZOEK CENTRUM NEDERLAND 126
- FONTYS HOGESCHOLEN 192
- FRIATEC TECHNISCH KERAMIEK / GLYNWED 140
- LOUVERS & HANIQUE 130
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- NORMA 11
- PHILIPS INNOVATIVE APPLICATIONS NV 160
- RENISHAW BENELUX BV 75
- SAFFIR, DESIGNERS FOR MANUFACTURING 58
- SKF NEDERLAND 123
- THE HOUSE OF TECHNOLOGY 57
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- AIR-PARTS BV 31
- ALL MEPP BV 14
- ARGON MEASURING SOLUTIONS 41

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- 3TU 195
- AAE BV 94
- AALBERTS INDUSTRIES INDUSTRIAL SERVICES 6
- ANTERYON BV 125
- BORIT NV 35
**PRECISION FAIR 2011 – WHO SUPPLIES WHAT**

| 124 | DEMCON |
| 153 | EFD INTERNATIONAL |
| 116 | ERTEC BV |
| 184 | ESI-CIT GROUP |
| 141 | FESTO BV |
| 183 | FRAUNHOFER INSTITUTE FOR PRODUCTION TECHNOLOGY IPT |
| 65 | HEINMADE BV |
| 194 | HOGESCHOOL UTRECHT |
| 4 | IEF WERNER GMBH |
| 88 | IMS BV |
| 136 | IRMATO |
| 47 | KMWE PRECISION SYSTEMS & PRECISION COMPONENTS BV |
| 10 | KUGLER GMBH |
| 188 | LAYERWISE NV |
| 156 | LEUVEN AIR BEARINGS |
| 134 | MA3 SOLUTIONS BV |
| 167 | MAAN GROUP |
| 169 | MASÉVON TECHNOLOGY BV |
| 166 | MAT-TECH DEVELOPMENT & TESTING AND MAT-TECH PRODUCTION |
| 24 | MECHAPHYSICS BV |
| 175 | NEWAYS TECHNOLOGIES BV |
| 16 | NORMA |
| 65 | NPOINT INC. |
| 106 | OLYMPUS NEDERLAND BV |
| 21 | OPTIKRON GMBH |
| 85 | PH-BEARINGS BV |
| 142 | RELIANCE PRECISION MECHATRONICS |
| 155 | ROMÈDES ENGINEERING BV |
| 40 | SCHNEEBERGER GMBH |
| 42 | SCHUT PRECISIONPARTS BV |
| 74 | SMARACT GMBH |
| 52 | TEESING SUBMICRON TECHNOLOGY |
| 107 | TRIOS PRECISION ENGINEERING |
| 32 | TSG GROUP |
| 45 | VACUTECH BV |
| 18 | WILTING |

**MICRO-CONNECTION**

| 195 | 3TU |
| 6 | AALBERTS INDUSTRIES INDUSTRIAL SERVICES |
| 103 | BOTECH BV |
| 23 | CUSTOM SPECIAL TOOLS BV |
| 126 | ENERGIEONDERZOEK CENTRUM NEDERLAND |
| 116 | ERTEC BV |
| 135 | ILT INDUSTRIELE LASER TOEPASSINGEN BV |
| 88 | IMS BV |
| 188 | LAYERWISE NV |
| 43 | LEMO CONNECTORS BENELUX |
| 134 | MA3 SOLUTIONS BV |
| 166 | MAT-TECH DEVELOPMENT & TESTING AND MAT-TECH PRODUCTION |
| 175 | NEWAYS TECHNOLOGIES BV |
| 52 | TEESING SUBMICRON TECHNOLOGY |
| 32 | TSG GROUP |
| 108 | V.A.C. MACHINES |

**MICRO-LASER PROCESSING**

| 94 | AAE BV |
| 6 | AALBERTS INDUSTRIES INDUSTRIAL SERVICES |
| 87 | AEROTECH |
| 131 | APPLIED LASER TECHNOLOGY BV |
| 23 | CUSTOM SPECIAL TOOLS BV |
| 126 | ENERGIEONDERZOEK CENTRUM NEDERLAND |
| 116 | ERTEC BV |
| 135 | ILT INDUSTRIELE LASER TOEPASSINGEN BV |
| 88 | IMS BV |
| 136 | IRMATO |
| 10 | KUGLER GMBH |

| 133 | LASER 2000 BENELUX CV |
| 86 | LASERTEC BV |
| 188 | LAYERWISE NV |
| 112 | LIGHTMOTIF BV |
| 167 | MAAN GROUP |
| 26 | NTS-GROUP BV |
| 11 | PHILIPS INNOVATIVE APPLICATIONS NV |
| 103 | Q-SYS BV |
| 109 | REITH LASER BV |
| 44 | ROFIN-BAASEL BENELUX BV |
| 108 | TRUMPF NEDERLAND BV |
| 32 | TSG GROUP |
| 108 | V.A.C. MACHINES |

**MICRO-SYSTEM TECHNOLOGY (MST/MEMS)**

| 195 | 3TU |
| 125 | ANTERYON BV |
| 116 | ERTEC BV |
| 65 | HEINMADE BV |
| 194 | HOGESCHOOL UTRECHT |
| 88 | IMS BV |
| 19 | IMT MASKEN UND TEILINGEN AG |
| 10 | KUGLER GMBH |
| 134 | MA3 SOLUTIONS BV |
| 2 | MAXON MOTOR BENELUX BV |
| 175 | NEWAYS TECHNOLOGIES BV |
| 65 | NPOINT INC. |
| 118 | ST INSTRUMENTS BV |

**MOTION CONTROL**

<p>| 195 | 3TU |
| 80 | ACE STOßDÄMPFER GMBH |
| 87 | AEROTECH |
| 31 | AIR-PARTS BV |
| 173 | ALIO INDUSTRIES |
| 100 | CCM CENTRE FOR CONCEPTS IN MECHATRONICS BV |
| 120 | CERATEC TECHNICAL CERAMICS BV |
| 3 | CONTROLLAB PRODUCTS BV |
| 171 | CTech METROLOGY |
| 124 | DEMCON |
| 58 | EMCMCC |
| 141 | FESTO BV |
| 185 | FRAMO MORAT BV |
| 33 | HEIDENHAIN NEDERLAND BV |
| 65 | HEINMADE BV |
| 39 | HITTECH GROUP BV |
| 73 | HIWIN GMBH |
| 65 | IMOTEC BV |
| 136 | IRMATO |
| 65 | JANSSEN PRECISION ENGINEERING |
| 133 | LASER 2000 BENELUX CV |
| 156 | LEUVEN AIR BEARINGS |
| 90 | LM SYSTEMS BV |
| 38 | MARTEK BVBA |
| 2 | MAXON MOTOR BENELUX BV |
| 91 | MIJSBERGEN BV |
| 83 | MINIMOTOR BENELUX |
| 182 | MI-PARTNERS |
| 104 | MOLENAAR OPTICS VOF |
| 65 | NANOMOTION LTD |
| 15 | NATIONAL INSTRUMENTS NEDERLAND |
| 128 | NEWPORT SPECTRA-PHYSICS GMBH |
| 65 | NOLIAC A/S |
| 16 | NORMA |
| 65 | NPOINT INC. |
| 26 | NTS-GROUP BV |
| 11 | PHILIPS INNOVATIVE APPLICATIONS NV |
| 65 | PIEZOMECHANIK GMBH |
| 103 | Q-SYS BV |
| 142 | RELIANCE PRECISION MECHATRONICS |
| 75 | SCHAEFFLER NEDERLAND BV |</p>
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**OPTICS**

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**PHOTONICS**

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**PIEZO TECHNOLOGY**

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**PRECISION ETCHING**

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**PRECISION PACKAGING**

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**PRECISION PLASTICS PROCESSING**

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**PRECISION TOOLS (DIAMOND)**

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Technobis Group, consisting of Technobis Mechatronics and Technobis Fibre Technologies is a developer and supplier of high-tech instruments and modules for OEM companies.

Technobis Mechatronics is specialized in carrying out complete product development projects from an idea to a successful turnkey product, prototype or series product. With more than fifteen years of experience, we have become a supplier of mechatronic systems for companies in a wide range of markets.

Technobis Fibre Technologies is specialized in the development and supply of total solutions in high-speed, multi-sensor fibre interrogators and sensors.

The combination of technologies found within the Technobis Group and the Technology Platform formed with partners is absolutely unique. Working within this platform ensures fast response, high flexibility and optimal solutions for complex multidisciplinary and interdisciplinary challenges.

Come and see us at Precision Fair 2011, booth 82.
The three leading universities of technology in the Netherlands – Delft University of Technology, Eindhoven University of Technology and the University of Twente – have joined forces in the 3TU.Federation. This federation maximizes innovation by combining and concentrating the strengths of all three universities in research, education and knowledge transfer. During the Precision Fair we would like to show examples of research that focuses on technologies that, with precision and sensitivity, can support or take over human action. In our interactive booth located in the Technology Hotspot, you will find a range of research varying from MEMS to Bicycle Dynamics and Telemanipulation to Automated Design Optimization.

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Mekelweg 2, 2628 CD DELFT (NL)
Contact person: Mrs. Lucienne Dado
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www.aalberts.nl

Aalberts Industries NV is a Stock exchange listed international industrial Group with two main activities, Industrial Services (Industrial products and Material Technology) and Flow Control. Aalberts Industries Industrial Services has contacts in several areas of the medical industry, is a longstanding partner of the semiconductor industry, suspension market, a qualified supplier in the aerospace industry and well-known in the automotive industry. The combination of engineering, surface- and heat-treatment and production technologies makes Aalberts Industries Industrial Services the right partner for many industries.

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Contact persons:
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The AAE Group is active in the fields of mechatronics and machine design in 4 different segments. With the recent expansion of our facilities, including an ISO7 Cleanroom of 10.000 m² we offer tailor-made solutions for a wide range of industries.

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State-of-the-art turning, milling and micro laser competencies guarantee quality results, with maximum flexibility at highly competitive prices.

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benelux@ace-int.eu
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Aerotech delivers the essential micro and nano positioning performance for demanding precision engineering applications across all areas of manufacture and research.

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With over 100,000 positioning axes installed world-wide, Aerotech provides low cost of ownership solutions for challenging motion control in semiconductor, flat panel, medical device, life science, laser processing, electronics manufacture & test, photonics, solar panel, automotive, military/aerospace, and many other markets requiring high precision, high performance motion control solutions.

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Advanced Chemical Etching Ltd. is a manufacturer of metal components by means of photochemical etching. With varying complexity, thickness, form and finish we produce components from a simple round shim to complex high pin count semiconductor leadframes. Technical support is of paramount importance for ACE. We constantly develop new processes for etching of special metals such as titanium, tungsten, molybdenum, hastelloy, constantan and tantalum. Starting from data we produce fully functional, formed, heat-treated and plated first samples within a matter of days.

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Airconet is a service providing company, certified with ISO 9001, VCA and STEK. Airconet is specialized in sales, rental, service and engineering of compressed air systems of amongst others Boge and Ekomak compressors and industrial process cooling of amongst others MTA waterchillers and liquid coolers. Airconet rents, designs and builds various compressed air and cooling systems and provides service and maintenance to all compressed air and cooling systems.

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• high, medium and low voltage;
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• military applications and equipment.

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Contact person: Mr. M. Klomp
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www.airconet.nl

ALL MEPP BV

All MEPP BV develops and builds high-tech systems, special machines and tooling according to client’s specifications.

We offer mechatronical engineering services, from concept design to test first products. Our experience is to combine high precision technologies with our years of manufacturing and assembly knowledge. We are able to engineer directly these advantages in the first handling, motion and test systems.

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11919 West I-70 Frontage Rd.
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Wheat Ridge, Colorado (USA)
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Mr. André Lammertink
T 001-303-3397500
marketing@groneman.nl
www.alioindustries.com

ALUMECO NL 147

AlumecoNL is een groothandel in aluminium halffabrikaten, gespecialiseerd in materialen voor de verspanende industrie. Wij leveren rond-, vierkant- en platstaf in diverse legeringen uit voorraad, desgewenst op maat gezaagd. Daarnaast hebben wij zeer uitgebreide mogelijkheden in platen op maat gezaagd, in diverse legeringen tot en met een dikte van 1.200 mm.

ALUMECO NL
Ketelmeer 25, 5347 JX OSS (NL)
Contact person: Mr. M.J. Huitink
T +31 (0)412-654430
moh@alumeco.nl
www.alumeco.nl

ANTEYON BV 125

Anteryon BV has been active in making, processing and assembling high quality glass or ceramics optical elements since 1943. We have access to the best research facilities like Philips Research Laboratory and Philips Applied Technologies. Anteryon’s specialty is creating solutions by using precision glass processing technique for industrial, imaging, telecommunication and microsystems. Anteryon is a high-tech company with innovation, precision, creativity and customer service as company values for products and process. Within Anteryon there are 3 different product groups, each with their own product specialty and can therefore produce a large range of products can be produced. See www.anteryon.com.

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Contact person: Mr. Jos Janssen
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Avantes is a leading manufacturer of fiber optic spectroscopy instruments and systems with almost two decades of experience developing customer-defined spectrometer configurations. With a long history of consulting with clients across diverse industries and applications, Avantes is an experienced partner, equipped to guide customers who want a solution tailored to their application and research needs.
Axxicon Moulds Eindhoven initially started in the moulding of micro- and nanostructures by manufacturing the very first moulds for producing optical storage media in the early 80’s. Axxicon is able to produce precision components by turning, grinding, lapping and polishing in climate controlled production facilities. Polished surfaces from Axxicon can reach roughness values of less than 5 nm. Such specific values are critical for optical quality. Axxicon uses its knowledge in the area of injection moulding of ultra-flat, high-precision parts. Our unique selling point is the replication of microstructures like microfluidic structures.

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c.schapendonk@bstechnology.nl
www.bstechnology.nl

Bakker Fijnmetaal produces fine mechanical parts for a wide range of constructions, components and applications. These precision components are meticulously produced and widely tested before they leave our factory. Our completely automated machinery guarantees you a short lead time and cost-efficient production. The materials used include copper, brass, stainless steel, aluminum, titanium and various plastics.

Bakker has an assembly hall and a clean room. Bakker Fijnmetaal’s experienced professionals carry out the assembly work. All the means required to clean and assemble your products are there.

To develop customer-specific products, Bakker Fijnmetaal uses CAD software to draw your design. If necessary, Bakker has the use of an engineering department. From first idea to final product, Bakker Fijnmetaal is able to help you.

B&S Technology specializes in the design and manufacture of dies, moulds, high precision components and assembled products in the high quality segment of the market. In doing so, B&S offers a total solution and plays an influential role throughout, from the development of a product through to maintenance and after-care. Our customers are found mainly in the market segments of microelectronics, medical pharmaceuticals, automotive, and the glass and packaging industries.

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3905 KL VEENENDAAL (NL)
Contact person: Mr. G.J. Bender
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info@bendertechniek.nl
www.bendertechniek.nl

For this exhibition Bendertechniek will focus on milling and mill/turning for the high-end Japanese Matsuura machines. With examples pieces from several respected Dutch Matsuura users Bendertechniek will show the possibilities of the very high accuracy of the Matsuura machines.

Besides a wide range of different spindles Matsuura also offers big toolchangers and palletsystems on almost all the horizontal, 5-axes and Cublex (mill/turn) models. Together with the superb reliability of all the Matsuura models this will guarantee a high productivity and return on investment and one of the best accuracies available in the world.

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We are specialised in working with high-performance plastics such as PEEK, Semitron ESD, Torlon and PEI with properties that include, for example, a high-temperature resistance. This means we can work with even more precision and enable our customers to achieve even lower tolerances.

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BKL ENGINEERING BV
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BORIT NV
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BKL Engineering originates from a traditional engineering company, established in 1983. Our company focuses on the engineering and production of special machinery with a specialization in customer specific tooling.
An important part of the tooling is special hoisting equipment. BKL is unique in this field as we cover the full range the OEM may need: development – production – maintenance/repair – inspection – certification.
Inspection is done according to the international standard ISO/IEC 17020 under supervision of the Dutch Accreditation Council (RvA). On request of our customers we can be held CE responsible for the tools they use.

BORIT NV
Borit’s technology Hydrogate of sheet metal products is based on hydroforming and offers high flexibility, excellent quality and high productivity. We support customers from the early design stage through material and coating knowledge, with state-of-the-art testing and characterization equipment and with a profound knowledge of flow fields.
- Plates for (Compact) Heat Exchangers
- Cold Plates & Cooling Plates for liquid or gas cooling
- Half shells for electronic equipment, phones, digital cameras, medical equipment and implants
- Cold plates for high-power electronics
- Bipolar plates and interconnectors, Fuel Cells

BOTECH BV
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BoTech provides complete solutions in large and stable high-precision bases, supports and moving parts. We are a high-tech company that specializes in the design, manufacturing and assembly of precision machine components and assemblies. We have over 25 years of experience in products in granite, metal, carbonfibre-epoxy, ceramics and combinations of these.

Our products are used in numerous applications, often combined with airbearings. Our extensive manufacturing facility contains numerous advanced CNC-machine centers for a large range of products, up to 2.5 x 7 meters in one piece. In our conditioned production and assembling areas the products are finished to micron-precision accuracies.
Brainport Industries connects all suppliers in the high tech systems value chain concentrated in the Brainport region around Eindhoven. In a unique ‘open supply chain’ model, these companies supply complete machines, (sub-)systems, modules and components to worldwide leading high-tech OEM companies. Some examples are the wafer steppers of market leader ASML, the world’s most precise electron beam microscopes of FEI Company and the highly intelligent medical equipment of Philips Healthcare.

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Brandt Fijnmechanische Industrie in Almere (NL) is a supplier and partner for the fine mechanical industry. The portfolio includes the manufacturing of mechanical products of various components in different forms, sizes and materials of complete prototype and serial parts. Additionally Brandt FMI is specialized in assembly, support, modification, overhaul and repair of machined parts, assemblies and equipment to customers specifications for aviation, space, defense and industrial applications. The strength of the organization is based on the guiding principle: “Vision on Precision”. Highest quality and precision are the business philosophy. Our processes are AS 9100 Revision C - EN 9100:2009 certified.

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Measuring solutions from Carl Zeiss ensure quality in precision manufacturing. Carl Zeiss Industrial Metrology is the world’s leader in Coordinate Measuring Machines (CMMs) and complete solutions for multidimensional metrology in the metrology lab and production. Our product line ranges from horizontal-arm and bridge-type measuring machines to form, contour and surface measuring instruments. In addition to this extensive range of precise measuring solutions, we support our customers with consultancy, project management and technical services like training, calibration and (re)programming. Our measuring house in Best (near Eindhoven) offers contract measurements, e.g. uncertainty measuring, tolerance analyses, R&R studies, reverse engineering and tomography.

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CCM CENTRE FOR CONCEPTS IN MECHATRONICS BV

Our main focus is on the appropriate functionality, performance requirements and time-to-market, without ever losing track of product cost price and development costs. In all project stages, from concept development up to realization and sustaining, CCM can be involved and can provide a competent and professional contribution.

Projects that have been realized cover almost the entire field of mechatronical designs and engineering (including optics and information technology).

You are most welcome to visit our stand.

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CCM has a long experience in inventing original concepts and is able to realize the entire development process up to a finished product or production equipment.

Bruker Nano Surfaces Division presents metrology systems:
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Ceramic materials offer unprecedented possibilities for many industries, especially when products and components with extreme material properties are required. Ceratec Technical Ceramics BV has specialised in industrial technical ceramic components since 1983. Ceratec’s strength lies in the complete formula of problem analysis, development (SolidWorks & Cosmos), prototyping (green shaping & sintering) and production (state-of-the-art grinding machines).

During the fair, Ceratec will show her latest ceramic developments in the following industries/applications; Mechatronics, Semiconductor, Piezo, Solar, LEDs, Ceramic Composites and Micro Valves. Properties such as low density, high stiffness, wear resistance, electric insulator, smooth surfaces make ceramic components successful.

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Connect 2 Cleanrooms is proud to support a range of industries, both locally and internationally, with critical contamination control solutions. Our freestanding modular cleanrooms are integral to client’s processes. We offer bespoke products to suit each application; utilizing in-house design and engineers to manage every aspect of each project.

Working together with Connect 2 Cleanrooms, ProCleanroom have made a huge impact on the cleanroom market, distributing and supporting cleanrooms throughout the Netherlands and Belgium. Their expertise, knowledge and customer-friendly approach have enabled them to develop many satisfied customer relationships.

Visit Connect 2 Cleanrooms & ProCleanroom on Stand 189.

CONTROLLAB PRODUCTS BV
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De besturing van machines wordt niet meer in de werkplaats ontwikkeld maar achter het bureau. Pas bij de eerste test van het prototype wordt duidelijk wat dat voor ellende oplevert. Controllab Products levert de gereedschappen en kennis om probleemloze machinebesturingen te ontwikkelen. Modelgebaseerd ontwerpen is de methode om al in een vroeg stadium besturingen te ontwikkelen in een kortere tijd.

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CONTROLLED VONK TECHNOLOGIE BV

Controlled Vonk Technologie (C.V.T.), boasting over 30 years of experience, is a true EDM-specialist. We know all the tricks of this special machining method and provide our customers with the most efficient solutions in high accuracy production. Our machines run almost autonomously allowing 24/7 production schedules. Because of this we have more machines than employees allowing us to work at a surprisingly competitive price level. EDM-machining represents a world of production possibilities which are continuously expanded. We are more than happy to share our knowledge with you and together with our customers often find innovative solutions to challenging problems. Interested in what C.V.T. can do for you? Just call +31497 - 541 040.

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CUSTOM SPECIAL TOOLS BV

Founded in 1994, Custom Special Tools is an international partner for special machining (jobber) and repairs on high-value technical components. Our services includes e.g. certified laser-welding, micro-welding, TIG-

welding, lapping, polishing, precision machining, high speed milling, EDM, precision grinding and superfinishing. All our processes and treatments are executed complying to ISO 9001:2008 and customer specifications. You can find more information at: www.customspecialtools.nl.

In 2011 Custom Special Tools has upgraded its machine park with a new Trumpf Trulaser station 5010 (laser welding), a Sodick AQ 900L (wire EDM), a Sodick AQ 750LH (wire EDM) and 2 Jung C630-CM (CNC-grinders).

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CTECH METROLOGY

CTech Metrology specializes in software solutions for spatial dynamic measurements.

CTrack is the next generation real-time 3D/6DOF tracking software. It serves applications where 3D and 6DOF motion tracking are needed in real-time.

Typical examples can be found in the area of structural testing, guided assembly and very particular ship-model tracking in towing tanks.

The real-time capabilities of CTrack allow both easy integration in a data acquisition network as well as closed-loop-position-feedback control.

CTECH METROLOGY
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In 2011 CZL Tilburg introduces ‘Blackprotect’ Black Nickel. The R&D department has succeeded to develop a perfect black coating which is 100% free of Chromium (VI), Lead and Cadmium. The black nickel phosphorous layer can be applied in optical instruments, as light absorbing material and for decorative purposes. For over 30 years CZL Tilburg provides surface treatments and repairs high-value technical components. Our services includes e.g. HP-HVOF, SuNiCoat® Optics, Diarc® Diamond Coating, Dicronite® Dry Lubrication, MCP®, Blackprotect Black Nickel, hardchrome, electroless nickel, black oxidizing, cleanroom packaging, cylindrical/flat grinding and superfinishing. All our processes and treatments are executed complying to EN/AS-9100 and customer specifications.

D&M VACUÜMSYSTEMEN BV

D&M Vacuum systems is specialized in offering turn-key solutions for (high-quality and complex) vacuum systems. D&M Vacuum systems’s competitive advantage is that we are able to offer all vacuum-related knowledge and services from internal sources (e.g. Engineering, CNC Manufacturing, Assembling and service), creating the best and most cost-effective solutions for our wide range of clients.

D&M is a reliable and independent partner that has a specialized knowledge of high-end applications and related processes. To create this knowledge, D&M has its own engineering department, service workshop and CNC production facility (for prototypes and smaller series) with an experienced team of vacuum specialists. With these competences, D&M has received confidence and credits from various prestigious companies and institutes.

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D&M VACUÜMSYSTEMEN BV

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DEMCON realizes high-tech mechatronic systems and products through research, development and production. With its mechatronic approach to design, DEMCON generates high-end solutions for complex issues in various markets, ranging from semicon and medical to life sciences and defence. DEMCON supplies advanced systems to leading OEMs and is an excellent partner for small and medium-sized enterprises in the introduction of their innovative products to existing and new markets.

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DSPE
The Dutch Society for Precision Engineering (DSPE) is a community of precision engineers in industry, university and institute. The mission of DSPE is to stimulate precision technology knowledge innovation, knowledge transfer and networking between professionals. Members of DSPE are companies, institutes and universities that are active in precision technology. The major players in the Netherlands are member of DSPE.

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DIAMOND KIMBERLIT BV
The Diamond story begins in 1958 with the processing of super hard materials. Diamond systematically expanded and perfected the know-how of precision mechanics. With a strong sense of diversification and the appropriate flexibility, the company developed to a leading manufacturer in high-precision components to connect fibre optics in the field of telecommunication and photonics. Diamond has a wide range of standard and special products. As well as the necessary dynamic to solve individual customer challenges quickly.

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DOEKO BV
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Dymato is supplier of high-tech CNC lathes, machining centres, grinding centres and EDM systems. The high-quality machines from Röders, Mitsubishi, Handtmann, Hanwha and Hyundai-Kia provide high cutting speed, highest accuracy and the most advanced control systems. Innovative solutions and customer orientated developments result in reliable product lines that give you an advantage in your search for higher accuracy and efficiency.

Some examples: Röders HSC milling in HRC64 with accuracy better than 5 μm, jig grinding better than 3 μm. Mitsubishi wire eroding system using a 0.05 mm wire diameter to produce miniature parts as used for eye surgery and other applications.

**DYMATO BV**

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EMCMCC provides design support to solve power integrity, signal integrity, EMC and wireless application issues. Support can be given from IC design up to container handling installations and everything inbetween, from circuits design to cabling and installations.

**EMCMCC**

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Engineering & Services is the technical support and development group of ECN. This group of about 100 employees supports you in designing, engineering and realizing of experimental installations, prototypes and high-tech components. E&S conducts materials research, takes care of data acquisition, data processing and visualization and realizes scientific and technical software. Besides ECN, this group supports innovative institutes and companies.

Recently, ECN started the Metal Injection Moulding activities. With the MIM process it is possible to produce complex shaped metal parts in small and bigger series. The ECN laser fabrication activities are broad divided over the different wavelengths and we can support you in optimizing your production.

E&S is the problem solver for technological challenges.

**ENERGIEONDERZOEK CENTRUM NEDERLAND**

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The principal association for precision cutting in the Netherlands. The companies affiliated with Dutch Precision Technology guarantee expertise, quality, flexibility and effective cooperation – at prices that are in line with the market. The companies affiliated to it mean that Dutch Precision Technology (DPT) has top specialists for all kinds of precision processes, combined with options for assembling parts into composites and/or complete systems or products.

**DUTCH PRECISION TECHNOLOGY (DPT)**

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ENGENIA
Engenia is supplier of courses on an academic level for companies within the technology industry or process technology. Engenia is part of Mikrocentrum and is situated at the High Tech Campus in Eindhoven. Courses with open registration as well as in-company courses are scheduled all over the Benelux. Engenia can also be found on Foursquare, LinkedIn and Twitter.

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SYNTENS / ENTERPRISE EUROPE NETWORK NETHERLANDS
The Enterprise Europe Network is the largest information and consultancy network in Europe. The aim of the network is to help small business to make the most of the European marketplace. Enterprise Europe Network is a focal point network consisting of 600 organizations – chambers of commerce, regional development agencies, university technology centers, where about 4,000 professionals are working in over 40 countries worldwide. Enterprise Europe Network Staff assist small business in sourcing new business & technology partners in Europe and advise them on accessing EU Funding.

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ESI-CIT GROUP

ESI-CIT Group, consisting of ES International, CIT Engineering and Dutch daughter company T&M Solutions, designs, builds and installs customer-specific, hi-tech testing, measuring and control systems. Currently, our company employs more than fifty employees in our Hasselt, Arnhem, Eindhoven and Wroclaw locations. We are active across Europe and in a whole range of sectors, from automotive, food and telecommunications to the glass, graphical and diamond industries.

ESI-CIT Group stands for:

• Designing unique T&M solutions.
• Building customer-specific test, measurement and (micro-)assembly systems.
• Developing solutions, from individual modules to turn-key solutions.

ES International’s main objective is to be a concurrent engineering partner that offers added value to the applications and products of its customers.

ETCHFORM BV

ETCHFORM BV

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ETCHFORM BV provides customized solutions for metal precision parts to international high-tech industries.

• Production of thin metal precision parts by means of precision etching & electroforming.
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• In-house R&D facilities.
• Additional surface and heat treatments as well as precision mechanical, assembly and logistic services can be offered.

Possible applications: apertures, (contact) springs, deposition masks, encoder discs, filters & meshes, flow sensors, fuel cell plates, grids, ink-jet nozzles, masks, medical implants, meshes, screens, shims, (solar cell) connectors, vaporizer nozzles.

ETHEL BV

ETHEL BV

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EURO-TECHNIEK EINDHOVEN BV

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Euro-Techniek is a specialist in metal forming and plastic molding. In these areas we take care of product and process engineering, design and build tooling, and manufacturing of components by molding and forming. Unique is the combination of these activities under a single roof. We are a technical driven company, take pride in our craftsmanship, knowledge and equipment. We work efficient and effective, resulting in high delivery accuracy, and a low level of complaints. We keep our overhead low with a short chain of command. We are ISO9001 and ISO13485 (medical) certified, and additionally are familiar with ISO-TS16949 (automotive), and HACCP (food).
**FARO BENELUX BV**

**FARO** (NASDAQ: FARO) develops and markets computer-aided coordinate measurement devices and software. Portable equipment from FARO permits high-precision 3D measurements and comparisons of parts and compound structures within production and quality assurance processes. The devices are used for inspecting components and assemblies, production planning, and inventory documentation, as well as for investigation and reconstruction of accident sites or crime scenes. They are also employed to generate digital scans of historic sites. Worldwide, approximately 10,000 customers are operating more than 20,000 installations of FARO measurement systems.

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**FESTO BV**

Festo is a leading world-wide supplier of automation technology and the performance leader in industrial training and education programs. Our aim: maximised productivity and competitiveness for our customers. Around 100 new products launched every year and some 2,900 patents world-wide are a clear indication of the company’s innovative strength. For our 300,000 customers around the world, we are always close at hand. Festo’s 13,500 employees in 176 countries ensure progress in the production of capital and consumer goods – day in, day out. Festo pneumatic and electrical automation technology stands for innovation in industrial and process automation. The principle of sustainability underpins all Festo’s activities and vision.

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**F.I.V. BV**

F.I.V. in Cuijk, the Netherlands, specialises in the manufacture of small-series turned and milled components from all of the most commonly used materials, with a focus on stainless steel. Thanks to the flexibility of its organisation, its top-of-the-range machinery and the technical expertise of its workforce, FIV is able to offer its customers high product quality and short delivery times.

FIV’s customer base boasts a number of high-profile companies operating in the food and luxury goods industry, apparatus engineering, die-making, the aircraft industry and mechanical engineering in general.

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HELMUT FISCHER MEETTECHNIEK BV

Helmut Fischer is a leading supplier for measurement equipment in the field of coating thickness measurement, material analyses, micro hardness testing and material testing. Fischer provides solutions for both your production environment and R&D laboratory with ED-XRF, instrumented micro and nano indentation, eddy current, magnetic induction, beta-backscatter and many more. Applications in the field of high reliability, RoHS screening, CIGS Solar thin film, wafer production, precious metal analyses can be solved with the advanced FISCHERSCOPES X-RAY systems. Represented all over the world, Fischer guarantees high quality, local support, honest advice and excellent service for its customers.

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Newport’s latest innovation in high precision motion control technology, the FMS Series of precision linear stages, deliver performance as strong as steel. Addressing the unique needs of surface metrology applications for smooth motion, low noise, high straightness and flatness, the FMS linear stages run highly flat and straight and combined with steel construction enable higher accuracy performance than aluminum stages.

- All-steel construction combines high stiffness and thermal stability resulting in robust and repeatable measurements
- Anti-creep crossed roller bearings provide exceptional straight and smooth motion, reducing measurement noise and eliminating measurement variability
- Nominal speed of up to 100 mm/s for improved throughput

The FMS linear stages are exceptional solutions for applications in surface metrology, surface profilometry and tribology.

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To receive a free catalog, register at www.newport.com/resource2011

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FMI Precision was originally a manufacturer of stamps, dies and moulds. Gradually the company developed into what it is today: a specialized manufacturer of one-off to medium-sized batches of fine precision components. FMI Precision works with extremely complex materials such as Hastalloy, Inconel, Duplex and other exotic materials. We manufacture the most accurate and/or complex components in the FMI group and make the impossible possible. FMI Precision delivers products for the semiconductor, oil and gas, petrochemicals, aviation and space branches.


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F. Morat (sister company) develops and manufactures customized solutions for individual tasks. We draw from our nearly 50 years of experience in precision injection molding.

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Framo Morat BV
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The department of Mechatronics is a knowledge center within the Fontys University of Applied Sciences. At the department there is knowhow about mechanical engineering, physics, computer technology and electrical engineering. The department of Mechatronics collaborates with companies in the area that have applied sciences as field of interest.

Typical research projects are "Composites in Mechatronics" and "Remote Robotics". An overview of these projects will be shown on the fair.

Fontys Hogeschool, Avans Hogeschool and Hogeschool Utrecht will be sharing a booth.

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Fraunhofer IPT is home to a wealth of expertise and experience in all aspects of production technology. At this year’s Precision Fair Fraunhofer IPT will exhibit a selection of samples for micro and precision components that can be manufactured by using high/ultra precision diamond machining processes such as Fast-Tool-Servo turning, (micro) milling, fly cutting and planning. This includes components with microstructures on freeform surfaces, mold inserts with nickel-phosphorous coatings, and large-area components with microstructured surfaces. Fraunhofer IPT will also demonstrate its capabilities concerning the process chain for the production of polymer optics and glass optics.

The roots of Machinefabriek Gebrs. Frencken (MFE) date back to 1947. Since then, a large number of our customers have been served with the supply of high-end precision mechanical machined parts and complex sheet metal products. When you need high-mix, low-volume products that require skills and craftsmanship, MFE is your preferred choice. MFE is an absolute leader in co-designing and making intelligent combinations of sheet metal and machined parts, joined together to form rigid frames or construction elements. For very small parts with extreme requirements with regard to shape and dimensions, MFE can be considered a leader in the industry.

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**GELDERBLOM CNC MACHINES BV**

OKUMA Machines are famous for their reliability and quality and therefore a perfect partner for automation. Gelderblom not only delivers standard machines but specializes in delivery of turnkey production cells that contain an Okuma CNC Lathe and/or Machining Center. It is our aim to add value for our customers in order to realize highly efficient and profitable production capacity.

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**GIBAS NUMERIEK BV**

In recent years Gibas has developed into one of the largest importers of machining tool centers within the Benelux. Besides stand-alone machines Gibas delivers a large number of turn-key projects including within the Automotive industry and suppliers to the metal industry.

In 2010 Gibas expanded its activities with a new department Gibas Tools specialising in cutting tools and accessories and also a number of suppliers of Swiss precision machines.

Gibas is divided into 4 main disciplines:

- Gibas Numeriek: Production and precision machines
- Gibas Automation: Automated production systems
- Gibas Tools: Cutting tools and accessories
- Logistics: Transport of machines

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Franke develops and produces Antifriction Bearings and Linear Systems, which are precisely adjusted to suit the needs of customers. We are experts in special bearings when it comes to Antifriction Bearings. The design with grinded race rings results in an extremely compact bearing which suits very small spaces. The choice of design and material for the surrounding component is flexible. We produce bearing solutions. The modular design of our Aluminium Linear Systems enables us to fulfill diverse customer wishes regarding low weight, high speed and silent running for maintenance-free and clean operation. We produce linear guides and complete systems.

The GloveQb system is a solution to integrate controlled and gastight atmospheres to your application, characterized by endless possibilities for expansion and adaptability. The basis for these properties is the 3D-modular construction system. A unique technique that allows you to design a fully controlled atmosphere for your experiments or processes. Interfacing your existing instrumentation to a GloveQb system is easily realized by using a modular panel with the appropriate connectors, for example standard CF or ISO connections or specially designed connections for your application. GloveQb has extensive experience with interfacing applications.

GlovesQb: Adaptive, modular, standard, customized and quickly deliverable.

GRIATEC is one of the most specialized manufacturers of ceramic components out of pure oxides, their registered trade mark is FRIALIT®DEGUSSIT®. Technical ceramics can be applied in various industries, laboratories, technics of measurement and regulating, machine building (O.E.M.), electrical engineering and electronics. Besides a large scale of standard products, custom-made products can be manufactured in alumina oxides, zirconia oxides, silicium nitride and silicium carbides.

As associated firm of FRIATEC, Glynwed is responsible for consulting and sales of FRIALIT®DEGUSSIT® ceramics. A variety of ceramic components of FRIATEC is presented on booth number 140.
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“Good collaboration with the client forms the basis for quality thinking.” Since 1980, this business philosophy has provided G.M.I. with an undisputed reputation. The development and production of both high-grade moulds and precision mechanical components involve accuracy and reliability. This requires two parties that can implicitly trust each other’s expertise, innovative thinking, operational speed and flexibility. High quality is not just achieved by continuously probing the limits in our own business but also by collaborating with our customers to find the best solution.

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**GEREEDSCHAPMAKERIJ GMI BV**
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**GREENTECH ENGINEERING BV**

To implement the customers’ business strategy, GreenTech Engineering is offering industrial engineering services, project realization, specific equipment and turnkey commissioned production solutions. From consultancy into project results and from specification into realization. Delivering tailor made solutions including project management and capacity. Our focus is industrialization of new technology by 6 sigma methodology and reliability engineering. Bridging the gap between 1st time right and never a failure again. Access to experience will accelerate your business.

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**W.L. GORE & ASSOCIATES GMBH**
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HEIDENHAIN NEDERLAND BV

HEIDENHAIN develops and manufactures linear and angle encoders, rotary encoders, digital readouts, and numerical controls. HEIDENHAIN supplies its products to machine tool builders and manufacturers of automated machines and systems, in particular for semiconductor and electronics manufacturing.

Worldwide presence
HEIDENHAIN has always sought a dialog with science and research on the one hand and with users and customers on the other. Today, HEIDENHAIN is represented in more than 50 countries – most of them with wholly owned subsidiaries. Sales engineers and service technicians support the user on-site with technical information and service in the local language.

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HEINMADE BV

HEINMADE focuses on development and supply of piezo ceramic solutions. To enhance your development process, we provide piezo components and (sub-) systems, give support or develop a customized solution. HEINMADE closely works together with Nanomotion, Noliac and Piezomechanik, which are all leading in their specific piezo technology field for known quality and performance.

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HEMBRUG MACHINE TOOLS

Hembrug is the specialist with more than 40 years experience in the design, manufacturing and worldwide sale of ultra precision fully hydrostatic turning machines. The Hembrug Mikrotum® machine range is at the leading edge of what is possible with hard turning today. Hembrug offers finish hard turning solutions for workpieces up to a diameter of 1,500 mm having hardness 58-68 HRC. Shape accuracies 0.1 - 2 micron, dimensional accuracies < 2 micron and surface finish accuracies of 0.1 - 0.4 micron have been obtained. The Hembrug Mikrotum® machines are supplied to various industries such as the bearing industry, the automotive industry and the die and mold industry.

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HiPrecision provides all competences needed for fast and efficient development of equipment and machinery. HiPrecision clarifies specifications, provides creative input into the concept design, and applies systematic design methods. Systematic and function-oriented design leads to an efficient use of staff and resources, and a design that is functioning reliably and predictably. In the proto-typing stage HiPrecision develops test plans, and takes care for the tests and for analysis of the results. HiPrecision makes it work!

Hartman Fijnmechanische Industrie (HFI) specialises in the production of fine-mechanical parts for the industry. The turned parts are used in measuring and control equipment and in the heating, electronics and automotive industry. HFI produces precision-turned parts in series ranging from several pieces to over a million. Diameter range from Ø1 to Ø100 mm. HFI uses modern CNC machines for the production of the turned parts. HFI is able to supply part assemblies to customer specification. These assemblies are often delivered “plug and play” in Kan-Ban fashion to customers worldwide. Since 2000 we are part of Aalberts Industries.

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HFI BV
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Hittech Group is a group of centrally controlled independent companies, operating as a system supplier. Development, engineering, manufacturing and assembly join in one organization acting as a partner for high-end precision industries, analysis and medical OEM companies, supplying systems, machines, (sub) modules and components. Hittech Group has ISO 13485:2003 certified facilities.

The separate companies within Hittech Group create the flexibility of an independent enterprise, while the Group generates a powerful synergy when operating as one business.

Hittech Group is geared to continuous improvement, in areas of design, product quality, cost or production processes. That’s why our partners consider us “Masters in improvement”.

Hiwin produces and sells components and solutions for the whole field of the linear technology. The product portfolio includes ballscrews, linear guideways, linear axis with ballscrews, linear motor axes, ready assembled gantry systems and cross tables, rotary tables, linear motor and torque motor components, linear actuators and ball bushes.

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The Research Group MicroSystemTechnology (MST) of the University of Applied Science Utrecht (HU) focuses on product improvement and industrialization of Microsystems.

Within the format of Submissive Product Design ten projects have been realized in which during the product development process the intended production methods were stringently taken into account.

A temperature sensor network, ~10 nodes, with data gathering via GPRS working with an energy-frugal protocol, will be shown.

HUniversal Production is proposed as the production philosophy for the future. It was developed within the framework of Agile Manufacturing. As an example will be shown the HUniplacer Delta, the third variant realized within this production platform.

Holland Innovative is market leader in supporting organizations in product, process and project management. In Solar we actively participate in and reinforce project teams in process development as well as running-in of solar production facilities on a global scale. A multidisciplinary team of experienced professionals develops and implements adequate and sustainable solutions. According to the “voice of the customer” and the “voice of the business”, with clear targets and results.

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If you are looking for yield improvement, development of production processes, reliability design or any other complex process….. Holland Innovative will offer in short time a sustainable, reliable solution. Challenge us!

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Hogeschool Utrecht, Avans
Hogeschool and Fontys Hogescholen will be sharing a booth.

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The House of Technology is a network of high-tech specialists (bureaus and freelancers) that can help innovative companies to support their projects.

The high-tech industry is very fast-moving. Speed of innovation is crucial for companies who want to stay ahead of the competition. That is why they are constantly working on technical developments. However, issues can arise for which they do not have the proper expertise in house. An extensive network of specialists with many years’ experience in the high-tech industry can often provide the required solution.

At the fair you can find an overview of our experts and their specialties.

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**IAI INDUSTRIAL SYSTEMS BV**

IAI industrial systems in Veldhoven designs, builds and delivers high-tech systems for a variety of industrial users. Our core market is document security, where we supply systems for the personalisation of passports and identity cards. We also operate in the solar market, where we design, construct and deliver production systems for wafers and solar panels.

**IBS PRECISION ENGINEERING**

In IBS Precision Engineering you will recognize a leading innovator in high-grade precision engineering, constantly challenged to push back frontiers. From our offices in Europe and agents around the world, we serve the world market with both standard and customized metrology solutions and engineering services that excel in accuracy, efficiency and usefulness. For our customers this will ultimately result in a better product quality, an increased productivity and reduced costs.

**IEF WERNER GMBH**

IEF Werner has a large range of products of handling components, transport and positioning systems as well as palletiser for the automation technology. A modular structure concept permits individual configurations.
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Your solution in precision and high precision parts and components. IGS Gebojagema has become one of the world’s leading players in the field and has left a definite mark in various sectors in recent decades. IGS Gebojagema combines know-how and experience to form an outstanding metal business.

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- Replacement parts and measuring devices for production processes.
- Components and subassemblies for manufacturers of tools and precision parts.

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- Laser (micro) drilling
- Laser engraving.
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- Small and accurate parts, projection masks etc. Cutting widths down to 20 microns.
- Laser (micro) welding
- Materials: stainless steel, Titanium, Gold, etc.
- Laser (micro) drilling
- Orifices from 10 microns to 0.5 mm.
- Laser engraving.
- Moulds for compact discs, chip cards.
- Reproduction of identity codes of transponders, etc.

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**IKO NIPPON THOMPSON EUROPE BV**

Founded in 1950, the company has accumulated numerous proprietary technologies and a wealth of experience that it uses to develop innovative products. Nippon Thompson has become an established leader in three specialties: Needle Roller Bearings, Linear Motion and Mechatronic Products. Marketed under the IKO brand, these products have established a worldwide reputation for high quality and originality.

Thompson Europe, has its head office in the Netherlands with own warehouse and facilities to modify linear motion products according customer specification. At the Precision Fair we will show our latest development of maintenance-free linear ways and mechatronic products.

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IMAGO GROUP BENELUX BV

We believe software will play an increasingly important role in mechatronics. Imotec has the knowledge, the experience and the products with which we can help you achieve state-of-the-art software solutions. We help you reach your goals now and in the future by development of optimal combinations of electromechanical, control, and information processing systems. This is what we call advanced intelligent mechatronics. We exhibit state-of-the-art custom piezo solutions in sensing and vibration control. We also show you an example of Multi-Agent Control Systems (MACS).

IMOTEC BV

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IMOS BV

IMS offers turn-key manufacturing solutions to customers worldwide in the high-precision, electronics and medical industry.
At the Precision Fair, the IMS stand will feature a live exhibit of the ProMicro platform for the medical industry: the ProMicro Medical. ProMicro is the semi-automatic work cell for micro systems and is commonly used in micro assembly projects for low to medium production volumes. Key aspects are its modular build up and the focus on automating the customers’ value added processes, resulting in a cost effective solution for micro assembly challenges.

IMS BV

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IMT MASKEN UND TEILINGEN AG

Microstructures on Glass – Optical Components
IMT has been a supplier of complex microstructures on glass for more than 50 years. Products: delineated optics, custom-made microstructures, thin-film coatings, lab-on-chip components, 200mm wafers with patterned optical coatings, electro-optic modulators. All manufacturing processes for complex microlithography are in-house.

Core competences:
• Microlithography, microstructuring of glass
• Micro-channels

IMT employs 70 experts in the fields of optics, physics and micro-technology. The production facility includes 1,200 m² clean rooms.

INSCOPE BV


IPS TECHNOLOGY

Our mission is both simple and wide-ranging: we ensure that your industrial products reach the user’s site in perfect condition, ready for efficient installation. We achieve that by cherishing your products. IPS is a specialized consulting and design agency in high-tech packaging, tooling and testing. Our knowledge and experience contains the dismantling, packaging, shipping and reassembling of industrial products. Meaning, we generate concepts for shipping them from the manufacturer to customer. Sounds like a narrow area of expertise. However, within that narrow area, we are incredibly wide-ranging. This wide-range is what we call ‘integral supply chain thinking’.

IPS recognizes the increasing importance of cleanliness within the high-tech supply chain. Therefore we proudly present our new sister Innovar! Cleaning Control. Cherishing industrial products!

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NL Innovation (a division of Agency NL) provides various means of financing of innovation activities. Especially for small and medium-sized companies (SMEs) the ‘Innovatiekrediet’ (Innovation Credit) is an attractive way to finance technical development projects of products, processes or services which are new for the Netherlands.

The Innovation Credit is a risk bearing loan which finances 35% of the project costs. When the project fails technically, the credit can be waived. Fill in the quick scan on our website (www.innovatiekrediet.nl) to hear from one of our advisors whether your project could qualify for the Innovation Credit.

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IRIS VISION BV

Iris Vision offers a complete range of machine vision and image processing products from major manufacturers. Our expertise is the integration of all necessary vision components for a wide variety of image processing and machine vision applications. Ranging from the beginning of the data chain with lighting and optics, through the versatility of the acquisitions and processing to the result of the application. We offer you a range of solutions, simple frame grabbers, extensive pipeline processors, host based processing and hardware processing.

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IRMATO

Irmato offers the one-stop-shopping principle. In this concept, Irmato supports its customers in the total product life cycle, from research to development & engineering, project management, supply chain management and assembly/realization.

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• Mechatronic Development & Engineering of Tooling, modules and systems.
• Assembly and realization of tooling, modules and systems with the following characteristics: high mix, low volume and high complexity.
• Concept Development “from scratch”.
• Consultancy for PLM, PDM and CAD-CAM implementation.
• Professional and flexible engineering support.

For more information please visit
www.irmato.com

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J.A.I.M.S.

J.A.I.M.S. develops and creates vision solutions for product quality inspection, measurement and positioning problems. Knowledge and experience gained within high precision machinery and equipment design, automotive, semi-conductors, special glass products, medical systems and optical systems. Expertise in:
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Since 1937 Jeveka is a leading specialist in the field of fasteners and tools in the Netherlands. We deliver a high-quality program, well attuned to our customers needs and wishes. We support you as a customer with our large knowledge base and a customer oriented, but above all reliable and independent organization with over 55 people.

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**JTEKT EUROPE BEARINGS BV KOYO BENELUX OFFICE**

Koyo is the brand name of a range of high-quality roller bearings for automotive and industrial applications produced by the Japanese JTEKT Group.

At the Precisie Fair 2011 we exhibit the Koyo-Exsev series of high precision roller bearings specially designed for critical applications and extreme environments. This range includes Ceramic-bearings, Hybrid-bearings and various types of steel bearings. We offer these custom-designed bearings for the various typical applications requirements such as: high precision, high and/or low temperatures, high vacuum, low/- non lubrication, non-particle emission, X-ray, contact with aggressive chemicals, etc.

**JTEKT EUROPE BEARINGS BV KOYO BENELUX OFFICE**

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**JEVEKA BV**

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KANTNER PRÄZISIONSOPTIK

Kantner Präzisionsoptik is the European representative for overseas OEM Optics suppliers. Kantner Präzisionsoptik is responsible for Rochester Precision Optics (RPO), Materion, Lattice and Hoya Candeo. RPO is a manufacturer for high-precision molded glass spherical lenses, polished lenses, and optical systems. The new division of RPO produces high-precision compression-molded plastic components like lenses, lens-arrays, prisms. Materion is a coating company. They produce with over 100 coating machines OEM coatings from 200 nm up to 40 µm. Dimension can go up to 1 meter. Hoya Candeo is a Japanese manufacturer for Color Filter Glass e.g. Color Compensating Filters, Light Balancing Filter.

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KMWE PRECISION SYSTEMS & PRECISION COMPONENTS BV

KMWE is a supplier for the high-tech equipment and aerospace industry. We are specialized in automatically machined parts and functionally tested mechatronic modules. KMWE is located in Eindhoven, Malaysia and Turkey, regions known for their High-Mix, Low-Volume, High-Complexity industry.

KMWE PRECISION SYSTEMS & PRECISION COMPONENTS BV
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KISTLER BV
NETHERLANDS

Kistler is a leading manufacturer of dynamic measurement technology. Sensors, signal conditioning and data acquisition solutions for force, pressure, torque, speed and acceleration are key areas of expertise. Application specific solutions have been developed for key markets:

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- Vehicle Technology
- Crash Technology
- Manufacturing Process Control
- Joining Systems
- Plastic Processing
- Biomechanics
- Road & Rail (Weigh in Motion)

The company is driven by innovation and engineering excellence and has production and R&D facilities in Switzerland, Germany and the United States. World-wide, the company employs 1,000 staff in over 25 countries.

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KUGLER GMBH

KUGLER develops and produces highly complex and sophisticated micro machine tools, ultra-precision optical and mechanical components, and (in jobshop production) optical surfaces, mainly of non-ferrous metals.

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- Special machine tools
- Linear guides
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Metrology:
- Ultra precision measurements / quality inspection on coordinate measuring machines, interferometric devices, etc.

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KUSTERS METAALBEWERKING OSS BV

The activities mainly consist of the production of (fine) mechanical parts for widely divergent trades. Almost all metal machining processes, with regard to the most widely divergent types of metal and synthetic materials, can be performed by us to perfection. Because of the flexibility, the quality consciousness of the organisation and the versatile modern machinery, high-tech products and a short production cycle can be realized.

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LARSEN PREMIUM PRECISION PARTS

Fine mechanical parts of undeniably high quality are essential to the workings of a machine and are decisive for a company’s reputation. This is our field of activity. Larsen is the specialist in premium milling and turning work. We are fully equipped with the knowledge and technology required to produce special parts made of stainless steel, aluminum, synthetic or exotic materials. We work for demanding clients who cannot and will not accept anything less than premium precision parts.

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As a pioneer in AM (additive manufacturing), LayerWise is a technology innovator rather than a technology user. This makes we are an innovation partner for our customers in industrial and medical markets. Our core business is to develop AM solutions with customers and deliver better-than-expected service in volume manufacturing. With headquarters in Leuven, Belgium, we are active on an international level.

LayerWise technology is a 3D print technique for metal components. Starting from a 3D file, we build up micron layers of solid material. In each layer, we deposit powder alloy and melt the geometry making use of a high-intensity laser source. Unlike machining and casting techniques, AM requires no tooling, has virtually no waste and enables designers to materialize complex geometries that can’t be made with “conventional” techniques.

**LASER 2000 BENELUX CV**

Laser 2000 Benelux is a design-in distributor, specialized in:
- industrial, lifescience and scientific lasers;
- laser material processing;
- LED, light and display metrology;
- motion control & positioning;
- vision and inspection.

Laser 2000 serves the industrial, OEM and scientific customers in the Benelux. Laser 2000 will show its latest developments in the area of lasers, industrial laser systems and nano-/micropositioning systems. To name a few:
- fiber lasers with advanced laser parameter handling,
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Our expertise comes from experience.
For more than 15 years now, Lasertec has been a strong and reliable partner in the world of laser technology. Thanks to its high levels of knowledge and practical experience, Lasertec can build bridges between the conceptual stages and technical execution. During the past years, this has resulted in a number of remarkable cases in which the level of knowledge of Lasertec and its strategic partners fires the imagination.

Keywords:
- 3D ultraviolet treatment in picoseconds
- Custom made applications
- Innovative power

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The Leidse Instrumentmakers School is a Vocational Training Institute for research instrument design and precision manufacturing. The school has close contacts with companies and institutes for applied instrument design. We accept design and manufacturing orders. Officially registered by the Dutch government under Crebo nr 94360.

LEUVEN AIR BEARINGS

Leuven Air Bearings develops and produces high-precision motion systems such as rotation stages and linear stages. LAB delivers turnkey solutions for high-demanding precision applications. Our motion systems are typically used in coordinate measurement machines, test equipment, wafer steppers, CT scanners, etc.

LEMO Connectors Benelux is a part of the international LEMO Group and is a partner that anticipates on signals from the market and reacts to the needs of customers by providing professional connector-solutions and cable-assemblies, which meet the highest expectations of the user.

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LEVES METAAL BV

Leves Metaal manufactures parts and components for clients in a wide range of industries. Our team is well trained and has many years of experience. We use state-of-the-art machinery.

Our customers can count on our exceptionally strong commitment. We are entirely focused on turning and milling and are able to reach a very high level of accuracy and specifications. Series of several 100,000 units are no exception, but at the same time our engineers cooperate already at the earliest stage with our customers to develop and design their prototypes.

Obviously we provide 3D measurement reports and we are ISO 9001 certified.

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TE LINTELO SYSTEMS BV

Since 1985, Te Lintelo Systems (TLS) is specialized in sales and services in the field of optical, opto-electronical components, lasers and high-performance optical test & measuring systems.

TLS is the leading company in the field of applications in the automotive, scientific, medical, industrial areas as well as the light engineering sector. In this field we represent prominent suppliers for the Benelux countries with well-educated engineers with a long experience and knowledge. We designs and produces custom-made systems as well.

We will demonstrate SIOS Laserinterferometric vibrometers ideal for accurate, contactless determination of position changes of objects or surfaces.

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LIGHTMOTIF BV

Lightmotif offers innovative production solutions for micromachining based on the use of ultrashort pulsed lasers. The ability to machine any material with high precision and no damage is used for micromachining as well as for surface texturing. Our expertise ranges from drilling, cutting, caving to surface structuring. Lightmotif is leading in application development for the most demanding requests. The company supports its customers from development to industrial implementation.

After successful application development, Lightmotif can perform in-house production or supplies its semi custom micromachining equipment to customers for mass production.

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LM SYSTEMS BV

LM Systems is located in Veenendaal and is the exclusive Dutch Service Supplier for THK. THK’s creative ideas and unique technology have made the company a worldwide pioneer in the development of Linear Motion (LM) products and have made THK a leading manufacturer in the industry. Today, THK’s linear motion products are indispensable in mechanical and electronic equipment in a wide variety of systems used in all industries.

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• Innovation support
• Linear technology
• Motion control

LOKET MBO MECHATRONICA

Portal site “MBO Mechatronica” organizes theme event “New technology in education”
The portal site Vocational Training Mechatronics is a unique site for anyone who is looking for information on vocational training in mechatronics. You will find information on: qualifications, training institutes, examinations, job market, knowledge circles, actualities and agenda items. All relevant information is available within 2 or 3 mouseclicks. The portal site is an initiative of Kenteq, centre of expertise and advice on technical craftsmanship.

Come and see us at stand number 181 (Hotspot) as well as at our theme event “New technology in education” that will be held on November 30th.

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As a strategic supply chain partner, Louwers & Hanique specializes in the development and supply of technical solutions based on advanced glass and/or ceramic materials. Furthermore, L&H provides special high-end solutions based on combined technologies and/or materials. Technical consultancy, co-development & farm out, prototype production as well as regular series production (including Lean Manufacturing and SPC), L&H provides precisely the solution that makes our customers successful in their business.

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LOUWERS & HANIQUE

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MA3 SOLUTIONS

MA3 Solutions is the leading manufacturer of tailor-made automation equipment for the micro-dispense and micro-systems assembly market. Active in the areas of Life Sciences, Medical, Automotive, Inkjet, Semiconductors, ICT/Telecom and MEMS/MST, MA3 supports its customers with shorter delivery lead-times and faster ramp-up to volume. MA3 works with customers active in production and integration and who operate between manual and proprietary automated solutions.

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MAAN GROUP

Maan Group - Glueing Technology
Maan Group in Raalte has the vision to connect by means of adhesion all materialistic (precision) compounds in a sustainable way. The three divisions of Maan have their own specialty to realize the Group’s objectives.

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  Maan R & D day-to-day is working on customer questions about adhesive bonds and surface (pre) treatment and is converting the answers into working solutions.
- Maan Engineering - Glueing Machinery
  Maan Engineering is specialized in the implementation of the solutions which are developed by Maan R&D. Maan Engineering is designing and building adhesive applications systems.
- Maan Special Products - Glueing Precision
  In specially designed (cleanroom) production areas, Maan Special Products can achieve very accurate adhesives layers and surface treatments.

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**MARTEK BVBA**

MARTEK is the BeNeLux specialist importer company for precision sensors, linear and angular encoders, inspection instrumentation, digital readouts and probing systems for machine tools.

**MARTEK BVBA**

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**MASÉVON TECHNOLOGY BV**

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**MASÉVON TECHNOLOGY BV**

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MECHAPHYSICS BV

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- Cryogenic Technology
- E-beam Technology

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MFK BV

Machinefabriek Van Knegsel (MFK) is a mechatronical system supplier, with over 50 years of experience. With around 25 employees, an advanced machine shop, specific know-how in high-tech machine operations and assembly, MFK is your partner for development and production of high-tech components, baseframes, complex assemblies and vacuum technology.

MFK is part of Aalberts Industries. Apart from our own competences, within Aalberts Industries MFK has a wide network of specialists active in special production techniques and surface treatments. With this, MFK always has the right partners to produce your complex modules.

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MEVI BV FIJNMECHANISCHE INDUSTRIE

The Mevi Group, with its principal office in Helmond (NL) and operating companies in Belgium and the Czech Republic, is a main supplier and valuable partner in the field of development, engineering and realisation of complete (prototype) machines and modules, to customer specification. Together with specialist companies of electronics and machine-control, complete projects are realised for customers active in the fields of semiconductors, copying attachments, the CD and DVD industry, automotive and the electronics industry. The Mevi Group is furthermore specialised in the production of high-precision mechanics (micron range) and parts, in any type of material required and in quantities ranging from single items to several hundreds.

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CVI MELLES GRIOT

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MIJNSBERGEN BV

Mijnsbergen is specialised in dynamic precision positioning systems. Besides selection of components Mijnsbergen realizes projects from engineering up to installation. At the Precision Fair Mijnsbergen will show an extended range of components such as AKRIBIS direct drive linear and rotary motors, circular and rectangular voice coil modules, piezo modules and ELMO servo drives. The motors and actuators are available as separate components or as complete modules, including linear guides, encoders and cabling. Experienced engineers offer support with the selection of components and offer the most efficient solution for your application needs.

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MIFA ALUMINIUM
Mifa Aluminum specialises in tight tolerance aluminum extrusions. The extrusion process offers the greatest design freedom possible to designers. Mifa is used to extrude tolerances up to ± 0.02 mm. With our innovative profile design engineering and technology, we can offer profiles with demanding shapes and sizes, a good surface finish, and press extreme thin wall thicknesses from 0.3 mm. Mifa is also capable to extrude in Magnesium alloys!

There is no minimum order quantity, and Mifa is able to supply a fully finished component as well, through in-house CNC machining, surface treatment and assembly capabilities. Some of our primary markets are machine construction, aerospace and defense, medical equipment, automotive and measuring and control equipment. Mifa complies with many quality norms including ISO 9002.

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MI-Partners is a centre of expertise in the field of mechatronics and is actively involved in the development of high-tech mechatronic systems. New concepts are defined based on extensive experience, creative thinking and combining knowledge from different markets. Predictive modeling in an early stage indicates final performance of the concept.

We proudly present an example of this way of working at our booth.

For seismic monitoring the ground is excited with a vibrator.

Commercially available systems use hydraulics to create the required forces. For the excitation at low frequencies (2-5 Hz), the non-linear behaviour of the hydraulics is the limiting factor in the performance. Therefore, a new vibrator, based on linear motor technology was developed.

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MIKROCENTRUM
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MIFA ALLUMINIUM
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MIFA ALLUMINIUM
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As a member of the FAULHABER® Group, MINIMOTOR Benelux takes care of the sales & support of the FAULHABER® products in the Benelux. The FAULHABER® product range consists of miniature electrical drive systems: brushed & brushless DC-motors, stepper motors, linear motors, piezomotors, gearboxes, tacho’s, encoders, drivers & motion controllers.

All products are characterized by the highest power-to-volume ratio, high efficiency, precision and reliability. FAULHABER® offers solutions based on standard or semi-standard products, as well as completely customized designs. Typical applications are found in instrumentation, medical equipment, optical devices, factory automation, robotics, military and space industry.

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Mitutoyo Nederland is a full daughter of the Japanese Mitutoyo Manufacturing Corporation, the world’s biggest manufacturer of precision measuring instruments. In the Netherlands, Mitutoyo offers besides the full product range of over more than 5,000 different precision instruments, also full service support, product and general metrology training and a RvA accredited calibration service.

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Mogema is a mechatronical system supplier, with over 50 years of experience. With around 135 employees, an advanced machine shop, specific know-how on high-tech machine operations and assembly, Mogema is your partner for development and production of high tech components, baseframes, complex assemblies and vacuum technology.

Mogema is part of Aalberts Industries. Apart from our own competences, within Aalberts Industries Mogema has a wide network of specialists active in special production techniques and surface treatments. With this Mogema always has the right partners to produce your complex modules.

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MTSA TECHNOPOWER is a renowned technology company for the design and production of high-quality mechatronic modules and systems according to customer specification. We excel in designing, engineering and manufacturing complex high-tech products and parts as one-off pieces or series for OEM in semiconductor, analytical, medical, pharmaceutical, food & beverage, energy and process technical industries, as well as for technical institutes, research centres and service companies.

MTSA Technopower: your partner in design and supply of complex process and mechatronic parts, modules and systems.

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NanoFocus is a developer, manufacturer, and distributor of measurement technology and software packages for the characterization of technical surfaces. The company has been active in this field for 16 years. The optical measurement systems allow high-precision micro and nano scale 3D surface measurements. The systems work at high measurement and analysis speeds for laboratory applications as well as for inline quality assurance and use near production lines. NanoFocus solutions are applied by leading innovative companies in the automotive, semiconductor, solar, and medical technology industries worldwide where they efficiently contribute to sustainability.

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Molenaar Optics offers innovation support for applications using optical and opto-mechanical components. Designs may contain both standard as well as custom-made parts. Optical components comprise simple lenses, mirrors, prisms and complex multi-element laser objectives for materials processing or telecentric camera lenses for vision systems. Opto-mechanical part series cover holders for optics as well as manual- and motorized positioning systems. Molenaar Optics also advises and offers optical measuring instruments, from basic microscopes and modular microscope components to digitally controlled profile projectors.
**MYTRI BV**

Your personal partner in precision granite.
MYTRI has been an established name in the precision measuring industry for over 70 years. MYTRI produces precision granite surface plates, measuring beams, squares, straight edges, portals, base plates, machine components and more within any measurable accuracy. MYTRI has the possibilities for many applications and processing according to your design drawings. MYTRI gained an international reputation and our products find their way into high-tech companies all over the world. Besides precision granite MYTRI also has a program for cast-iron surface plates and components.

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**NANOMOTION LTD**

As the leading manufacturer of piezoelectric motors for precision motion control applications, Nanomotion’s product line ranges from single-element motors for actuation, to larger motors for driving typical stages. Nanomotion motors operate with no intrinsic magnetic fields and no moving parts. The motors provide unlimited travel in a compact package, with the ability to achieve unmatched precision for linear or rotary motion. Nanomotion’s motors have been successfully applied in diverse applications, from using our standard housed motors for motion control positioning to simply applying a piezoelectric element embedded in consumer products.

**NATIONAL INSTRUMENTS NEDERLAND**

National Instruments offers an embedded design and prototyping platform that combines the LabVIEW graphical development environment with off-the-shelf, microprocessor and FPGA-based measurement and control hardware for design, simulation, rapid prototyping, implementation, validation and verification of embedded systems. Using the intuitive LabVIEW graphical dataflow programming environment, engineers and scientists can rapidly develop and iterate on designs, reducing the time from concept to prototype. After prototyping and validating the design, domain experts can then deploy these custom designs to an extensive range of off-the-shelf NI hardware or deploy to custom hardware. Come to our booth 15 for more information.

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Eye for Precision

Laser 2000, specialist in:
- lasers
- laser marking and cutting systems
- motorized and piezo-positioning stages
- fast and accurate light metrology

Precisiebeurs, booth 133

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**NDI EUROPE GMBH**

The NDI was started in 1981 by University of Waterloo graduates who were designing custom, scientific instruments for industrial measurement applications. NDI set out to design an optical motion measurement system for human movement tracking. In 1983, this new product became the company’s first generation of 3D, real-time optical measurement products. In 2001 NDI Europe opened there doors - We are providing Optical and electromagnetic measurement solutions for Medical, Industrial and Life Science.

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**NEWAYS TECHNOLOGIES BV**

Neways Technologies, a member of the Neways Electronics International Group, offers a combination of services covering the entire product life cycle of high quality industrial electronics applications. These services range from co-development (hard/software and mechanical) up to sustaining services. Based on good component management and DFM-scans we assure that your product is developed at cost conscious with high quality in a short time to market. For design and development to sustaining services of complete machinery or parts of it, one can also call on Neways Technologies. The experts of Neways have knowledge and experience in various disciplines, such as improvement of serviceability, cost price reduction and CE marking.

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**NEITRACO GROUP**

The Neitraco Group is a collaboration of engineering companies in the Benelux. Our core competences are Projects, Detachment and Realization in the fields of, mechatronics, (precision-) engineering and tooling in the areas of aviation, civil, geodesy, transport, heavy- and light rail, nano-technology, food and healthcare. A selection of our customers: ASML, Fokker, Philips, Nedtrain, SBM GustoMSC, Vanderlande, VDL Group. Our mission is technical support to collaborate with our customers to achieve mutual success. We achieve this with approximately 300 highly motivated and educated employees. Our slogan is “Engineering in 4D”.

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NIJDRA GROEP (FMI)

The Nijdra Groep is a full-service, family-owned organisation and is specialised in high precision components and mechatronic modules:
1. Fine Mechanical Industry (turning & milling);
2. High-tech Mechanical Industry (grinding);
3. Nijdra Special Products (engineering & assembling);

The Nijdra Groep is ISO 9001, ISO 13485 and ISO 14001 certified. Cost-efficient production on robotized 5-axis milling machines and Flexible Manufacturing System (FMS) are especially for low volumes, high mixtures and short delivery times. With our experiences in several high-tech branches we create a surplus value for our customers by supporting them at the design of new projects and existing products.

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NOLIAC A/S

The Noliac Group presents a unique proficiency in the field of piezoelectric technology. Noliac designs, develops and manufactures the total range of piezoelectric products – from powders to mono- and multilayer components and all the way to finished plug-and-play applications. The picture shows a wide variety of piezo electric components.

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**NIKON METROLOGY** 110

Nikon Metrology manufactures non-contact measuring systems covering laser scanners, vision systems and microscopes as well as X-ray and computer tomography (CT) systems. Precision Fair visitors should check out the NEXIV VMR system for ultra-precise automated video measurement. And try out the ShuttlePix, the first handheld microscope in Nikon Metrology’s line-up of industrial microscopes. Furthermore, the company markets its own mechanical and optical CMMs, supporting 3D laser scanning and tactile inspection. Also watch the Handheld Scanning Demo that shows a portable metrology system that measures anything anywhere. It combines an MCA II articulated measuring arm with a digital ModelMaker laser scanner.

**NORMA** 16

Norma: Your System Integrator

Norma employs more than 400 motivated people divided over 3 locations in Europe and 1 location in Asia. Norma has secured a strong position as a “low volume-high mix” 1st tier system supplier over the entire life cycle of complex modules. We offer our OEM-clients service throughout the complete value chain.

Key competences:
- Development and construction – Build to specification
- Ultra precision machining (Micron level) – sizes up to 0.5 m³
- Precision machining (10 Micron level) – sizes up to 3 m³

Active market places:
- Semiconductor industry
- Scientific industry
- Medical industry
- Defense industry
- Aerospace industry
- Consumer Lifestyle industry

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**NOMA**

**EFD INTERNATIONAL** 153

Nordson EFD is the world’s leading manufacturer of precision dispensing systems for applying controlled amounts of the adhesives, sealants, lubricants and other assembly fluids used in almost every industrial manufacturing process. The EFD product range includes:
- Advanced fluid dispensing systems to apply accurate, consistent amounts of fluids.
- Benchtop dispensers for precise fluid deposits ranging from uniform dots as small as 0.004 inches in diameter to neat, controlled beads.
- Pneumatically operated dispensing valves that combine accuracy, low maintenance and outstanding reliability.
- Tabletop robots to deliver precise placement and accurate fluid deposits.
- Non-contact jetting system using piezo-electric technology, to apply fluids on uneven surfaces or hard-to-access areas.

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nPoint manufactures ultra-precision motion and control devices for nano-scale research and manufacturing. Our products include a series of nanopositioning systems that consist of piezo stages and control electronics. The positioning products enable rapid, precise, and repeatable motion and are used in a wide range of applications including aerospace, semiconductor industries and life sciences. The nPBio stages (see picture) from nPoint are closed-loop XYZ nanopositioners with up to 30μm range of motion. Their large aperture allows for easy integration with optical microscopes or any application that requires easy sample access. Slide and petri dish sample holders are available for this product.

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The NTS-Group is a system supplier in the high tech industry. The company assumes responsibility for the development, creation and optimization of optomechatronic systems and modules for leading original equipment manufacturers (OEMs). The NTS-Group is a chain of specialized companies in the Netherlands, the Czech Republic, Israel and China. This unique concentration of strength on an international level means that customers can deliver high quality machines to their market in a shorter turnaround time and at competitive prices.

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Olympus Microscopy for any application
Olympus, the leading system-solution provider in microscopy, puts all of its expertise and passion into developing forward-looking products that will advance their users. Every application is turned into an exciting voyage of discovery. Olympus offers a complete product range which covers applications from education and routine studies up to state-of-the-art research imaging systems, both in life- and material science.

In many (research) microscopes, various peripheral devices are integrated to make up a complete, software-controlled imaging solution so that e.g. processes in living cells or in production of coatings can be accurately visualised and analysed.

Olympus therefore develops customizable soft- and hardware for microscopical imaging, in which all components can be optimally integrated.

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OPTIKRON GMBH

OPTIKRON has specialized in manufacturing micro-optical components, complex optical assemblies, modules for micro-systems and thin-film optics. For endoscopes, laser and sensor systems we are producing micro prisms and other miniaturized plano-optics. Furthermore, OPTIKRON manufactures complex customized assemblies made of micro-optical, mechanical and fiber-optical components. There is also a production department at OPTIKRON which develops and manufactures optical coatings and thin-film optics like mirrors, beam splitter, optical windows and filters. The optical components made by OPTIKRON for use in medical applications are optimized for the special requirements in this field and for the need of being autoclaveable.

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OPTIWA BV

More possibilities in complex precision parts
Optiwa is a supplier of complex accurate machined parts and mechanical assemblies. Optiwa is able to offer you efficient production for parts with tolerances down to 0.5 µm accuracy. (Dimensional, form and location tolerances within the Sub-micron range.)
In addition to turning and milling processes, Optiwa offers: grinding, hard turning, polishing, lapping and all possible surface and heat treatments. Various parts of the production area are climate controlled. Several CNC machines are automated by robot installations.
Parts are used in electron microscopes, air bearings, optical modules and specific medical and analytical equipment.

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Philips GTDM, a group of over 100 manufacturing technology experts provide professional services in order to develop and improve the reliability and efficiency of production processes. These services comprise process and feasibility studies, mechanical and electrical engineering work and machine realization, including vision and measurement tools for process control.
Over the past 50 years, the GTDM group has gathered particular expertise in some major technology areas such as laser processing and micro-welding, manipulation and dosing of small quantities of materials, integration of machine-vision systems, light measurements and handling and processing of glass components.

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**Platos Consulting**

Platos Consulting offers a wide range of services in the field of modern surface treatment technologies, mainly plasma technology. Available services are e.g. trainings, technology workshops, process optimization, troubleshooting, case studies, sample treatments, subcontracting, surface analytics, rentable equipment.

Experience in all major industrial sectors, where all types of materials like polymers, ceramics, textiles are converted and surface-processed – e.g. printing, glueing, painting, functional coatings, cleaning, laminating, welding, .... Platos Consulting supports, completes and strengthens your R&D, Engineering and Production teams by providing additional expertise and an independent viewpoint on your surface-related problems, questions and needs.

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**Piezomechanik GmbH**

Piezo actuation is a top innovative technology in the field of linear drivers on motors, featuring a unique combination of drive parameters with respect to positioning accuracy, force generation, load capabilities and dynamics. Most applications in mechatronics / adaptronics would not be feasible without piezo actuation. Piezomechanik accompanies you to investigate these new fields and to provide the right measures and products for a successful innovation step. Piezomechanik offers you its assistance from the very first visions of your new business up to a final real working and profitable product.

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**PM-Bearings BV**


PM-Bearings competences:
1. Systems realisation from R&D to Serial production
2. High precision machinery
3. Linear technology
4. Wafer inspection equipment
5. Nanopositioning mechatronical modules
6. Motion control
7. Piezo technology
8. Module assembly, also in clean room conditions
9. UHV and UCV production

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Precision Micro is one of the largest specialist metal component manufacturers in Europe, innovating, developing and utilizing a unique combination of manufacturing processes to meet the needs of customers worldwide. The company has pioneered developments in photo etching (also known as chemical etching, photo chemical etching, acid etching and chemical milling), electroforming and mechanical forming, achieving standards admired by the industry and appreciated by customers in automotive, communications, aerospace, electronics, medical, military and other ‘high-tech’ engineering industries.

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Promis Electro Optics (PEO) is a modern trading company with over 30 years of experience in the field of non-contact electro-optics and radiation technology QA and radiation safety. We offer specialized measurement and detection solutions to optimize your processes using light, position (PSD), absolute color and radiation.

PEO knowledge comes together with field experience and an established network of professionals. PEO offers high standard in Quality, Innovation and Support through selection of the best suppliers that are up-to-date with the latest technology and optimal communication.

We deliver professional support in a personal way. Your satisfaction is our focus.

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Qioptiq designs and manufactures photonic products and solutions that serve a wide range of markets and applications in the areas of medical and life sciences, industrial manufacturing, defense and aerospace, and research and development. The company is known for its high-quality standard components, products and instruments, its custom modules and assemblies, its leading-edge innovation, its precision manufacturing and its responsive global resourcing. Through a series of acquisitions, Qioptiq has an impressive history and pedigree, and benefits from having integrated the knowledge and experience of Avimo, Gsänger, LINOS, Optem, Pilkington, Point Source, Rodenstock, Spindler & Hoyer and others. For more information, visit www.qioptiq.com

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For more than 20 years Reith Laser has been the leading supplier of laser-processed products in Europe. By using completely automatic production processes, we are capable to produce just one piece, but also larger series. You can find our products all over the world and even beyond....

With our very expanded and modern laser equipment (20 laser installations), we can offer you a great diversity of laser material processing activities:
- Laser (micro-) cutting
- Laser drilling
- Laser welding
- Laser micromachining

Reith Laser is active in precision industry, medical industry, aerospace, semiconductor and automotive industry.

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Q-Sys offers a complete service, from initial application assessment, through feasibility and costing studies, system design, manufacture, calibration and commissioning. Bespoke system design is a speciality and we also offer a complete turnkey capability for multi supplier configurations. Additionally we provide comprehensive technical support to maintain system availability at a maximum. Q-Sys offers cost-effective solutions for all motion control and positioning requirements. Some examples are: large format digital printing, laser welding and cutting, flat panel display mastering, X-ray and optical inspection and holographic master creation.

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RELIANCE PRECISION MECHATRONICS

Reliance Precision Mechatronics, a division of Reliance Precision manufactures, designs, assembles and tests high-precision mechanical components and mechatronic assemblies. We offer a wide range of standard high-precision motion-control components such as couplings, gears, rack, leadscrews, gearboxes, motors, and slides to build your precise assemblies. We can assist with your design, test your assembly and manufacture for prototypes or production. We can also help you further with high demand specialist components and assemblies at Reliance, where we have two cleanrooms and a team of qualified engineers for vacuum-compliant components and assemblies.

RENISHAW BENELUX BV

Renishaw is a global company with core skills in measurement, motion control, spectroscopy and precision machining. We develop innovative products that significantly advance our customers’ operational performance – from improving manufacturing efficiencies and raising product quality, to maximising research capabilities and improving the efficacy of medical procedures. Typical applications: machine tool automation, co-ordinate measurement, additive manufacturing, gauging, Raman spectroscopy, machine calibration, position feedback, CAD/CAM dentistry, shape memory alloys, large scale surveying, stereotactic neurosurgery, and medical diagnostics. Our aim is to be a longterm partner, offering superior products that meet our customers’ needs, backed up by expert technical and commercial support.

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RODRIGUEZ GMBH

Rodriguez is one of the leading suppliers of thin-section bearings, linear technology, precision roller bearings, special bearings and components for various industrial applications. In our modern time, which is characterised by technical innovations, the demand for superb construction solutions is higher than ever, including the competent consulting for the best fitting and customer-specific roller bearing technology, which is gaining more and more importance. Rodriguez delivers to the most important industrial sections.

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Romédès Engineering is an energetic company, which characterises itself by enthusiasm, drive and precision. The group of engineers is an energetic team of highly qualified and well attuned specialists. Based on the question c.q. problem definition, with a clearly defined process, Romédès will generate a resourceful solution.

The realised projects consist of fast moving machines for precision engineering industries, assembly machines for electronics components, handling equipment for the medical and related industries. We show several fast moving machines which function with approx. 600 strokes per minute with a positioning accuracy within 10 µm. Real engineers should not let the opportunity pass by to get acquainted.

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info@romedes.nl
www.romedes.nl
De Rooy Slijpcentrum (Grinding Centre), founded in 1939, has been a reliable supplier to a number of well-known industrial companies for many years. The company has developed the last decade into a centre of allround grinding and milling excellence.

Capabilities:
- Flat and profile grinding 7,000 x 1,750 x 1,500 mm
- Surface grinding 6,000 x 1,400 x 500 mm
- Cylindrical grinding Ø 1,000 x 4,000 mm
- Internal grinding Ø 2,000 x 1,300 mm
- Milling 16,000 x 4,000 x 1,300 mm

Furthermore, De Rooy is specialized in delivery of complete precision components. De Rooy’s extensive, modern machine park offers a high level of both flexibility and precision. De Rooy Slijpcentrum’s quality control system conforms with – and is qualified by – TÜV-Nederland for ISO 9001:2008.

SARIX SA always at leading edge of the highest Micro-machining performance, SARIX offers a new machining concept, the 3D Micro EDM Milling. Complexes cavities can be achieved down to real micro scale of 10 micron with accurate tolerance down to 1 micron within high surface finishing of $R_a < 0.1$

SARIX designs, manufactures and markets highly efficient Micro-EDM equipment typically used in many industries such as: medical, die-making, microelectronics, automotive, aerospace as well as universities.

With its reliable machine concept using in once the Micro-Drilling, Sinking and EDM Milling, SARIX contribute on the development of new high-tech products from R&D to Mass Production reliability.

Specialized in the supply of know-how about engineering materials, in combination with a broad view on all imaginable forming, joining and surface technologies.

Our focus is concentrated in giving support at early stages of product development. This is the most suitable moment for attention to this subject at an efficient and most profitable way.

It is the supply of this specialized know-how in which Saffir, Designers for Manufacturing has developed its specialism. We can assist by temporary support of your development department, initiate and support of innovation processes or full time stationing of specialists and making links to specialized suppliers.

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SARIX SA
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www.sarix.com
**SCHNEEBERGER GMBH**

SCHNEEBERGER has been developing and producing already for more than 80 years linear guides, guiding systems and complete turnkey positioning systems for the high-tech market. For regular environments as well as for clean-room and vacuum applications where the μm or nm accuracy is needed. More and more we cast base frames for our systems out of mineral cast with high benefits regarding damping.

One of our strengths is the flexibility to produce customised product based on our standard products. SCHNEEBERGER is globally oriented and has worldwide companies and representatives.

**SCHNEEBERGER GMBH**

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**SCHAEFFLER NEDERLAND BV**

Schaeffler Nederland is part of the world-wide operating Schaeffler Group. With her brands LuK, INA and FAG the Schaeffler Group belongs in the world of drives to the leading suppliers of rolling bearings, linear systems, maintenance products and services for all existing fields of application in the sectors Automotive, Industry and Aerospace.

In our booth 75 we will show you our latest developments of:
- IDAM (INA Drives & Mechatronics) – direct drives and mechatronics.
- INA Linear – overview of linear products and solutions.
- Barden (part of FAG) precision bearings.
- Blis – ballscrews.

**SCHAEFFLER NEDERLAND BV**

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**SCHUT GEOMETRISCHE MEETTECHNIEK BV**

Schut Geometrical Metrology is an international organization, specialized in the development, production and sales of measuring instruments and systems. Products produced by Schut are the 3D CNC coordinate measuring machines “DeMeet” (video, touch probe and multi-sensor models), “DF-System” measurement fixtures, “Approve” SPC software. Besides products as Magnescale (electronic scales, gauges etc.), TESA and Mitutoyo (measuring instruments), Fisso (stands), Käfer (dial indicators), Wite (“Alufix” fixture systems) Peak (magnifiers), LMW (gauges), Schwenk and Kroeplin (internal / external measuring tools) and Renishaw (probe systems), Schut offers an extensive range of measuring equipment in various price ranges.

**SCHUT GEOMETRISCHE MEETTECHNIEK BV**

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**SCHUT PRECISIONPARTS BV**

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**SICK BV**

SICK B.V. is a subsidiary from SICK AG, which has a worldwide presence with numerous subsidiaries and affiliated companies, agencies and sales offices, and is one of the leading producers of sensors and sensor solutions.

SICK supplies optical sensors, inductive sensors, positioning encoders, distance measurement systems, vision sensors and cameras, barcode-reading scanners, safety systems and level measurement equipment for process automation.

SICK BV
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**SENTECH SENSOR TECHNOLOGY**

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5253 CB NIEUWKUIJK (NL)
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info@sentech.nl
www.sentech.nl

Sentech Sensor Technology thinks and acts with a view to meeting the customer’s needs. Our specialized trading company supplies integrated sensor solutions tailored to fit the specific purpose for which the customer will use them. Sentech regularly delivers assembled sensors ready for immediate service, pre-fitted with casing, plug, cable or connector. The total sensor product will often embody ingenious solutions to specific problems that came to light during the customer’s everyday operations.

At Sentech, we don’t merely supply products, we advise, integrate and assemble.

**SCHUT PRECISIONPARTS BV**

SCHUT PRECISIONPARTS BV is a state-of-the-art subcontractor for mechanical parts and assemblies. We are specialised in precision machining, assembly and grinding. Our company offers a fully conditioned production facility, high-tech machinery, a certified quality system, 3D measurement facilities. A combination of these high standards and services enables us to function as a reliable partner.

Schut PrecisionParts is a state-of-the-art subcontractor for mechanical parts and assemblies. We are specialised in precision machining, assembly and grinding. Our company offers a fully conditioned production facility, high-tech machinery, a certified quality system, 3D measurement facilities. A combination of these high standards and services enables us to function as a reliable partner.

**SENTECH SENSOR TECHNOLOGY**

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At Sentech, we don’t merely supply products, we advise, integrate and assemble.
SIGMACONTROL BV

SmarAct develops, produces and distributes piezo-based micro- and nanopositioners, advanced control systems and micro-tools. In addition, SmarAct offers complete micro- and nanomanipulation systems, ranging from XY tables over 6D manipulators to multi-manipulator systems. All positioning systems can be applied in normal pressure as well as in vacuum conditions.

SMARACT GMBH

SmarAct develops, produces and distributes piezo-based micro- and nanopositioners, advanced control systems and micro-tools. In addition, SmarAct offers complete micro- and nanomanipulation systems, ranging from XY tables over 6D manipulators to multi-manipulator systems. All positioning systems can be applied in normal pressure as well as in vacuum conditions.

SKF NEDERLAND

SKF Group is the leading global supplier of products, solutions and services out of five technology platforms: Bearings and units, Seals, Mechatronics, Lubrication Systems and Services. Services include technical support, maintenance services, condition monitoring and training.

By utilizing capabilities from these platforms, SKF develops tailor-made offers for each customer segment, helping customers improve performance, reduce energy use and lower total costs, while bringing increased added value.

Technical development and quality have been in focus at SKF since the very start. The Group’s efforts in research and development have resulted in numerous innovations, forming bases for new standards, products and solutions.

SKF NEDERLAND

Kelvinbaan 16, 3439 MT NIEUWEGEIN (NL)

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SIGMACONTROL BV

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office@sigmacontrol.eu www.sigmacontrol.eu

Industrial companies evolve constantly. There’s always a need of improvement, efficiency and cost reduction. Not rarely the machine park functions as an accelerator of that evolution. Machine builders of industrial applications have to follow these developments. With SigmaControl, you have a partner understanding your business. We allow you to get your machines to respond to the demands and needs of a changing market.

We already did it for twenty years with a variety of clients, and with one clear vision: to provide machine builders all the tools they need to optimize their own products constantly. SigmaControl is exclusive Benelux distributor of SIGMATEK products.

SIGMACONTROL BV

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**STAMHUIS LINEAIRTECHNIEK BV**

**170**

*Linear Motion Components and High Tech Assemblies*
Stamhuis supplies precision linear motion components and systems for machine, instrument, medical and semiconductor applications, of world leading manufacturers. These components include linear guides, ball screws, speciality gears and related components. For projects, which push beyond the limits of standard products (load, temperature, speed,...) they assist you to find a perfect solution. Sometimes by modification of standard products or by new developments in cooperation with our manufacturing partners. For many products, like linear guides and ballscrews, we offer our QUICKCENTER service.

During the Precision Exhibition we show on stand nr. 170:
- high-speed and accurate handling system;
- high-tech assembly;
- new line of ballscrews;
- ATEX and cleanroom solutions;

**STAMHUIS LINEAIRTECHNIEK BV**
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**STEEN METROLOGY SYSTEMS NV**

From the outset in 1982, SMS has offered a full range of high quality geometrical measuring equipment with consultancy, support, training and service back-up. To achieve this, SMS (located on the motorway E25 at 35 minutes from Maastricht) uses in its own laboratory a variety of high-precision measuring equipment from its general sales range. Including manual or CNC measuring machines, 3D multisensor with image analysis software, all supplied by world renowned manufacturers.

**STEEN METROLOGY SYSTEMS NV**
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**STICHTING APPLIED PIĘZO**

**65**

We make piezo work for you!
Applied Piezo:
- creates new business in piezo actuators and sensors;
- promotes piezo technology;
- stimulates knowledge development and innovation;
- provides a network where knowledge, expertise and products can be exchanged.

One stop shop for piezo solutions.

The aim of AppliedPiezo.com is to facilitate the access of industry to utilisation of piezo technology. We will help you evaluate and benefit from the advantages of piezo technology and support you from idea to production. Applied Piezo is a group of cooperating industrial companies and universities with supplemental expertise in the field of piezo technology.

**STICHTING APPLIED PIĘZO**
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**TECHNOBIS GROUP**

Technobis Group is a developer and supplier of high-tech instruments and modules for OEM companies around the world. The combination of technologies found within the Technobis Group and the Technology Platform formed with partners is absolutely unique. Working within this platform ensures fast response, high flexibility and optimal solutions for complex multidisciplinary and interdisciplinary challenges.

The unique combination of technologies makes it possible to develop instruments in diverse high-tech industries. Using the experience and expertise of Technobis Group, customers were and are able to realize high-tech solutions which proved to be a key contribution to the realization of their business cases.

**TECHNOBIS GROUP**

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TECHNOLOGY TWENTE BV

As a member of the Aalberts Industries Group, Technology Twente has been in the metalworking business since 1990. Our company specialises in the manufacture of high-value components and assemblies. Our products are used in a large number of sectors, including defence, aerospace, medical, mechatronics and general mechanical and apparatus engineering. Where necessary, Technology Twente seeks out suitable innovative solutions to meet its customers’ specific requirements.

Our organisation is characterised by a combination of quality, customer focus, craftsmanship and technology. By continuing to invest in expertise and the latest technologies, Technology Twente has developed into a reliable and innovative partner for the high-tech industry.

TECHNOLOGY TWENTE BV
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TECNOTION BV

As a member of the Aalberts Industries Group, Technology Twente has been in the metalworking business since 1990. Our company specialises in the manufacture of high-value components and assemblies. Our products are used in a large number of sectors, including defence, aerospace, medical, mechatronics and general mechanical and apparatus engineering. Where necessary, Technology Twente seeks out suitable innovative solutions to meet its customers’ specific requirements.

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TEESING SUBMICRON TECHNOLOGY

Teesing Submicron Technologies supplies components for applications in a wide variety of products, assemblies and systems associated with gases and liquids used for semiconductor processing. Ranging from cooling systems, bulk storage gas cabinets, gas monitoring applications, bulk filtration and purification to point-of-use gas supply. For the HP and UHP applications, Teessing offers a high quality components and sub assemblies such as: piping, valves, regulators, tubing, manifolds, assemblies, and systems are supplied to semiconductor toolmakers and meet the stringent demands of the semiconductor industry. Double packed and produced under cleanroom conditions.

TEESING SUBMICRON TECHNOLOGY
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TSG GROUP

TSG Group is a mechanical engineering agency that combines knowledge, design and technology. Over a hundred employees work for companies that range from small businesses to large multinationals in Industry, Automotive and Consumer.

TSG Group consists of:
• Engineering by Total Support
  Our Analysts, Mechan(tro)nic Specialists and Product Designers provide knowledge and expertise within your organisation.
• Design by Modesi
  From Design Strategy to Concept Design to Analysis: a professional and powerful partner in the field of design.
• Projects by InnoteQ
  As a provider of total solutions we not only focus on Product Development and Industrialisation but also on Proto / Pilot Production in our own workshop.

TEGEMA GROUP

The Tegema Group develops, innovates and realizes products, processes, systems, modules, and apparatus from the idea or specification phase up to a functional model, prototype or pre-production series. In doing so, we take care of the means of production and assembly, tooling and test equipment from the problem definition up to and including realization and commissioning.

We realize total solutions using a project-oriented approach. For specific knowledge and skill, we work closely with specialist companies and institutes. We also strive to work as much as possible and jointly develop together with our customers.

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TELMASTAAL BV

Telmastaal is a reliable partner since 1980 who provides you with high quality materials, craftsmanship and matching advice. Our global network of suppliers, large inventory and expertise provides a wide choice of materials and best support in providing customized materials for almost every industry imaginable.

TelmaStainless is a specialist in providing custom products of high quality stainless steel and nickel based alloys. Nimadi focuses on the processing of stainless steel and non-ferrous materials to partially or fully processed products.

The strength of these companies is that they complement each other and thus can offer a suitable solution to each question.

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TESA BENELUX

Tesa is a Swiss company that produces precision measuring equipment since 1941.

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TSG GROUP

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TRUMPF NEDERLAND BV 108

The TRUMPF Group is one of the world’s leading manufacturers of laser technology and production engineering. We set the standard with our innovations – in lasers and laser systems, machine tools, power tools and medical technology. Today, we are the global market and technology leader in industrial lasers and laser systems. You will find that we have the most comprehensive product portfolio in the world, with the right laser to suit every need. Through systematic research and development, we are extending the advantages we provide our customers well into the future.

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TRIOS PRECISION ENGINEERING 107

TRIOS Precision Engineering is a mechanical engineering firm offering high-grade, durable solutions in product development, product innovation and machine building. TRIOS specializes in developing precision-engineered solutions that perform under extreme conditions such as high vacuum and cryogenic temperatures. Constructing these solutions with high-performance metals and fabrics has become one of TRIOS’ core competences, as well as transport and handling under cleanroom conditions and with extreme specifications. Over many years, TRIOS has acquired experience in various industrial sectors, with applications for equipment in the semiconductor industry, medical equipment, the food industry and space travel.

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TRIOS Precision Engineering

V.A.C. MACHINES 108

Het lasermarkeren wordt steeds meer toegepast. Vooral in de kunststofwereld is er een opmerkelijk stijgende vraag om producten te voorzien van een kentekening. Dit kan gaan van een louter functioneel opschrift, tekst, codering, traceability tot echte logo’s. Met de laser maken we een heel snelle, flexibele en onuitwisbare markering. Voorbehandeling van het oppervlak is niet noodzakelijk. Door verschillende lasertypes in te zetten slagen we er vandaag in de kunststof of te carboniseren ofwel fotochemisch af te bleken. Kleuromslag door omvorming van het kleurpigment in het basismateriaal geeft een heel mooie, onvoelbare markering met meestal goed contrastbeeld. De TRUMPF TruMark is een industriële markeerlaser. Geleverd als OEM-laser of geïntegreerd in een werkstation is hij geschikt voor seriegroottes van 1 tot enkele miljoenen stuks, waarbij de lage verbruikskost en de grote toepasbaarheid zijn grootste troeven zijn.

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V.A.C. Machines

V.A.C. Machines
**VACUTECH BV**

Vacutech has been creating high-quality technical solutions for a wide range of industries since 1982. We are a trusted and critical partner for the manufacture of precision mechanical and vacuum products for industrial applications. Vacutech employees are highly skilled and have flexible, state-of-the-art equipment at their disposal. In addition to our production department we have a specially equipped assembly department. We produce, assemble, and test products, always in close consultation with our customers. We focus on professional and intensive collaboration, a process that is central in our philosophy. It makes us a partner you can talk to at your own level. Together we’ll make it work!

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**VHE INDUSTRIAL AUTOMATION BV**

VHE Industrial automation is an acknowledged specialist in the field of machine controls. We design and build complete systems and modules and represent also a number of renowned producers of components for driving and controlling machines (motion control). Our employee’s technical knowledge and expertise guarantee inventive, innovative and cost-efficient solutions. Our key drive is boosting the success of our customers, because that is the best imaginable safeguard for continuity.

**VHE INDUSTRIAL AUTOMATION BV**
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**VIBA NV**

VIBA is leverancier van kwalitatief hoogwaardige technische producten voor de metaal- en kunststoffverwerkende industrie. De Business Unit Gereedschappen is verantwoordelijk voor het pakket Geometrische meettechniek, bestaande uit handmeetgereedschap en meetsystemen voor lengte, ruwheid, contour en vorm.

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**VARIODRIVE AANDRIJF- EN BESTURINGS- TECHNIEK BV**

Variodrive is specialist op het gebied van high-end Motion Control, waarbij zij toeleverancier zijn voor de machinebouwers met besturingsystemen, servoregelkaps, servomotoren zowel lineair als roterend tot complete actuators in het submicrometer bereik. Alle berekeningen voor uiteindelijke bepaling van de juist in te zetten componenten behoren tot onze standaard werkzaamheden.

**VARIODRIVE AANDRIJF- EN BESTURINGSTECHNIEK BV**
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ehogervorst@variodrive.nl
www.variodrive.nl
WENZEL BENELUX 102

Wenzel Benelux is together with EMS sa, one of the biggest suppliers in the Benelux for:
• 3D measuring machines (wide range of types)
• Optical 2D + 3D machines
• Mobile 3D (scan) measuring arms
• Profile projectors
• Hardness, Roughness, Form and Roundness equipment
• 3D laser measuring and scan systems
• 1D + 2D Height gauges
• Wide range of hand measuring equipment from big brands
• Software
• Calibration (RvA)
• Product measuring
• Maintenance & Service
• Measuring and training courses

Wijdeven Power Supplies & Inductive Technology BV 72

Wijdeven is a modern, dynamic and technology-driven company with an experience of more than 70 years. Wijdeven is competent in areas of engineering, production and sales of transformers, coils, magnet assies and electro mechanics.
Wijdeven has more than 100 well-motivated employees divided over two ISO-9001 certified facilities in Oirschot and Ter Apel. Besides own facilities in the Netherlands Wijdeven has co-activities in Eastern Europe and the Far East.
We are known as: proactive, short time to market, innovative and cost efficient. Focus markets are medical, machine equipment, semicon and energy.

Wijdeven will present items of the business unit Motion, e.g. coils, linear motors, voice coil actuators, direct-drive motors, magnet assies and gravity compensators.

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VSL

VSL is the national metrology institute of the Netherlands. VSL is part of Holland Metrology Group.
VSL makes measurement results of companies, laboratories and organizations directly traceable to international standards. VSL makes an important contribution towards the reliability, quality and innovation of products and processes, both in business and society at large.

VSL is active in the field of:
• Calibration and Reference materials
• Contract research and consultancy
• Interlaboratory comparisons
• Courses and training

VSL
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www.wenzel-benelux.com
WILTING

Wilting manufactures mechanical components and mechatronic modules in small and medium-sized series. Wilting is the specialist in manufacturability. So no matter if cost, lead time, reproducibility, quality or logistics is the main challenge for your components / assemblies, Wilting will implement the optimal production process and value chain. Wilting builds on extensive experience in a wide variety of markets like Semicon, Aerospace, Medical, Food, etc. We look forward to meet you at the Precision Fair 2011 to understand your requirements and to explore how Wilting can support your business.

WILTING
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Contact person:
Mr. Adwin Kannekens
T +31 (0)40-2052747
adwin.kannekens@wiltingcomponents.com
www.wiltingcomponents.com

ZME VOF

ZME offers precision machining using modern machinery like turning lathes with driven tools and machining centers of the brands Benzinger, Spinner and Chiron. Maximum accepted diameter is 40 mm for the lathes. ZME has, despite the small size, a quality assurance system operational and is used to just-in-time deliveries and stockholding of parts. ZME is specifically good at producing parts in series but realizes that the market demands smaller series in shorter lead times and is working to follow this trend, ZME is probably the only precision machining company proudly operated by female personnel only.

ZME VOF
Rijksstraatweg 28,
3545 NA UTRECHT (NL)
Contact person:
Mrs. Nikki van der Zouw
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ZYGO LOT

ZygoLOT is the European Headquarter of ZYGO Corp., US. ZYGO designs, manufactures, and distributes high-end optical systems and components for metrology and end-user applications. ZYGO has two divisions: Metrology Solutions Division and Optical Systems Division. The Metrology Solutions Division is comprised of two business units: Metrology Instruments and Precision Positioning Systems. This division’s products employ various optical phase analysis techniques for surface shape, texture, roughness, and film thickness. The Optical Systems Division is comprised of two business units: Electro-Optics and Optical Components. These groups leverage ZYGO’s expertise in optical design and assembly, and high-volume manufacturing of precision optical components and systems, for the medical/life sciences, and industrial markets.

ZYGO LOT
Im Tiefen See 58, D 64293 DARMSTADT (D)
Contact persons: Mr. Peter Kuschnir, Mr. Torsten Glaschke
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Our Commitment
Aerotech’s commitment to advancing its product and value-added service capabilities is summed up in our motto, Dedicated to the Science of Motion.

From concept to final certification, Aerotech applies its engineering expertise and skills, along with unrivalled motion control and positioning technologies to provide:

• The lowest cost of ownership
• Highest throughput
• Highest accuracy
• Best return on investment

With over 100,000 positioning axes installed world-wide, Aerotech provides innovative solutions for challenging motion control applications in semiconductor, flat panel, medical device, life sciences, laser processing, electronics manufacture & test, photonics, solar panel, automotive, military/aerospace, and many other markets requiring high precision, high performance motion control solutions.

Component-To-System Solutions
The comprehensive range includes technically superior linear and rotary air- and/or mechanical-bearing positioning stages with advanced motion and machine controls that are individually supplied or interconnected to form high performance positioning sub assemblies or completely custom engineered motion systems.

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E sales@aerotech.co.uk
I www.aerotech.co.uk

Precision in Performance

Etchform is a manufacturing and service organization for etched and electroformed metal precision parts

Etchform provides customised solutions for metal precision parts:

• Production of thin metal precision parts by means of precision etching & electro-forming.
• Standard copper and stainless steel alloys, but also specialties such as beryllium copper, Elgiloy/Phynox, gold, Invar/Kovar, molybdenum, silver and titanium.

• One-off and mass production.
• Additional surface and heat treatments as well as precision mechanical, assembly and logistic services can be offered.

We also supply MicroNano metal parts and tools such as:

• MicroNano Moulding Tools, Stamps, Shims.
• Micro Stencils.
• MicroNano Parts: micro precision parts, filter sieves, vaporizer nozzles, ink-jet nozzles, apertures, probes, gears.

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layers and ion-implanted surfaces. Measurements can generally be undertaken without complex sample preparation. Thus the Picodentor HM500 is suitable not only for use in laboratory conditions, but also for quick deployment in production monitoring. With high-precision distance measurements in the picometer range and force control at a level of just a few micronewtons, hardness measurements are possible even for ultra-thin coatings. Featuring a repeatability of ≤0.5 μm, the high-precision, programmable xy-table allows measurements on even very small structures. Its compact design and granite base make the Picodentor HM500 stable and isolated against vibration. To avoid environmental influences, the system operates within a closed chamber and uses an active vibration-damping table. The Picodentor HM500 also has an enhanced optical system for higher resolution of extremely small structures and a motorized z-axis with autofocus. Easy and intuitive operation is possible by the customizable, multi-language WIN-HCU software. An atomic force microscope can be integrated as an option.

Fischer is an innovative specialist in the field of coating thickness measurement, material analyses and instrumented micro hardness testing.

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E info@helmutfischer.nl
I www.helmutfischer.nl

Fischer is an innovative specialist in the field of coating thickness measurement, material analyses and instrumented micro hardness testing.

With the Picodentor HM500, Helmut Fischer has launched a high performance measuring system for determining micro-hardness according to ISO 14577 and ASTM E 2546. This instrument is ideally suited for the determination of the Martens hardness (HM), elastic characteristics and other material parameters of hard coatings, thin DLC coatings and coatings on glass, CDs, hard disks and sensors, as well as of thin paint

LEMO is the acknowledged leader in the design and manufacture of precision custom connection solutions.

LEMO’s high quality push-pull connectors are found in a variety of challenging application environments including medical, industrial control, test and measurement, audio-video, and telecommunications.

LEMO has been designing precision connectors for six decades. Offering more than 50,000 combinations of product that continues to grow through custom specific designs LEMO, and it’s affiliated sister companies REDEL and COELVER, currently serve more than 100,000 customers in over 80 countries around the world.

LEMO is the standard connector supplier in several markets. This is due to the many benefits that LEMO Connectors can offer you. To name a few advantages:

• UL Recognized
• Mating cycles >20,000
• Up to IP 68 protection
• Resistant to -55 °C to 250 °C
• Many contact configurations

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Sterilizable motors EC 13 and EC Size 5 - 50 Watt Drives for Medical Technology.
For the use in high speed medical applications of up to 90'000 rpm, maxon motor extends the product range by two sterilizable 50 Watt drives “EC Size 5” and “EC 13”. Stand-alone, or as motor/gear combination, the drives stand out by high power, extremely low-noise and low-vibration operation, marginal heat generation and minimal size – welcome characteristics particularly in medical handheld power tools.

The solution is always a matter of the right combination.
maxon motor develops and produces brushless and brush DC motors with an unique ironless maxon winding, up to 500 watts. Our modular program is complemented by flat motors with an iron core. The modular system with planetary, spur and special gearheads, sensors and control electronics, completes the range. High-tech CIM and MIM components are produced in a special competence center.
We combine motor, gearhead and electronics according to customers’ specific requirements to create an integrate total solution. We are driven by your specific requirements.

We are pleased to inform you about our newest high-precision drive systems.

EPOS2 24/2 - Miniaturized Positioning Controller – No Ifs, No Buts.
The EPOS2 24/2 quasi represents the synonym for the currently possible degree of miniaturization in positioning controller design. More power, more functionality, and more comfort in such a small space are today almost impossible.

The new linear DC servomotor includes 3 analogue hall sensors for position and speed control/feedback eliminating the need for an additional encoder in most applications. The 3 output signals, are 120° phase shifted, and are used by an external motion controller for commutation and speed and position control. The FAULHABER MCLM series motion controllers are available with RS232 and with CAN interfaces. The easy to use “Motion Manager” software makes parameter adjustment and motion control simple and fast.

This micro sized powerhouse is suitable for application in all fields where high precision linear movement in the most compact dimensions is necessary. The motors are highly efficient and maintenance free. Based on their simple frictionless design the motors provide extremely long operational lifetimes.

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info@minimotor.be
I www.faulhaber.com
The World’s Smallest Brushless DC Servomotor with Integrated Motion Controller

A new Ø22mm innovation extends the portfolio of four pole brushless DC servomotors.

 Faulhaber has extended its BX4 range of four pole Brushless DC Servomotors with the introduction of the series 2232 / 2250…BX4 CSD/CCD, the world’s most compact drive with integrated motion controller. This new series combines all the advantages of the BX4 four pole brushless technology with a single axis motion controller. High reliability, high torque, compact slotless design with no cogging torque, and robust construction without the use of adhesives make this new series ideal for complex applications like robotics, automation, medical and laboratory technology, specialty machinery and aerospace.

The drives are based on the flexible and easy to use FAULHABER motion control platform. The compact motion controller, which fits within the diameter of the motor, combined with the motor and a full range of gearhead combinations provides a versatile modular platform for a variety of applications. The drives are available with a RS-232 serial or CAN interface. Configuring the drives is simple using the free FAULHABER Motion Manager 4.4 software. The drives have a wide operational temperature range from -25°C to 85°C and provide a continuous current up to 0.69 A with a peak of up to 3 A. The speed can be precisely controlled from down to 5 rpm and up to 8000 rpm. Custom firmware and software are available on request.

The new series are available in two different motor lengths of 32 mm and 50 mm with a supply voltage of 24VDC. The very flat slope of the linear torque to speed curve and the extremely high torque to volume ratio of the motors with up to 18 mNm respectively 35 mNm continuous duty torque make these drives unique in combination with a motion controller.

Nijdra Groep - Precision is our Profession

The Nijdra Groep is a full-service, family-owned organisation and is specialised in high precision components and mechatronic modules.

The Nijdra Groep consists of the following business units:

1. Fine Mechanical Industry (turning & milling);
2. High-tech Mechanical Industry (grinding);
3. Nijdra Special Products (engineering & assembling);

The Business Unit Nijdra Special Products (NSP) engineers, assembles and delivers strategic modules like the Goniometer (module for the X-ray diffraction machine) with an assembled tolerance of 3 micron!

The Nijdra Groep is ISO 9001 and ISO 14001 certified. The final implementation and certification of the ISO 13485 at this Business Unit will take place at the end of 2010.

Due to our high skill of automated and robotizing machines we can produce 24/7 unmanned. Cost efficient production on our robotized 5-axis milling machine and our Flexible Manufacturing System (FMS) are especially for low volumes, high mixtures and short delivery times.

With our experiences in several high-tech branches we can create a surplus value for our customers by supporting them at the design of new projects, but also with value engineering of already introduced products.

PRECISION IS OUR PROFESSION!
EFD®’s PicoDot™ Jet dispensing system

High production speed and exceptional accuracy in product miniaturization trend.

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Compact 6D Manipulator for Microassembly

SmarAct develops, produces and distributes piezo-based micro- and nanopositioners, advanced control systems and tools for the micro- and nanoworld. In addition, SmarAct offers complete micro- and nanomanipulation systems, ranging from XY tables over 6D manipulators to multi-manipulator systems.

The compact positioning systems combine sub-nm resolution with a high straightness and cm-sized travels. They can be applied in normal pressure as well as in vacuum conditions.

An example for a compact nanomanipulator is the SmarPod 70.42. It provides six degrees of freedom that can be used to position samples in microscopes and synchrotron facilities, or to assemble microoptical components.

Despite the compact design (70mm diameter, 42mm height) the SmarPod 70.42 provides relatively large travel ranges e.g. 11mm for planar translation, 6mm for vertical translation, 20° for tilting and 30° for rotation. Due to the integrated nano encoders and piezo-based SmarAct actuators the SmarPod 70.42 can move with high resolution and repeatability - completely free of backlash.

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ZeGage™ - Robust and Affordable 3D Optical Profiler for Precision Surface Metrology on the Production Floor

Booth: 152

ZeGage™ is the ideal non-contact optical profiler for quantitative measurements of 3D form and roughness on precision machined surfaces.

Zygo Corporation is a worldwide supplier of optical metrology instruments, high precision optical components, and complex electro-optical systems design and manufacturing services. ZygoLOT is the European head quarter for Zygo Corporation.

ZeGage™ is the ideal non-contact optical profiler for quantitative measurements of 3D form and roughness on precision machined surfaces.

- Quantitative surface metrology with nanometer-level precision provides superior gage capability.
- Selectable magnification and field-of-view with numerous imaging and system options.
- Measures a wide variety of surface materials and parameters, including 2D and 3D profiling of surface texture, form, step-height and more.
- High resolution 1 million pixel image sensor provides fast areal measurements in seconds, for excellent surface detail and visualization.
- Integrated autofocus and focus aid simplifies part setup and minimizes operator variability.
- Cost-effective price-to-performance ratio compared to alternative systems, including mechanical contact stylus profilers.

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The LiS is founded in 1901 by the famous scientist prof. Kamerlingh Onnes. Nowadays the LiS is a modern school for vocational training on level 4 MBO-BOL. The school encourages establishing projects in close cooperation with contractors and scientific institutes, allowing for high level “real life” work.

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Carl Zeiss Industrial Metrology is the world’s leader in CNC coordinate measuring machines and complete solutions for multidimensional metrology in the metrology lab and production environment. We also provide contract programming and contract measuring in our newly founded Measuring House near Eindhoven (NL).

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ACE has developed into a leading engineering and consultancy firm with a strong focus on precision mechanics and mechatronics. Services include conceptualization, development, engineering and prototyping.
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Faulhaber is a leading manufacturer of miniature drive systems based on ironless micromotors with the highest power-to-volume ratio.

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• Positioning systems
• Drives
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Manufacturer of among others: gears, rack, couplings and linear systems
Your company profile in this guide?

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Mikroniek is the professional journal on precision engineering and the official organ of the DSPE, The Dutch Society for Precision Engineering.

Mikroniek provides current information about technical developments in the fields of mechanics, optics and electronics and appears six times a year.

Subscribers are designers, engineers, scientists, researchers, entrepreneurs and managers in the area of precision engineering, precision mechanics, mechatronics and high tech industry. Mikroniek is the only professional journal in Europe that specifically focuses on technicians of all levels who are working in the field of precision technology.

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For questions about advertising please contact Gerrit Kulsom at the Precision Fair, booth 61.

Or dial: 00 31 (0)229 211 211 E-mail: sns@wxs.nl

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**More options in machining complex precision parts**

Parts produced by Optiwa are used, for example, in the most accurate electron microscopes, air bearings and optical modules for water stepper, specialized medical and analytical equipment.

Optiwa is able to offer you a series of production process for parts with tolerances down to 0.5 micron accuracy (dimensional, as well as form and location tolerances within the sub-micron range).

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Optiwa B.V.
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Chipmakers strive constantly to make smaller and cheaper products. To keep up with this trend, the structures on a chip are getting ever smaller and the wafers ever bigger.

On these increasingly smaller chip structures, even smaller particles (in the order of 50 nanometer) are producing defects that may cause the chip to stop functioning. So it is essential for the manufacturing processes to be extremely clean and for any contamination like dust particles to be entirely removed.

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