

Hittech headquarters in The Hague officially opened



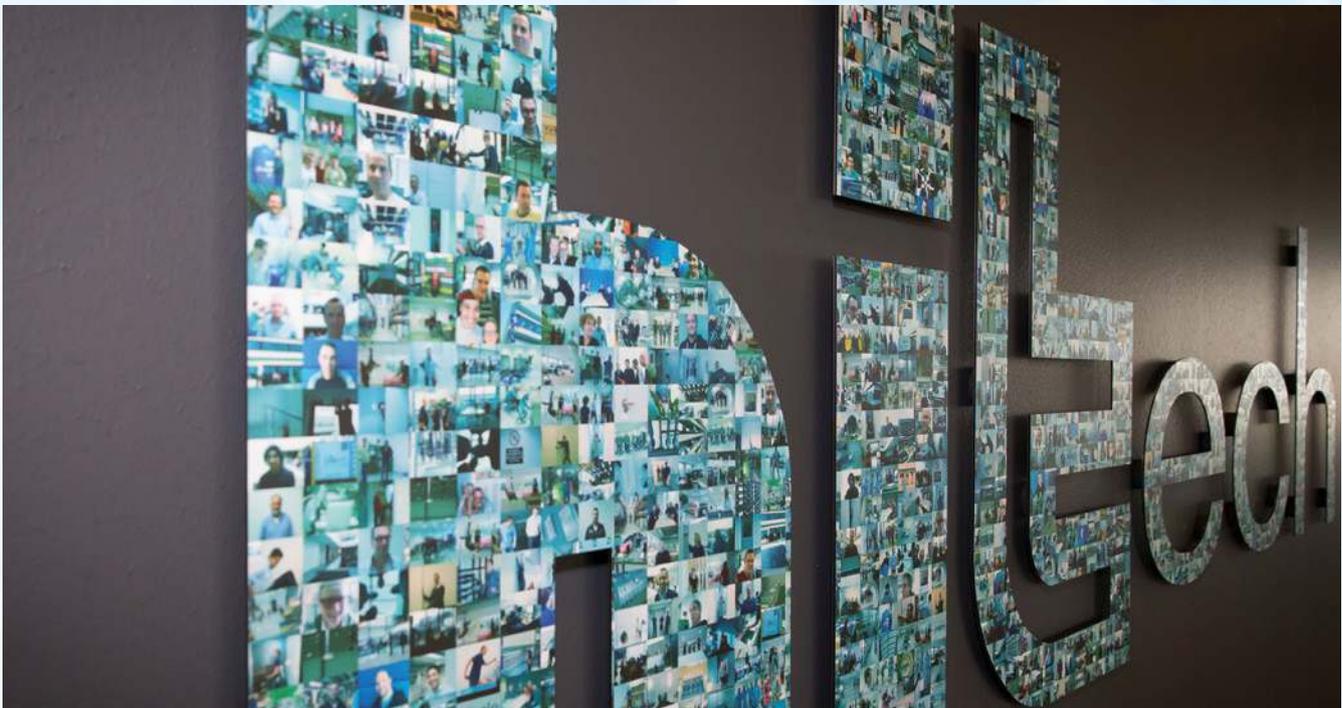
Over 200 relations witnessed on 14 April 2016 the supreme moment when Cor Heijwegen, President of the Hittech Group, and guest of honor Franz Joseph Kemp, German Ambassador in the Netherlands, jointly performed the opening ceremony. The presence of the ambassador emphasized the important Dutch/German relations in our daily operations, which have taken a major step since our acquisition of Hittech Prontor in 2014.

With the push of a button an animation was started in which a specially designed Hittech opening logo was composed of photos of all staff, which underscores that our people are the driving force in growth, innovation and success of the Hittech companies.

We were especially honored with the praising words by Derek Wallace, Vice President Strategic Sourcing & Procurement at ASML, in which he expressed his appreciation for our approach and way of working.

All the guests were given a tour through the new building and the neighboring facility of Hittech MPP, both located on business park Ypenburg in The Hague. Also, a seminar was held in which customer cases and technical cases were treated, ranging from Value engineering, Optics to Material developments.

We want to thank all interested parties for their visit and their congratulations and we hope to be of service to them, you and our future customers from our state of the art new site.



COLUMN

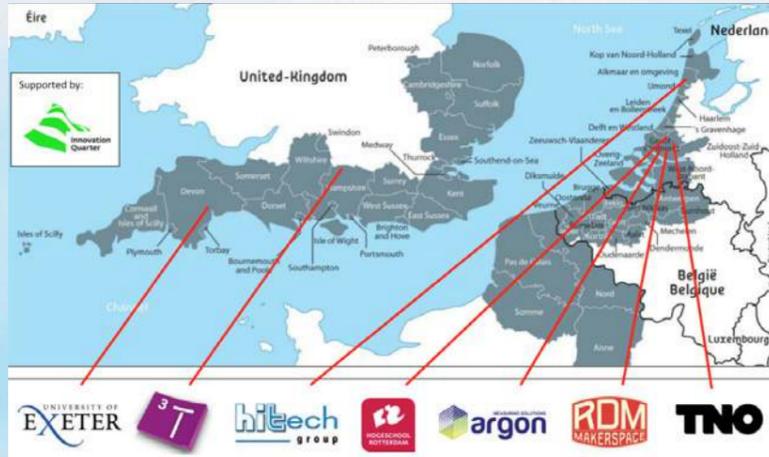


This Newsletter, the second of 2016, gives a good idea of the width of topics of interest which are currently ongoing at Hittech Group. It ranges from the development of a new alloy for a Formula 1 engine through a fine value engineering project, in which three Hittech companies are working together exemplarily, to the opening of our

new beautiful building in Ypenburg and the training of young professionals in our German company. And I haven't even mentioned our new managers yet. In short, there's a lot going on and we are well on the move.

Dr. Ir. C.P. Heijwegen
algemeen directeur Hittech Group BV

Interreg project 'flexible post-processing of 3D printed parts'



At the initiative of InnovationQuarter and Hittech Group, a European consortium was established in 2015 to work together on an optimised and integrated post-processing system for 3D metal printing. A major challenge for the 3D metal printing industry is to arrive at a real production technology phase through further development. The disadvantage of metal 3D printing is that the current post-processing process is a costly, inefficient and time-consuming activity. At present there are several techniques for post-processing 3D metal printing parts,

but these techniques are not integrated into a single process. The consortium, consisting of the province of South Holland and parties Hittech Group, TNO, Argon, Rotterdam University and RDM MakerSpace, is collaborating with the British 3T RPD and University of Exeter to tackle this problem. Apart from the above main partners, 23 observer partners from different sectors and countries have given their signatures for support and input from user cases for this project. A project proposal with a volume of € 3.5 million was submitted by Interreg 2 Seas, of which 60% is funded by Interreg.

Result:
The 3D project will result in an inline production process for high precision post-processing of 3D metal printed parts. Solutions will be created that are required in order to automate the printing, post-processing and polishing. The whole chain of 3D printing, high-precision milling of metals, sensor technology, software, robotics and mechatronics will be engaged to work together, in order to create this solution. An innovative clamping system will be developed for complex near net shape parts. The preparation of the current clamping systems and the accurate positioning of the parts is complicated and often takes several hours. Using the clamping system that is currently being developed, we want to reduce positioning time to a few minutes.

RSP alloys for Formula 1 purposes

RSP develops and produces aluminium super alloys by melt spinning. The development of new alloys is a dedicated process based on strong, long-term partnerships. Developments of alloys often result from the limitations of conventional materials which are used in demanding applications.

One of RSP's development partners is a Formula 1 team. The object of a recent project was to improve the engine performance by improving performance of the turbochargers. The turbochargers can be improved by reducing the weight of the compressor wheel; the so-called impeller (figure 1). Representative for the material performance of the impeller is the specific material fatigue at 250°C. The starting point is a common conventional alloy with a certain material fatigue limit and density: (Conv Alloy 1 in figure 2). Alternative conventional alloys that have a better fatigue limit are available, but as a result, they have a higher density: (Conv Alloy 2 in figure 2). An impeller made of such an alloy can withstand higher loads, but as a consequence it is heavier due to geometrical design limitations. All of this combined will not lead to an overall improved impeller.

RSP's melt spinning process provides a large alloy-freedom and allows for the development of high-alloyed materials, using elements that have a low density while, at the same time, adding performance enhancing elements. This forms the basis for a new alloy with improved fatigue and lower density: RSA-612 (figure 3). This alloy automatically reduces the weight of the impeller, without requiring any redesign. In addition, it also improves the load capacity.

In short, RSA-612 has a unique set of properties which can only be achieved by the melt-spinning technology. The specific fatigue (=fatigue/density) provides an improvement of 30% compared to the best conventional materials. RSA-612 has been used in Formula 1 impellers since the racing season of 2015.



Figure 1

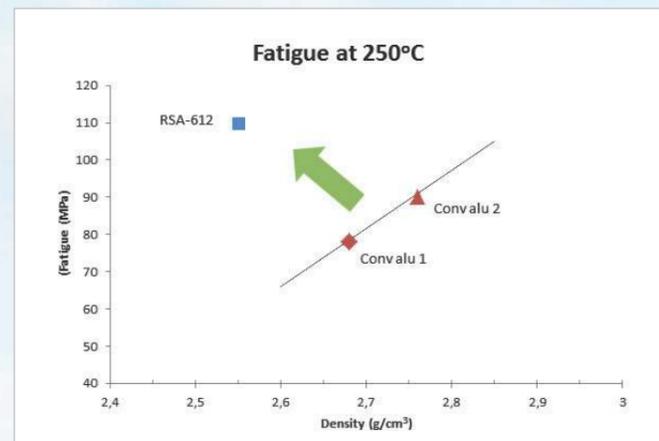


Figure 2

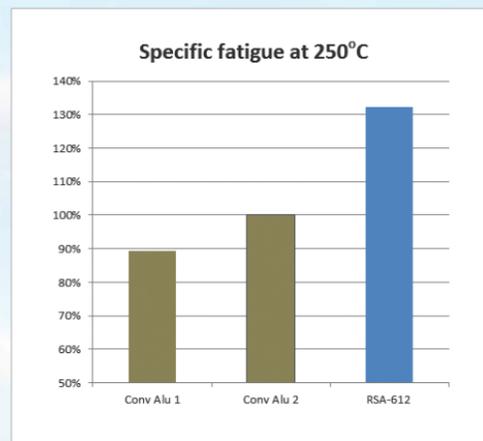


Figure 3

Carrier Handler cast frame project of three Hittech companies

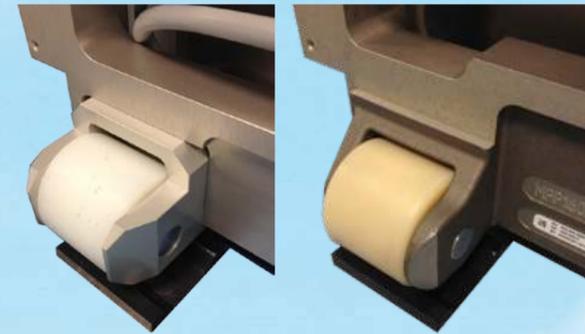
Combining the expertises within the Hittech Group provides our clients with good business cases to lower the cost of their products. The casted Carrier Handler frame for one of our clients in the semiconductor market is a good example where this is clearly visible. This accurate and stable frame made of machined aluminium is part of a product that we build in series at Hittech Group.

Thanks to a value engineering project by Hittech Multin, in close cooperation with Hittech Gieterij Nunspeet and Hittech MPP, a large cost reduction has been achieved for this product.

Using the casting technology has also resulted in great environmental advantages being achieved, namely much less material being required and much less machining time. During this project, the design was optimized both for the total solution and in the separate steps of the production process. For example, an optimum was found between the level of detail of the casting work and the cost of the machining.



From the casting-mould to the assembled product



The use of a sand-casted base is part of the cost reduction, in which the casting process has made it possible to integrate a number of separate components. By applying an appropriate post-processing of the moulding part, the part can be used in our clients' clean room environment.

The other part of the cost reduction is realized by adapting the design and thereby avoiding the use of special machining tools. Furthermore, the model has been fully optimized for both the clamping and the measuring of the frame.

After a prototype phase in which all functional and cleanability requirements are defined, the casted frame is seamlessly transferred into series production.

Casting gives the opportunity to integrate different parts into our casting, which leads to a cheaper product

Machining of titanium and the importance of the material designation

Around 2008 there was a clear increase in demand for products made of titanium at Hittech. In January 2009 Hittech had already started delivering a so-called carrier for the semiconductor industry, which is made entirely of titanium and is still being produced to this day.

Over the years there have been several improvements in the field of cutting tools and milling strategies. Improvements in the material area have mostly been neglected.

The indication on the product drawing is mostly grade 5 or grade 2, referring to the ASTM standard, where ASTM B265 refers to strip ("sheet" and plate) and B381 refers to blocks (forged titanium). This ASTM standard is so broad that ordering in accordance with this standard results in a lot of problems for machining (in addition to product differences). After all, machining requires a fine and uniform structure. The ASTM standard has very few requirements here; AMS, on the other hand, requires a check on microstructure. In other words, with an AMS standard with a properly prescribed microstructure, the machinability is much more constant. With materials in accordance with the ASTM designation, there have been cases in the past where the teeth broke after only one minute (normally > 60 minutes), so that the service life of the tool, was consumed.

Choosing for AMS (American Material Standard) (4928 and 4911) titanium thereby shows a more constant service life of the tool and a lower risk of delays. With large massive products (thickness/length ratio > 0.1), it is also advisable to melt the material again (remelt). This creates a very fine machinable structure (e.g. "triple remelt").

This knowledge is gained by working together with a reliable supplier in respect to materials. Hittech sees its relationship with clients as a partnership and has chosen



to share this knowledge. Based on this, other machining subcontractors are now also ordering from this client, in accordance with this standard.

When carrying out intermediate annealing treatments, in particular with sheet materials, dimensional variations (in particular, shrinkage) up to 0.05% may occur. This material changes can be reduced by choosing material with a VCF (Vacuum Creep Flattening) treatment. By applying this treatment, the shrinkage is more or less halved.

Vocational training at Hittech Prontor

At Hittech Prontor, vocational training takes place in a 'dual' system, which is the most common form in Germany. Depending on the job profile, vocational training takes 2½ to 3½ years but, in case of excellent performance, can be shortened by half a year. At Hittech Prontor we are proud that this is a regular occurrence, also this year.



What is a dual training?

Most state-approved vocational training (currently around 350) have been designed according to the dual system. "Dual" is a two-part form of training on two different training locations. The theoretical knowledge is transferred in the school of the student, and practical knowledge and skills are gained working in the company.

Vocational training usually takes place one to two days a week in addition to the operational work. In some embodiments of the school, classes are held in block form; here the students alternately spend a few consecutive weeks at school or in the company.

During the dual program, two important exams take place that have to be taken at the IHK (Chamber of Industry and Commerce). The final exam part 1 is taken halfway through the course and counts for 40% of the final grade. The final exam part 2 is taken at the end and counts for 60%. Both results determine the final grade. By passing the exam, the training is completed. A completed course provides a professional qualification equivalent to level 4 of the EQF (European Qualifications Framework).

You can then follow further training, for example, to achieve a Meister Title, a Master's degree or an Engineering Title.

Training at Hittech Prontor

At Hittech Prontor, vocational training takes place in our own training centre, where the first basic skills are taught and courses (pneumatics, control engineering (PLC), CNC, measuring technique) take place. Furthermore, the training centre provides support when working on series production and in carrying out complete projects, such as the recent development and production of a leak test-setup for machined castings. During the rest of the training, the students work through all the departments in order to apply what they have learned, in practice.

In recent years, an annual average of 25 of these students studied at Hittech Prontor.

Hans Alfter Managing Director at Hittech Prontor



My name is Hans Alfter, I'm 52 years old, married and I have twins aged 21, both of which began their studies last year. On 1 August 2016, I started as managing director of Hittech Prontor GmbH in Calmbach.

After an electrical engineering education, I followed a study in physical engineering at the University in Aachen. Immediately thereafter I followed a study in biomedical engineering at the "University of Dundee" in the UK. In January 1993 I started my career in medical technology at Johnson & Johnson, first with sales in Germany and then in management. Between 2000 and 2012 I have worked at several medical companies, such as Boston Scientific, Medtronic and Nucletron. My duties as a director were first and foremost managing international sales and marketing, but also leading departments such as financial, human resources, quality and customer service. From 2012, I have worked as an interim manager and consultant at various companies. I love sports and playing the trumpet. I would like to take on the new, exciting and challenging task to continue the success of the company and I look forward to a fruitful and successful cooperation within the Hittech Group.

Lai Kee Kian General Manager Hittech Assembly Malaysia



My name is Lai Kee Kian, I am 43 years old, married and have a daughter and a son. On 1 August 2016 I started as General Manager at Hittech Assembly Malaysia Sdn.Bhd. I have a Bachelor's degree in Mechanical Engineering and an MBA from the University of Queensland (Australia). I have worked in Asian and international companies and have 19 years of industry-specific knowledge, especially in

modules and equipment design and manufacturing in semiconductor, medtech and automotive sectors. My previous roles and functions included management in sales, business development, engineering, project management and general management. I am a strong supporter of "together we achieve more" and synergy, to bring out the best in each other. I am delighted to be employed by Hittech Assembly Malaysia and look forward to adding my value to the Hittech family.

Ruud Masselink, Controller Hittech Gieterij Nunspeet



My name is Ruud Masselink, I'm 52 years old and I live in Zwolle. As of 17 May 2016, I have been working as the controller at the Hittech Gieterij Nunspeet. After my HEAO Register Accountancy, I came to the conclusion that my heart was not really in accountancy and, together with a classmate, I started an automation company. This adventure lasted five years. I then went into regular employment and have held various positions as head of administration, assistant controller and controller. Over the years I started to miss the classroom and 4 years ago, I successfully and enthusiastically completed a Post HBO Financial Controller training course. I'm right where I belong at Hittech Gieterij Nunspeet and I work there with great pleasure. In addition to working, I find relaxation in cycling, meditation, sauna, reading and listening to music.

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group

Masters in Improvement

Hittech Group NL is a publication of Hittech Group BV,
published by Profound Groep BV.

Editor Dr. Ir. C.P. Heijweggen

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MarcelisDékavé, Alkmaar

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for a wide range of branches, at-the-highest levels possible.

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