



## Project "Delta Null"

### ENSINGER Injection Moulding Division – qualified partner to the automotive industry

Last year marked a turning point for our injection moulding division. As never before, the requirements of big automotive suppliers collided with the situation in the division. Our components quite often ensure elementary and safety-relevant functions under the bonnet and, as a consequence, the requirements placed on ENSINGER have risen in the light of increasing quality problems of our customers. ENSINGER was given the status "on hold" (virtually "under heightened observation") during a recall action and, at the same time, we were confronted with the decision whether to continue supplying the automotive sector long term under different auspices or to give it up altogether.

Under the circumstances we decided to fundamentally adapt our procedures to the needs of the automotive industry and to completely turn our management system inside out. At the centre were the elements

- Product development
- Quality system
- Planning and decision fundamentals (management system)

With the help of an external company, the procedures were screened and adjusted in parallel to work on specific jobs which were then newly documented. Product development is now divided into six main phases and numerous single steps, which



Daily quality conference of the research group TQB as part of the continuous improvement process.

are extensively documented. Essential decisions and phase transitions are released internally or in agreement with customers. The requirements of the application are defined in performance specifications. Functional and manufacturing risks are analysed in advance and preventive action is specified. Special attention is paid to the controlled changeover of prototypes or small volumes to mass production, as well as to stable production conditions set up according to statistical criteria.

At the centre of quality management stands the will and the ability of all concerned to scrutinise existing pro-

cedures and procedures on the basis of operating figures and to strive to always continuously improve on the level reached (KVP). Employees refer back to working methods in working groups in order to "crack" difficult problems and to solve them systematically and on a sustained basis.

At defined intervals the management team meets in subject-related meetings and discusses the next steps on the basis of key-data and models.

We still have a long way to go before the new practices become a matter of course and the standards and pro-

cedures will show an advantage, also for all those items "with a previous history". Now and again there are setbacks. But the sum of that achieved is increasing and thus the way we think changes too. Processes do not have to stay as they always were. Employees look closely and point things out. The store of topics fills itself with fresh challenges anew, the presentation boards with tips and suggestions and the machines with trial orders. The results achieved are published and assigned to other problems. Many small solutions slowly produce an extensive effect and some of the key-data begins pointing in the right direction.

My compliments and thanks go to the colleagues in the division – management and team – who have actively driven the improvements forward or, as those affected, have openly and constructively cooperated. The burden in terms of time is high, but the successes and the joy of something new allows us time and again to forget all our troubles. The greatest motivation for all of us is, of course, the fact that we have eradicated the "on hold" status and have no cause to complain about underutilisation and lack of enquiries since we are now qualified or frequently A-suppliers with our customers.

*Klaus Ensinger, Managing Director*

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## Semi-finished Products Division

### New materials for medical applications

**X-ray opaque TECASON P MT XRO and economic TECANYL MT**

ENSINGER has launched its new line of x-ray opaque XRO series, thermoplastic rods with TECASON P MT XRO, in different colours and in diameters ranging from 1 to 2 1/2 inches. This new material meets some of the new challenges created by minimally invasive and im-

age guided surgery. A radio opacifier is added to the standard line of coloured PPSU extruded rods for orthopaedic sizing trials and other instrument devices allowing for clear visibility of the component on fluoroscopy and x-ray. TECASON P MT XRO has been tested to the requirements of ISO 10993 for external communication devices intended for less than 24 hour contact with tissue, bone and dentine.

TECASON P MT XRO ("x-ray opaque") is a technical plastics with

extraordinary resistance to common sterilisation techniques, giving additional safety in medical applications. The new material possesses the same properties as TECASON P MT. TECANYL MT (PPE) is a further shape offering from ENSINGER which is developed especially for medical device applications. The product is made from the raw material Noryl® HNA055 by GE Plastics. The shapes are exclusively marketed by ENSINGER. TECANYL MT is destined for the repeated exposure of up to 1000 autoclaving cycles at 134 °C, without considerable loss of mechanical properties.

The material is excellently suitable for medical device applications, e.g. reusable surgical instruments. It has good strength and high impact strength and it is easily machined.

For the user, TECANYL offers a great advantage due to its high resistance to gamma radiation, steam autoclaving and ethylene oxide sterilisation. Due to its impact strength, it keeps its good properties in a wide temperature range.

The raw material conforms to FDA and EUFC and is biocompatible according to ISO 10993.

#### Exclusivity:

### TECAMAX SRP shapes made from raw material Primospire™

Last year, plastic producer Solvay Advanced Polymers acquired American Mississippi Polymer Technologies, supplier of raw material used in the production of TECAMAX SRP. As a consequence of this takeover, the raw material for TECAMAX SRP, has been subject to a name change: Parmax SRP became Primospire™ Self-Reinforced Polymer (SRP). For ENSINGER customers, there will be no change.

The ultra-performance polymer TECAMAX SRP is exclusively marketed by ENSINGER and has extremely high strength without fibre reinforcement.

Further outstanding properties: **Great mechanical properties:** The unfilled TECAMAX SRP has mechanical values (E modulus, pressure and tensile strength), that are normally only displayed by composite materials. The material behaves isotropically, ie, the properties remain the same in all directions and the thermal expansion is very low.



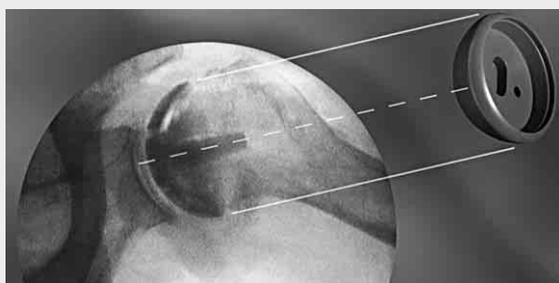
Regarding the specific strength, i.e. strength in relation to low weight, this material exceeds most metals and alloys.

**Maximum temperature range:** TECAMAX SRP maintains its properties over temperatures ranging from -270 °C to 150 °C.

**Chemical resistance:** TECAMAX SRP remains stable towards acids, alkaline solutions and solvents, even at higher temperatures.

**Biocompatibility:** TECAMAX SRP is biocompatible and has USP VI approval. The material dissolves without releasing toxic substances and without outgassing.

TECAMAX SRP passed smoke and toxicity requirements according to ABD 0031 as well as a test concerning outgassing behaviour according to ECSS Q-70-02.



Surgical instruments and test trials made from radio opaque TECASON P MT XRO allow clear visibility of the component on fluoroscopy and x-ray.

## Editorial



Dear Readers,

Ever since it was founded, ENSINGER has placed particular value on offering a wide range of high-performance plastics of the best quality. In this way we were able to produce with our customers semi-finished goods made of fibre-reinforced thermo-

plastics at a time when these were still basically developmental products and the commercial quantities were correspondingly small. These investments in future technologies were highly valued by customers and are an important reason for our growth in recent decades. Ever more important is also the intensive collaboration with raw material manufacturers and hence we are pleased to manufacture exclusively for such well-known raw material producers, such as GE Plastics and Solvay, engineering materials—as you can infer from the articles mentioned on the title page.

Just as the success of our products has increased, so have the requirements of customers. These days, not only the know-how about excellent materials is important, but every industry demands customised solutions. Our customers operate globally in order to be competitive. For that reason, we also provide our know-how locally regardless of where it is needed: Our global group of companies with 40 production and sales subsidiaries provides the right expertise for all industries on the spot. Internet-working ensures that knowledge is transferred quickly, because times change today faster than ever before. Change is only possible with active employees who drive these changes forward – and for this I wish to sincerely thank all of my colleagues. I assure our customers that we will support them in their developments in every possible way. Their challenges will encourage us to achieve new all-time highs.

Today we are trying to help industries more specifically. The medical and semi-conductor industries and specialized mechanical engineering serve

as examples. And only just recently, we are no longer just active all around the world, but way beyond that: Page 5 of this issue is dedicated to the aerospace industry.

What has also changed in the last few years is that people are more conscious of using natural resources. Fossil energy is once again at the top of the agenda of politicians and companies. ENSINGER has two product lines insulbar® and Thermix® which can contribute considerably to saving energy in buildings. Read more about this in the reports from our Building Products Division further down on this page. We believe that this market will continue to grow worldwide, especially in the USA. For this reason, we have made significant investments in our sites in Grenloch, Pennsylvania, and in Bavaria at Cham.

One final remark about our materials: insulbar® building products are produced from fibre-reinforced polyamide 66 – and interestingly enough it is these reinforced thermoplastics which we mentioned above which were research projects at the time and which today help to conserve

the valuable resource energy in a commercial way.

I think you will agree that is an extremely good change for the positive.

Dr. Roland Reber

P.S.: There have also been some changes at management level. Rick Philips, member of the Executive Committee, has accepted a new challenge and has left ENSINGER. For more than two decades he was the driving force behind ENSINGER USA, which made it what it is today: From a small cell in the East of the U.S.A. has emerged a company group with several hundred employees. Rick will nevertheless remain closely associated with the company: As the owner and managing director of Plastifab he will be marketing our products in Canada. Furthermore, we will also be able to continue to profit from his experience as a member of the ENSINGER Board. We wish him all the very best for the future!

## Building Products Division

### BAU 2007 trade fair in Munich

#### A successful start to the year for ENSINGER building products

[Wey] According to official reports from the Messe (trade fair) München, BAU 2007 achieved a new record for visitors. More than 209,000 visitors attended the world's largest specialist trade fair for building and construction materials held over six days between 15th – 20th January. For the first time in more than the 40-year history of BAU, the record of 200,000 visitors was exceeded.

The attending public was never more international than this time: more than 36,000 qualified visitors came from abroad. Visitors attended from 143 countries – that too is a record number.

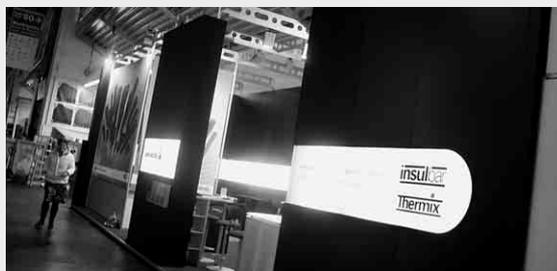
The ENSINGER booth, at which the Building Products Division presented its two product lines insulbar® + Thermix®, was also 'hit' by the boom at the trade fair. On the one hand, visitors were able to receive advice about the numerous solutions for individual and standard systems using insulbar® insulating profiles. An innovative possibility was presented with insulbar® prototyping to provide profiles for pre-trial purposes at short notice. These



products are machined from semi-finished goods using Rapid Prototyping in the original plastic material or extruded identically to volume production using prototype tools.

The ENSINGER stand also presented how the edge bond of insulating glass can be best insulated using Thermix TX.N spacers as well as the simple processing of the products, which was demonstrated with a small bending machine.

At the end of the trade fair it was possible to draw a positive balance: Numerous excellent discussions and contacts shaped the course of the fair, which also allows us to make an optimistic view of the current year.



### The product lines

#### insulbar® – Metal windows, doors and facades perfectly insulated

insulbar® profiles create thermal separation of the inner and outer shells of metal windows, doors and facades. The profiles have been successfully used internationally for almost 30 years. insulbar® standard profiles are available in small graduations (construction sizes from 12 to 36 mm), in straight or offset versions and with versatile functional zones. Furthermore, numerous user-specific, complex geometries have been developed, for example, full profiles or hollow chamber profiles according to the individual wishes of the customer. The highest fire protection re-

quirements are satisfied with special and unique fire protection profiles. Laminations of metal profiles with these profiles can withstand enormous heat development for up to 60 minutes at a time. The versatile range of material solutions made of TECATHERM plastics rounds off the choice of profile design possibilities. A further advantage of thermoplastic insulbar® profiles is that they are made of a single material system and are thus directly material recyclable, in contrast to constructions in which duroplastic foams in particular are used.

#### Thermix® TX.N – the new spacer generation

Thermix® TX.N is a further top product from ENSINGER in the fast growing "warm edge" market. For users of glazing for windows and facades, insulating glass edge laminations with Thermix® TX.N are a sensible and economical investment in energy saving and a gain in comfort. More than 10 years of experience have been put into the development, production and use of spacers in the new Thermix® TX.N product series. Numerous test series with renowned partners in the glass industry, as well as strict testing by neutral institutes, preceded the market launch at the end of 2005. The warm edge spacers have already passed various national regulations, such as the British BFRC rating (A-rating for windows with Thermix® TX.N) and the Avis Technique in France, for example.

Using a combination of stainless steel with high-insulating plastic, the respective material properties are utilised optimally. This leads to very good insulating values.

Thermix® TX.N spacers are suitable for all customary insulating glazing. A considerable energy saving and a clear improvement in room climate can be achieved with Thermix® TX.N in an economical and intelligent manner. Thermix® TX.N guarantees best possible thermo-technical values. Thermix® TX.N spacers are available in the standard colours light grey and black. The product range of Thermix® TX.N spacers comprises of the profile widths 8, 10, 12, 14, 16, 18 and 20 mm.

#### Only for customers

The insulbar® website was expanded with a login area for customers. Here, they can deposit and exchange coded individual data. Requests to: [insulbar@ensinger-online.com](mailto:insulbar@ensinger-online.com).



#### insulbar® standardprogramme

Customers and those who are interested find the range of all insulbar® profiles that can be produced without additional tooling costs in the updated 10 language overview 1/2007.



Download from [www.insulbar.com](http://www.insulbar.com) or [www.insulbar.de](http://www.insulbar.de) or e-mail your request to [insulbar@ensinger-online.com](mailto:insulbar@ensinger-online.com).

## Highest possible reliability of all components

### ENSINGER engineering plastics in satellite antennas

[Hä] The projected lifespan of a satellite ranges from a few weeks to up to ten years – according to the demands of the mission. During this period, communication with the satellite has to be ensured. Were the radio communication system to fail, the satellite and hence the entire mission would be irretrievably lost. In order to keep the probability of a failure as low as possible, only the most reliable, pre-qualified single components are used in the construction of such systems.



STT-SystemTechnik GmbH, Munich develops and produces high performance and robust radio antennas for use in space. Various parts of these antennas are made of high performance plastics from ENSINGER. The instruments and systems of STT-SystemTechnik GmbH are designed for extreme ambient conditions, such as temperature, vibration, shock, high vacuum and cosmic rays.

#### Satellite antennas with TECAPEEK and Vespel®

The S-band satellite antenna S2023 and the GPS-L1 antenna L1575 are especially designed for use on "LEO" (low earth orbit) satellites. With the help of engineering plastics from ENSINGER, it is possible these days to produce compact, light and nevertheless very robust antennas for use in space.

The manufacturer uses the ENSINGER materials TECAPEEK and Vespel® for the antenna radome. Both materials have very high thermal and mechanical stability. Vespel® can be used in the cryogenic range down to -273°C, without losing its mechanical properties. In addition, the materials are highly radiation resistant, have low emission ratings in vacuum (listed with Nasa) and are inherently flame resistant. An advantage for the processor is that both are very easy to machine.

#### The materials

Vespel® has a continuous operating temperature of 300 °C and is also optimally suited for use in the cryogenic range. The material exhibits high strength, stability and creep resistance. Vespel® is distinguished by good chemical resistance and excellent sliding properties with special types, as well as excellent electrical insulation properties. It has a high degree of purity, has a low emission rating in vacuum and is inherently flame resistant.

TECAPEEK is a partially crystalline plastic with high strength, rigidity and hardness. The continuous operating temperature is up to 260 °C. TECAPEEK is resistant to many types of hydraulic oil and chemicals, also when used at high temperatures and in the low-temperature range. The plastic has excellent dimensional stability and very good sliding properties with special types. Extremely low fume emission and density, as well as low toxicity of smoke gases distinguish the material. It is also inherently flame resistant.

## ENSINGER at AIRTEC

### High performance plastics for use in aerospace technology

[Hä] ENSINGER entered new trade fair territory with its attendance at the AIRTEC, a specialized supplier trade fair for the aerospace industry, which had its premiere at the end of October 2006 in Frankfurt. At the joint booth of LRBW, Forum Air and Space Technology Baden-Wuerttemberg e.V., ENSINGER presented high-performance plastics, which satisfy the exacting requirements of the aerospace industry. These are Vespel® and Sintimid, TECATOR, TECAPEEK, TECATRON, TECASON, TECAPEI as well as TECAMAX SRP.

"AIRTEC offered us an optimum platform, at which we were able to present our highly exacting materials and convince the industry", according to ENSINGER Industry Specialist Rainer Gottschalk, "because construction components made of plastic make airplanes lighter, safer, faster and more economical." Plastics are about 50% lighter than aluminium, for example, have a high thermal and mechanical loading capacity, have low heat expansion, as well as good electrical properties and are inherently flame resistant.

#### New brochure

In addition, the company presented the new brochure "High-performance plastics for aerospace technology" at AIRTEC. In this, ENSINGER especially emphasizes the requirements in aerospace technology and presents those polymer materials which are suitable and have been tested and approved for use in this highly exacting area.

The eight page information leaflet presents in graphical form and in technical tables the fire protection properties and smoke gas density, radiation resistance and chemical resistance, as well as many other relevant material characteristics for

construction and development in detail, as well as approvals for ENSINGER plastics. The brochure is available for downloading with immediate effect at [www.ensinger-online.com](http://www.ensinger-online.com). The printed version can be requested at [info@ensinger-online.com](mailto:info@ensinger-online.com).

The reader can learn more about what plastics are capable of doing in aerospace technology in the brochure, which ENSINGER has recently published.



## Finished Parts Division

### Hall refurbishment in the Finished Parts Division

[Hä] More recently, about 30 industrial employees of the Cham machining division are able to carry out their work in new, bright and friendly working surroundings – the refurbishment of the halls in the finished parts division has now been completed.

As the production area no longer satisfied the requirements for modern manufacture, the company started the first partial refurbishment of the milling shop in the year 2004.

However, the areas for turning and milling were not to be visually separated from one another for much longer. Thus, the partial refurbishment of the turning shop followed – and after completion of the renewal work, both production areas present a uniform picture.

The new placement of the machines has led to greater room

optimisation and to an improved arrangement, from which all have profited.

In order to ensure continuation of production, refurbishment took place in individual steps. Detailed planning of the single activities was the basis for success.

Punctually after the Christmas and New Year's break, production started up again at the beginning of January 2007 – also the final smaller completion jobs did not influence the workflow.

During the refurbishment work, all employees in the division's area made an excellent contribution to maintaining the narrow timeframe and keeping production going by the use of flexible working hours. A special word of thanks goes to the shift managers of both production areas, as well as to the technical service department of the division.

## Custom Cast Division

### Extension of office and social room facilities

[Hä] After new employees joined the Moulding Division in Cham recently, the facilities of the sales division had become increasingly more crowded. The logical consequence was to expand and extend to make new, bright offices and social rooms. A clearly larger office area, a new lounge as well as new shower and modern washroom facilities are now available for approximately 35 employees. At the same time, the foreman's office was extended and modernised. Many thanks to all employees who ensured that the rebuilding and move went smoothly and that

the day-to-day activities were not affected.

Building also took place in the outside areas: Since the amount of semi-finished goods and finished parts from moulding production have significantly increased, the previous halls were no longer adequate to use for intermediate warehousing. So that plastic parts are not exposed to the elements in the yard, ENSINGER has constructed a roofed open warehouse with shelving.

The entire construction activities were completed in December of last year.



## Wilfried Ensinger prize now also for apprentices and BA students



Wilfried Ensinger is well-known for his trend-setting developments in the area of plastics technology. In order to motivate young scientists to grapple more with technological issues involving plastics, the Wilfried Ensinger foundation already introduced the Wilfried Ensinger Prize four years ago. Since then, prizes have been awarded annually for final year project papers and dissertations. From this year, outstanding results of apprentices and BA students, who have completed their professional training with good and very good results, can now also be awarded the Wilfried Ensinger prize. At a small ceremony held at ENSINGER, the process mechanic Markus Killinger (2nd from left) and the grad-

uate engineer (BA) Corina Steck (middle) were honoured for their good overall results and awarded the Wilfried Ensinger prize. Besides receiving a certificate, both awardees were also given a monetary prize. At the end of last year, the former apprentice at ENSINGER Cham, Christoph Paul, was also distinguished



for completing his course with excellence and the grade 1.0. The young man now works as a machining mechanic for the company. "Professional training is important to me. With the extension of the prize to these new areas, we would also like to motivate future apprentices and graduates to give their best. Because they are our qualified specialists of tomorrow," is the view according to the company founder and chairman of the foundation, Wilfried Ensinger.

## Frank Gross visits ENSINGER do Brasil



Frank Gross (in front right) felt very well at the circle of his colleagues from ENSINGER do Brasil. He was rejoined about the enjoyable collaboration.

[Hä] In November, Frank Gross from Semi-Finished Products Extrusion undertook a 3-week business trip to visit ENSINGER do Brasil in Sao Leopoldo. He was accompanied for three days by Franz Holzberger. The reason for the journey was to provide support to our Brazilian colleagues in the semi-finished products extrusion division. After staff changes had taken place at ENSINGER do Brasil, it was necessary to ensure that the introduced and trained procedures still functioned smoothly. The two supported the Brazilian team with their combined know-how. Theoretical estimates were made as to what extent one can produce optimally with the available equipment and where optimisation is necessary. This was a diversified and instructive time for Frank Gross. He was particularly impressed by the extreme hospitality and sincerity of the Brazil-

ans. He greatly appreciated how openly he was accepted by colleagues and the pleasant collaboration with them. "The Brazilians were open to everything and also promptly put many of our suggested improvements into practice", according to Frank Gross. He also noticed with what motivation and joy the colleagues carried out their work. And what impressed the two in particular in their free time? – The exceptional beauty of the country, the contagious zest for life of the Brazilians and – how could it be otherwise – the incredibly mouth-watering and elaborate food. Sincere thanks go to the colleagues Alfred Moser, Arlindo Prereira Filho, José Roberto Stiehl, Angelo A. Stein, Ana Paula Celiberto and the many others, who made the time such a success.

## Mysterious V.I.P. visit ...

On January 10, Gary Davies from TRIG Engineering received a phone call from Rich Lock, buyer at UK helicopter producer Westland, requesting his assistance with an "urgent job with a sensitive nature". It seemed to be a very mysterious top secret affair. For the following day, TRIG was asked to prepare a "table top display" at Westland for a V.V.V.I.P. whose name was confidential for security reasons. Working against the

clock, with great improvisation skills and excitement, finally, everything was perfect. TRIG had a very impressive display and the whole crew was now looking forward to the big "Mr. X." – who even arrived on time: It was Tony Blair, the PM himself! He made a tour around the company to see the helicopter production line, then he spoke to employees and trainees, before he had to end his visit after shaking hands and posing for some memorable photographs.



Tony Blair with Frank Nicholls and Clare Langley from TRIG Engineering.

## Sales training at ENSINGER Polska

Employees of ENSINGER Polska took part in a training course to optimise selling techniques and sales strategies at the beginning of November. The team was divided into two groups, internal sales and field representatives, in order to address more specifically the respective character of customer contacts in a more dedicated way. The training was carried out by a well-known training company, whose expertise and specialist knowledge very positively impressed all participants. In particular, the dedication of the trainers has to be emphasised - they communicated an optimum of know-how in two days and also trained using many practical exercises. The practical exercises strongly motivated all participants to develop new attractive selling techniques. In this way, participants also learned how to satisfy various customer expectations in specific situations even better. This was also the whole purpose of the organised training. The

declared objective of ENSINGER Polska still remains to continuously revise and, if applicable, to correct previous customer service practices, continuously adapt selling techniques and presentations to match different customer personalities and situations and to better come to terms with "difficult" customers. Last but not least, integration as a team is decisive for the satisfaction and motivation of employees. The training, which was held outside the normal working surroundings in Karpacz in the Herz Mountains, was also in this respect a complete success. The hospitality and very personal service was praised very much, and after a full day there was still time for relaxation in the swimming pool, or to play skittles or billiards. After this very successful training the ENSINGER team see themselves in a better position to master the challenges of the dynamic development still ahead.

Cezary Michalczuk



The picture shows the distribution team of ENSINGER Polska, which learned within two trainingdays a lot of new salesmanships.

### Impressum

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