

Development of optical systems

Hittech Multin and, especially, Hittech Prontor have broad experience in the development of optomechanics. This involves the expertise required to realise not only stable, robust optomechanics with reliable optical alignment and mountings, but also motion control for mechatronic subsystems such as shutters or accurate stages. In addition, dynamic and thermal stability analyses ensure reliable performance of the mechatronic part of an optical system.

Successful system development calls for meticulous system engineering. This approach leads from good requirement and interface definition at the start to correct verification and validation at the end of a development. Furthermore, there is a constant focus on cost. In close consultation with the system engineer, the optical designer translates the client's measurement and inspection requirements into an optical system. This creative design process is supported by optical tolerance analyses in Zemax. Electronics and software complete the array of technological expertise. This part of the development team is responsible for the design of dedicated



electronics and, frequently, embedded software for (for example) data acquisition, vision or motion control.

Development forms an integral part of the successful production of optical systems. On the one hand, Hittech uses this in the design or modification of optical products for clients; on the other hand, it plays an important role in the realisation of optical systems. The process of assembling optical systems almost always calls again for specialised measurement or inspection tooling, which is usually designed in-house.

Turning a measurement principle into an intelligent, optical measurement principle with an associated Zemax tolerance analysis may be a big step, but converting this into a reliable and affordable total system calls for many different competencies. Accurate mounting and alignment of optics determines the success of a robust, affordable design. This, in particular, is a field that requires much creativity and experience on the part of the designers. Hittech Prontor, which can call on many years of experience, has unrivalled expertise in this respect.

Hittech Prontor – from central shutter to digital microscope



Hittech Prontor's production of components for cameras began in 1902. In 1904, Prontor was already able to meet the demand of camera manufacturers for a central shutter, with the development of its Koilos product. The leaf shutter principle became widely adopted in photography and was constantly improved and expanded upon, due in part to the many inventions of Hittech Prontor employees. In 1976, the entire production of Compur shutters and Hasselblad objective lenses was moved to Hittech Prontor. Today, central shutters are still used for a small number of special applications such

as aerial photography. A piezo-powered shutter is used for this, an invention patented by Hittech Prontor. In this shutter system, the number of parts is reduced to a minimum through the use, in part, of just one leaf system for both the diaphragms and the shutter.

Starting in medical technology

Since the decline of the German photographic industry in the 'seventies, Hittech Prontor's existing capacities were increasingly used to develop and produce

components and modules of medical equipment for the former parent company, Carl Zeiss.

The current 180° rotatable tube (the viewing part of the microscope) was the first project in this field where Hittech Prontor was involved in the development. This tube is still used as standard in almost all Carl Zeiss neurosurgical operation microscopes. It remains an important product of Hittech Prontor. In the following years, a complete re-design of the stereo assistant tube began. Special characteristics of this development are the leaf brakes on all three rotation axes and the prism drives for image inversion. This tube is also still produced by Hittech Prontor.



COLUMN



In this newsletter, we want to make clear that the field of optics is one of our genuine areas of competency. Not only Hittech Multin but also Hittech Prontor have optical expertise and put it to use. They develop and produce many optomechanical modules for various clients. Close collaboration in this field has been achieved between the two companies. Together, they serve the clients. We also describe the NORIA, a new shoot on our fast-growing tree. NORIA is an exciting collaborative venture involving Hittech Multin, NorthLab (Sweden)

and TNO, and is led by Hittech Multin. This is facilitating the birth of a new generation of sensors. We also throw further light on a number of new and interesting matters at Hittech. I am proud that our growth towards increased turnover (€ 110 million in 2015) and the addition of to acquisitions to our group in July last year have gone very well. They have brought us new competencies and new customers.

Dr. Ir. C.P. Heijwegen
CEO Hittech Group BV

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Based on the existing tubes, a new, ergonomically optimised, rotatable tube with integrated image inversion was developed from 2003 in conjunction with Carl Zeiss for the latter's microscopes. In this, Hittech Prontor was responsible for the optics and the mechanics of the housing. This product is completely manufactured and assembled at Hittech Prontor.

In 2010, Hittech Prontor developed a stereo camera module with two high-resolution cameras and then put it into production. These cameras are integrated into a highly accurate, optomechanical system. This stereo camera module produces brilliant 3D images of micro-surgical procedures, for example for documentation or presentations in university lectures.

Diaphragms for semi-conductor lithography

In 1999, development started on a diaphragm with an optical diameter of up to 256 mm. That makes it the biggest diaphragm ever developed and built by Hittech Prontor. As the diaphragm opens, its vertical positioning is adjusted in a synchronised fashion. Apart from the enormous diaphragm aperture, this product's challenging requirements were resistance to wear, freedom from dust particles in an aggressive

environment, and long endurance of the objective lenses. Via Carl Zeiss, these diaphragms were delivered to ASML.

Objective lenses for the film industry

In 2001, in collaboration with Carl Zeiss, development started on high-end objective lenses for the film industry. Hittech Prontor's focus in this was on the lens mountings and mechanical construction.

In 2012, Hittech Prontor assisted Carl Zeiss in the development of a new series of high-end, anamorphic objective lenses for the film industry. To cater for the various focal lengths, the construction was modified, the movement of the lenses was optimised, and the full production documentation was drawn up.



Roboxis Packaging: getting ahead to new market opportunities with Value Engineering

In 2014, Roboxis Packaging installed its first egg-packing system for a Dutch client. In tandem with the Moba sorting machine, this EP60 system packs 60,000 eggs per minute, and with the aid of the patented T-Robot these are stacked fully automated in boxes or crates. These are then

palletised for transport to the supermarkets. Roboxis Packaging's aim was to enter the market with a new and even more productive system, so that more eggs can be processed, and with more packing options, using the same system.



Using the EP60 system as a basis, a project was initiated with Hittech Multin's Value Engineering department to embody the above requirements in a new machinery concept. They also worked closely with an end user. In this packaging market, the final price of a system is closely connected to the savings that can be made through using the system. The variety of packaging and wrapping types give rise to high demand for a system which has a high throughput and good reliability, but also can provide flexibility and structural simplicity. With this EP80 platform, we succeeded not only in satisfying a higher demand for capacity (80,000 eggs per hour), but also in creating a system that could pack and stack both folding boxes and display/pallet boxes.

In the meantime, the EP80 is being built: the end result of a challenging, exciting and successful Value Engineering project that led directly to the sale of two new EP80 systems.

Besi modules at Hittech Assembly Malaysia

Hittech Assembly Malaysia started up in 2008 with the transfer of an existing module from Hittech Multin in Delft to Kuala Lumpur. By catering for this module's full supply chain in Malaysia and simultaneously switching to cheaper local suppliers via intensive sourcing, the transfer of this module was successful and the module price for the client could be considerably reduced.

We have seen steady growth in Malaysia, and in October 2013 Hittech Assembly Malaysia relocated to a new 1000 m² building in Subang Jaya. There, in addition to Hittech Assembly Malaysia's existing activities, an engineering department was established for work in Solidworks and ProE for our internal and external customers.

Hittech Assembly Malaysia recently began assembling two new modules, the Roll-Out and the Die-Ejector, which are used in the ESEC platform of Besi Semiconductor. Over the coming months they will also start production of two modules for Besi's Datacon platform. For these modules, an extensive training course had to be followed in close cooperation with our customer. For example, the Roll-Out module requires accurate alignment for three interdependent movable axes. To assure continuity of performance and quality, Hittech Assembly Malaysia developed an in-house training programme for its present and future technicians. Furthermore, ERP software and assembly software were implemented.

Thanks to skilful supply chain management, competitive pricing and further strengthening of the organisation, Hittech Assembly Malaysia brought in orders for various new modules from its biggest Malaysian customer, Besi Apac Sdn Bhd. In 2014 and 2015, Besi awarded Hittech Assembly Malaysia the status of preferred supplier.



NORIA launched at Laser World of Photonics fair in Munich



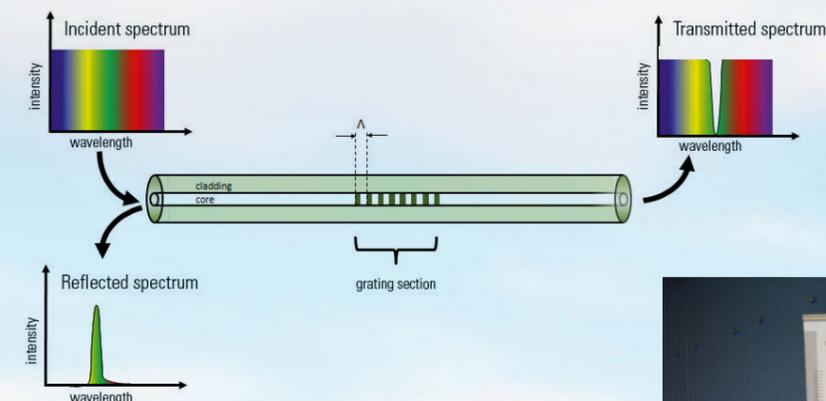
On the 22nd of June, the NORIA was presented to the world. The NORIA is an optical lithography system for the production of fibre Bragg gratings. The development of the NORIA was initiated by TNO, and it was further developed into a reliable, high-tech product by Hittech Multin in collaboration with NorthLab Photonics in Sweden.

The NORIA uses a class IV ArF excimer laser. This laser generates very short light pulses of a few nanoseconds at a wavelength of 193 nanometres. Using this light and a mask, a periodic pattern is written into the core of an optical fibre. This periodic pattern is known as a Fibre Bragg Grating, or FBG.

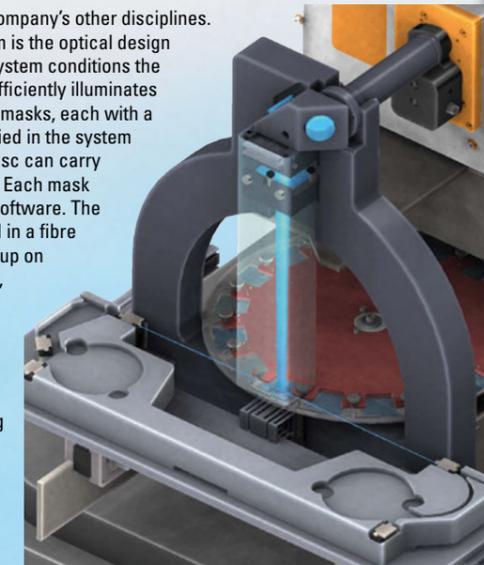
An FBG (see figure 1) is used to measure various parameters, such as temperature, strain and pressure. These FBGs are mainly used in difficult conditions where electric sensors cannot be used.

The operating principle of an FBG

Broadband light, i.e. light with various colours, is led through an optical fibre. Each light colour represents a different wavelength. A single colour of light, or wavelength, corresponds exactly to the period of the FBG. This colour is reflected, while all the other light colours continue undisturbed. When the optical fibre is stretched, the period of the grating will change. This also changes the colour of light that is reflected. By putting multiple FBGs, each with a slightly different period, on one optical fibre, it is possible to read several sensors simultaneously using just one optical fibre.



to collaborate with the company's other disciplines. At the heart of the system is the optical design of the NORIA. The lens system conditions the laser beam such that it efficiently illuminates the optical fibre. Various masks, each with a different period, are carried in the system on a rotating disc. This disc can carry up to 16 separate masks. Each mask can be selected via the software. The optical fibre is positioned in a fibre holder. This holder is set up on a motorised, linear guide, so that the optical fibre can be illuminated in a variety of positions. Finally, an innovative optical fibre positioner has been designed; using this, the optical fibre is picked up from the holder and accurately positioned at the focal point of the optical system and at the correct distance from the mask.



A considerable amount of time has been spent on establishing a practical business strategy. TNO was responsible for initiating the NORIA concept and had built an operating laboratory setup for this purpose. Hittech Multin became the partner in development and production, and the partner with access to the market was found in Sweden. The company NorthLab Photonics is a well known participant in the market for optical fibre processing equipment. On 31 March this year, a joint venture was set up between TNO, Hittech Multin and NorthLab Photonics under the name of Noria Fibre Technologies (NFT). The company is headed by Peter Reijneker, who is also the Managing Director of Hittech Multin.

Laser World of Photonics is an international trade fair held in Munich, focusing on the laser and photonics industry. The 4-day fair was a great success, bringing a lot of attention and positive feedback for the NORIA. Over 40 direct contacts were eventually made with companies interested in buying a NORIA. In brief, it was a tremendous success.

The use of light rather than electronics offers a measurement solution in conditions where other technologies no longer suffice. One example is an oil well, kilometres below ground level, with a high pressure and temperature. Another is an MRI scanner (powerful magnetic field), in which these sensors can also still be used safely and efficiently.

The NORIA is the solution that allows (optical fibre based) sensor manufacturers to produce their own FBGs instead of buying them. The FBG quality, rapid availability and reduction in cost price per FBG are very important factors here.

The development of the NORIA is one of the first projects in which Hittech Multin's recently established Optics Department has been able



See also: <http://www.northlabphotonics.com/product-category/fbg-manufacturing/>

Expansion at Hittech Machining



DMG CTX800

Hittech Group is successful in the field of optics. This resulted in demand for more complex products from Hittech Machining.

In the components of the optical devices, a helix form is often used to facilitate adjustment (for focusing). Together with a need to expand, the demand for these helix forms led Hittech to purchase a DMG CTX800. This machine is actually a lathe incorporating a complete (5-axis) milling machine. As usual with Hittech Machining, also this machine is able to make products in the micron accuracy range. In addition, the machine has special options such as high-pressure cooling and bur removal to guarantee a smooth surface. The machine has been installed at Hittech MPP.

DMG Mori NLX1500

Another development in the market is 'globoid gearing'. Using this type of gearing, a higher torque can be transmitted using the same structural dimensions. Here too, a demand for expansion is linked to a new processing possibility, and this has resulted in a new lathe: a Mori NLX1500 machine, installed at Hittech Bihca.

With both machines, the developments in 'smart industry' were taken into account and we opted for software that can be linked to the ERP system and to automation.



DMU Mori 105MB

Furthermore, a new DMU Mori 105MB 5-axis milling machine has been purchased for Hittech MPP, to mill large, complex, titanium components. This machine, which has a working range of 1400 x 1240 x 750 mm, will be delivered in October.



Trade fairs

Over the coming months, the Hittech Group will be represented at a number of trade shows, namely the Compamed, the Precision Fair and the Nortec. Compamed is the fair for suppliers to the medical sector, which is part of MEDICA in Düsseldorf, Europe's biggest medical trade fair. The Precision Fair is the pre-eminent venue for high-tech Dutch technology, where Hittech attends already for many years. Finally, our machining companies will present themselves to the public in northern Germany at the Nortec Fair in Hamburg. At the various fairs we will display the latest developments within our companies and, of course, proudly show off our latest products and competencies.

COMPAMED



Compamed 2015
Messe Düsseldorf
Stand H29.4 in Hall 08a
16-19 November 2015
Registration: www.compamed.de



Precision Fair 2015
De Koningshof Veldhoven
Stand 38
18 & 19 November 2015
Registration: www.precisiebeurs.nl



Nortec 2016
Hamburg Messe und Congress
Stand 124, Hall A1
26-29 January 2016
Registration: www.nortec-hamburg.de

Hittech Multin's new building



After years of preparation, Hittech Multin's new building is almost finished. No more artist's impression in the photo, but a real building. Handover is planned for October. We will relocate a month later. In terms of space and logistics, it is a big step up for us. We will have more than 3500 m² of standard production space and a big 650 m² cleanroom. It also means we will be close to our sister company, Hittech MPP, which will make the cooperation between our companies even better.

Hittech Foundry Nunspeet invests in a Laempe LL20 core shooting machine.

Recently Hittech Foundry Nunspeet has expanded the core capacity by purchasing a Laempe core shooting machine type LL-20 Coldbox.

This allows complex six-piece cores to be produced with a volume of 20 liter. With the automatic clamping system product changes can be done within minutes, so the flexibility is further increased. The machine will be operational by mid-October.



Hittech Group Update

Dymphia Roeterdink Logistics Manager Hittech Bihca



My name is Dymphia Roeterdink and I started at Hittech Bihca in Winterswijk per the 10th of August. After my education Logistics Business, NIMA A and B and APICS CPIM, I have worked in several business areas in several jobs, from Sales, Product Management and Logistics in the Fast Moving Consumer Goods till the production of Cooling Fans. The theme in all these years was optimizing the total process from customer to supplier and the use of ERP as a tool. I am married and we have two sons.



Masters in Improvement

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