

# inform

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## Luxury for the Kitchen

*// We seldom notice them when we are preparing food and drinks; even though they are all around us in the kitchen: High-performance plastics ensure smooth and fast processing in frying, cooking, baking and heating and that we can enjoy our food without working too hard.*

Today's kitchens are truly luxurious with great time savings: Many foods and beverages are available at the press of a button – just think of the delicious coffee specialties, freshly ground and brewed completely automatically; or meals that can be heated in seconds in the microwave. Kitchen appliances would be absolutely unimaginable without the development of high-performance plastics. They are seldom visible yet their performance is all the more impressive.

One outstanding example is the use of Vectra® LCP in a microwave-oven combination from AEG-Electrolux. The inside door trim here made

of the special grade E440i withstands extremely high temperatures of up to 250 °C as frequently occur in ovens. Since this liquid crystalline polymer is also transparent to microwaves, it is especially suitable for a combination of oven and microwave – thus replacing metal which cannot be used. In addition to these benefits, Vectra® LCP E440i is also very rigid and strong even in applications with lower thicknesses. It is highly resistant against chemicals and oxidation. This is perfect for microwave-oven combinations but also for many other areas – especially in the kitchen.

Another Ticona high-performance plastic feels at home in the kitchen: Hostaform® POM is used in various applications. Siemens uses three grades in the espresso machines EQ.7: The lever maintains its robust mechanical function thanks to Hostaform® POM C13031. The tribological Hostaform® POM grade C9021 SW ensures low noise as a gearwheel with low wear. And Siemens also uses the media-

resistant Hostaform® MR130ACS in the casing of the boiling unit. This special grade of polyacetal copolymer is excellent in drinking water applications since it has improved acid and alkaline resistance (ACS) as well as excellent chemical resistance even at high temperatures. This material also conforms to all EU and US specifications regarding use with foodstuffs.

High-performance plastics – these are really not often seen in the kitchen. But it would be impossible to warm up the meals from yesterday in the microwave or brew up a delicious latte macchiato at the press of a button without them.

They also save time and money in production and even reduce noise for final consumers. True luxury for the kitchen.

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### Imprint



*// Dear readers,*

Imagine curving through the streets in a runabout with an electric power train, getting to the station and parking your car there. No, not in a parking-lot, but inside the train! There you can charge the battery of your car, while the train takes you closer to your destination. Having arrived, you can just drive on. Dreams of the future? No – almost reality! The small electrically powered car UC? constructed by the visionary concept-car designers of "Rinspeed" makes it possible. Alongside constructing the car, the engineers and developers also created the appropriate mobility concept. At Ticona we are so thrilled about the UC? and the associated vision of an electromobile future that we decided to support the construction with our high performance polymers. They are part of the vision because they provide for an efficient and thus eco-friendly electric power train. Read more about the UC?, the concept behind the car and the application of Ticona polymers from page 10. On page 14 we show you other green drive systems that can be realized with Ticona polymers. Besides, there are other industries in which the emissions of carbon dioxide can be reduced and power can be saved when polymers are applied. Representatives of economy and politics stated these amenities of plastics on the second board meeting of the German Wirtschaftsvereinigung Kunststoff (WVK). We report on this event on page 29. Polymers and Climate Protection – we want to show you what is possible today!

Have a pleasant reading.

Yours Henning Kull  
Head of Communications Europe, Ticona





## The New Safety for Foods

*// Safety plays an enormous role in the food industry because consumers demand ever stricter guidelines for the production of their foodstuffs. Various types of detector are therefore used during production to locate any possible contamination directly and at any stage. These detectors can now recognize plastic particles in foods – provided these are metal detectable plastics from Ticona.*

Mixers, stirrers, cutters, kneaders, conveyor belts – until now these helpers in the food industry consisted mainly of metal. Because if a small part such as a nut should loosen then it can be detected and removed from the foods with the detection systems customarily used in production operations. However, metal can now be replaced with plastic: Hostaform® POM C 9021 MD, Vectra® LCP E550i MD and GUR® UHMW-PE 4150, the detectable plastics from Ticona, can be identified by the conventional contamination inspection systems based for example on electromagnetic induction.

Metal detectable plastics prove to have enormous advantages over other plastics in this application; the customary method of detecting plastics in foods today is visual inspection. Thus contamination of foods is only established at a very late stage – or in the case of inclusion of the foreign particle in the foodstuff, possibly not at all. Substantial amounts

of foodstuffs must then be rejected. Metal detectable plastics can be recognized in production promptly and thus contribute to minimizing the potential damage.

Your advantage compared with metal or stainless steel: These grades reduce energy consumption and cause less noise in use. Their excellent slip/friction properties also in combination with metals and the conformity with current foodstuff guidelines (FDA/EU/BfR) make them suitable for many different applications from the food industry to medical engineering technology. Heavy and costly metal constructions can be replaced with light and more cost-effective plastic solutions. The simple manufacture of the components compared with metalworking leads to considerable cost reductions.

Ticona provides the solutions for all applications with three metal detectable polymer grades: The detectable grades Hostaform®

POM C 9021 MD and GUR® UHMW-PE 4150 are intended for standard conditions while Vectra® LCP E550i MD can be used at temperature ranges from flash freezing to as high as 300°C – a diversity that impresses for example in slide rails, conveyor chains, conveyor belts or as baking pans and sheets.



## Variotherm Mold Temperature Control for Smooth Appearance

*// Ticona has accomplished the perfect replacement for coated components with Hostaform® POM MetaLX™ with a high-quality metal effect as the required finish. A special process with an innovative specialty grade of the copolymer now also permits implementation of high-speed moldings without weld lines and cold spots.*

Hostaform® POM MetaLX™ ensures cost and time optimized production with an integrated metal effect: Because the appearance required is already present thus dispensing with the need to paint or coat components made of this material; even vacuum metallization is no longer necessary. These costly and labor-intensive working steps can be dispensed with. This POM grade is ideally suited for applications such as the interior of automobiles, electrical appliances or medical technology. This copolymer now shines with a further

distinctive feature. Employees in the Technology & Service Department at Ticona succeeded in completely eliminating weld lines and flow-induced cold spots in the gate area in high-speed injection molding applications. Their remedy: Variotherm mold optimization. High temperatures of up to 180 °C are applied to the molds for a brief time and then they are completely cooled. Such brief and strong heating cannot be achieved conventionally with hot steam or heating cartridges; instead inductive heating or ceramic heating is used.

Ticona collaborates with system suppliers for such special processes; in this case for example with the Kunststoff-Institut Lüdenscheid (K.I.M.W.) and the temperature control specialist GWK (both in Germany) as well as RocTool from France who has developed the patented CageSystem®. As well as preventing weld lines and cold spots, this process led to a useful side effect: The higher mold wall

temperature changed the otherwise matte surface of Hostaform® POM MetaLX™ into a brilliant one. But design freedom is not restricted: A matte surface is also possible in the cavity due to a corresponding surface grain (etching). Further advantages of this high-performance polymer: It does not show any tendency towards stress cracking; resists chemicals such as those in cockpit cleaners and has good slip/friction properties in contact with other polymers. Superior properties combined with cost efficiency and maximum design freedom – Hostaform® POM MetaLX™ ensures brilliant prospects in various applications.



## Fortron® PPS Contributes to Prestigious Award



*// Ticona, together with a total of four partners, receives the coveted JEC Innovation Award 2010 in Aeronautics.*

At this year's JEC Composites Show, the largest compound material show in Europe, the world's first welded thermoplastic composite aircraft primary structure in series production will be honored. The jury of experts chose a landmark Fortron® PPS-based ruddervator for the sensational new business jet Gulfstream 650 from the USA. It was developed by Fokker Aerostructures from the Netherlands, where together with the KVE Composites Group as well as Ten Cate, the other two partners are also headquartered. This product innovation represents a decisive breakthrough for the aeronautics industry in minimizing costs and weight.

Arnt Offringa, Director of Development at Stork Fokker. Thanks to the inherent flame retardency, it also fulfils the high special safety requirements of the aircraft industry such as the so-called FST standard (Flame Smoke Toxicity). And not only this makes Fortron® PPS perfectly suitable for working in the air:



The new type of rudder is produced at around 300 °C under high pressure from PPS composites – so-called prepregs – made of Fortron® PPS films as a matrix material as well as reinforcing fibers. The individual components are welded to one another in an autoclave. This dispenses with costly screw and rivet processes while increasing strength and safety as well as reducing the total weight. Time and money are also saved compared with conventional processes. Up to now a combination of duroplasts and metal has been used for this purpose. "The resistance of Fortron® PPS against aggressive substances such as fuel, antifreeze or hydraulic oils makes it an excellent material in aircraft construction" explains

For example, in modern airliners the thermoplastic reduces weight up to 50 percent and thereby decreases the fuel consumption up to 15.000 liters daily. Additionally, even at high temperatures its tendency to creep and its absorption of water are very low.

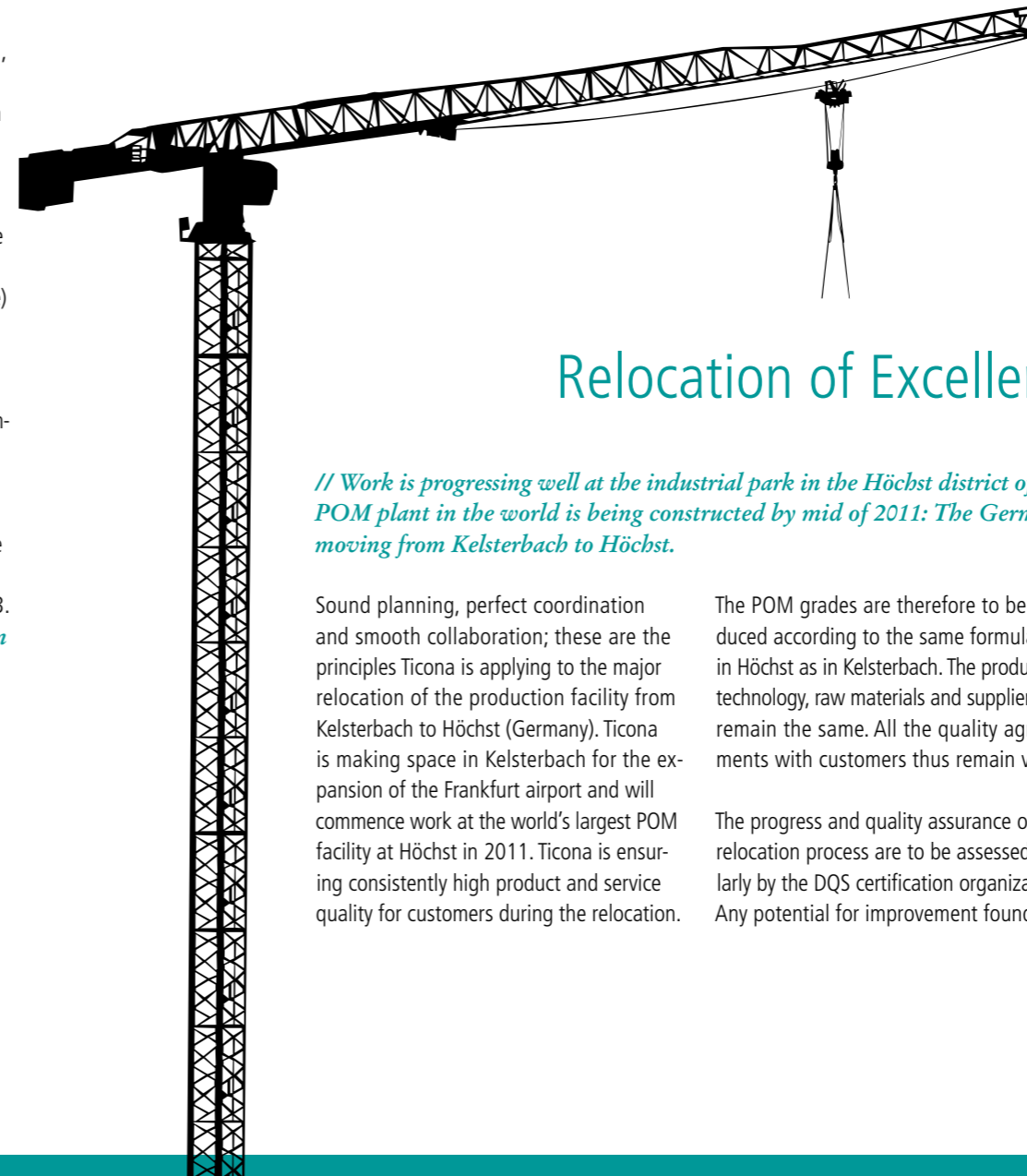
### *// More to the point*

This innovation was made possible by a method of induction welding invented by KVE in which the individual components are spot-welded at some critical points to combine them into an unbreakable unit. As well as saving time and money, thermoplastic composites like those based on a Fortron®-

polyphenylsulfide (PPS) in the Gulfstream 650 also lead to considerable reductions in weight – thus large profiled parts can be manufactured at around half the weight of conventional models made of metal or light alloys.

"Of course we are pleased about this award", says Thomas Petzel, President of Fortron Industries at Ticona. "But we are actually even more pleased that we have been able to set a milestone in aircraft construction due to the development partnership with the companies involved." The high-performance polymer Fortron® PPS is, in addition to PEI (polyetherimide), PEKK (polyetherketoneketone) and PEEK (polyetheretherketone), the only thermoplastic product approved by the US Federal Aviation Administration (FAA). PPS composites remain impact-resistant, dimensionally stable and robust even at temperature fluctuations of more than 100 °C.

The official awarding of the innovation prize will take place at the opening ceremony of the JEC Composites Show in Paris on April 13. [// www.jeccomposites.com/innovation](http://www.jeccomposites.com/innovation)



## Relocation of Excellence

*// Work is progressing well at the industrial park in the Höchst district of Frankfurt am Main (Germany). The largest POM plant in the world is being constructed by mid of 2011: The German Ticona Hostaform® production facility is moving from Kelsterbach to Höchst.*

Sound planning, perfect coordination and smooth collaboration; these are the principles Ticona is applying to the major relocation of the production facility from Kelsterbach to Höchst (Germany). Ticona is making space in Kelsterbach for the expansion of the Frankfurt airport and will commence work at the world's largest POM facility at Höchst in 2011. Ticona is ensuring consistently high product and service quality for customers during the relocation.

The POM grades are therefore to be produced according to the same formulations in Höchst as in Kelsterbach. The production technology, raw materials and suppliers also remain the same. All the quality agreements with customers thus remain valid.

The progress and quality assurance of the relocation process are to be assessed regularly by the DQS certification organization. Any potential for improvement found is to

be included in a written report and then implemented by Ticona. A summary is to be published in a statement letter.

The extension of the existing ISO 9001 certification of Ticona GmbH to include the new Höchst site as well as a letter of conformity according to ISO/TS 16949 for the Höchst site will be effected at the same time.

[// relocation@ticona.com](mailto:relocation@ticona.com)



Major Station for an  
Electric Automobile

RINSPEED



*The UC? concept car from Rinspeed wants to open up completely new prospects in mobility thanks also to plastics from Ticona.*

The new concept car from the automobile developer Rinspeed from Zumikon in Switzerland has been hotly discussed among experts since late 2009. UC? is the name of this concept vehicle. Maybe the shortened form of "You see?"? This real eyecatcher concept vehicle is reminiscent of the Fiat 500; but officially the abbreviation stands for Urban Commuter. A closer look quickly reveals that the UC? serves as a model for urban traffic. Rinspeed's 'Electric speedster to avoid gridlock' has at least as much concept as automobile: This small electric two-seater is to drive under its own power in the town but change to the railroad for longer distances – and recharge its battery at the same time.

Rinspeed founder, Frank Rinderknecht, not only presented the design for an environmentally friendly urban automobile in his newest study for the Geneva Automobilsalon in March; but rather for a complete automobile world that intelligently integrates individual and public transport. Ultimately we want to "Create a community of people open for a new definition of mobility".

// Rail travel with new energy

The automotive think tank from the Zurich region (Switzerland) wants to help electric cars gain leverage by finally solving a basic problem: The lack of range. The UC? also only gets some 120 km out of one battery charge – and that is already comparatively far. Supplementing a link to public transport extends the range of the cute car decisively: The driver parks his UC? in a custom railcar and resumes driving at the destination – with charged batteries because the UC? is connected to charging stations during the train journey. Booking is convenient and fast via the Internet.

While the concept vehicle shines with huge ideas; it is itself extremely small at only 2.50 meters long. Like the Smart Fortwo, the UC? fits into even the narrowest parking space. The automobile is controlled with ease using a joystick; the maximum speed is stated by Rinspeed as 110 km/h. The weight is higher than non-professionals would expect due to the comparatively heavy electric drive. Electric motors get along without gearboxes, clutch, generators and fuel tanks; but the battery carries weight and the capacity per kilogram is markedly below that of customary liquid fuels.

// Light advantages of plastics

This lower energy density leads to a double bind: The theoretical gain in range due to the larger battery is to a great extent used up by the pure weight of the battery and the con-comitant higher energy demand. The consequences would be higher electricity consumption and constant breaks to recharge the battery. This dilemma can be solved by using lightweight components made from modern plastics and composites. The positive side effect: The increased use of plastics also generally reduces costs. A sandwich board made from Celstran® LFT from Ticona with a polypropylene honeycomb core in the trunk of the UC? ensures greater stability and less weight. Celstran® LFT is also found under the hood in the support structure of the battery. Safe holding of the heavy battery is important here with the deadweight being kept as low as possible. In addition, the higher temperatures so close to the motor should not impair the properties required of the plastic. Ticona specializes in tailored and customer-oriented solutions with a number of products. The extraordinary properties of Celstran® LFT win through in electrically-powered mobility in particular. This high-performance plastic is in addition to Factor® LFT and Pryltex® LFT one of the product brands for long fiber-reinforced thermoplastics from Ticona and a typical



material for modern aircraft construction: The matrix materials of LFT – mostly polypropylene or polyamide – save weight while the fiber skeleton guarantees stability even with moldings under heavy loads. Compared with short fiber-reinforced plastics, long glass fibers or some-times also stainless steel filaments, carbon and aramid fibers enhance the impact strength of the material.

A further advantage is brought to bear in the battery mounting: The high energy absorption capacity of the material ensures that vibration and impacts are not transmitted to the battery and thus increase safety. The fact that Celstran® LFT, Factor® LFT and Pyltex® LFT also withstand higher temperatures makes these thermoplastics ideal replacements for light metals in the automotive industry; since these properties also make them especially durable.

// Close to series maturity

There are still some obstacles to be overcome on the path to a marketable product to make emission-free and quite drive systems competitive outside cities as well. And the most important factors concern the battery directly or indirectly. Rapid rechargeability, high energy density and thus lower weight as well as lower production costs are top the developers' wish list.

Even skeptics are now acknowledging unreservedly that electric vehicles like the UC? are superior to conventional gasoline cars in urban traffic – ecologically and economically. Driving in towns means frequent stops, accelerating again and consuming unnecessarily high amounts of energy with a combustion engine. The electric motor with its higher level of efficiency in contrast does not consume electricity when at a standstill and can even recover some of the energy through regenerative braking. And the freedom from exhaust emissions is already an enormous bonus for

city dwellers. The Urban Commuter, which utilizes the advantages of electric drive and at the same time gets round the disadvantages, could provide decisive impetus to electric-powered individual transportation. The vehicle is itself optimized for urban traffic; this mobility concept elegantly avoids the technical development problems with the battery. Rinspeed boss Frank Rinderknecht sees brilliant prospects in any case: "We have structured our concept so that the UC? can go into series production – and we are

already conducting discussions at top level." The electric pioneers are stepping on the gas ...  
// [www.rinspeed.com](http://www.rinspeed.com)

## Ticona plastics in electric cars

*// Ticona regards itself as a partner in the development of new drive possibilities and delivers products with perfect properties for electric-powered mobility:*

**Celanex® PBT:** Plug connections for electric lines have long been a specialty of Celanex® PBT. This plastic is excellently qualified for the purpose with good slip properties and a high service temperature. The resistance to chemicals and weathering is also persuasive.

**Celstran® LFT:** Due to its lightness, stability and temperature resistance, the long fiber-reinforced Celstran® LFT is excellently suited for load-bearing parts. The battery mounting and the battery case are among the most important applications; but floor plates and instrument panels also benefit from the properties of this versatile plastic.

**Fortron® PPS:** This polyphenylene sulfide is another almost classical material for vehicle engineering and electric cars also profit from its advantages. It is used among other things in pumps for coolants or in fans, recently also in coil carriers for wheel hub motors.

**GUR® UHMW-PE:** This ultrahigh molecular weight polyethylene is especially suitable for applications in electric car construction due to the low weight. It can be gel processed for example to battery separators.

**Hostaform® POM:** Ticona has developed its own series of products for automobile interior applications with these high-performance, low-emission XAP® grades. This makes the company one of the pioneers in POM applications in automobile interiors. Further specialties like improved lubricity or UV resistance also make Hostaform® ideal for mechanical components, for example in automobile seats or visible moldings like loudspeaker grilles.

**Vectra® LCP:** This liquid-crystalline polymer is even by now used for actuators. In electric cars LCP is at the beginning of its career. Connectors, components for high-voltage applications or elements for illumination and in LED-aprons are imaginable as well.



The Mobility Concept: The UC? takes the train for a refueling stop



Straight from the socket: Compared to other electric vehicles the UC? is lighter – due to plastics – and does not need to be refueled that often



*„I have always had real fun making apparently impossible things possible.“*

Frank Rinderknecht

// *Alternative drive concepts*

Natural gas-powered buses, hydrogen-powered cars, solar vehicles, LPG hybrids etc. There is now a vast number of drive concepts for vehicles. The matter is made only slightly easier by the fact that basically they are variations of two models – either chemical or electrical energy is converted to mechanical energy. In the first case, gas, ethanol or the well-known gasoline is combusted; in the second case, the electricity comes from a battery or new types of energy converters like fuel or photovoltaic cells.

Whereas alternative fuels can make use of the existing system – the conventional combustion engine and the gasoline station supply network – the electric drive is a completely different concept that demands new technology and a different infrastructure. The hybrid is symptomatic of the possible system change facing automobiles in the coming decades: Combustion engine and electric motor compensate for the respective weaknesses of the other in a hybrid – emission-free drive meets greater range.

The CO<sub>2</sub> emissions and above all the finite nature of resources are the major disadvantages of fossil fuels and the reason behind the

search for new solutions. The alternatives for combustion engines range from natural gas and liquid petroleum gas that occurs as a waste product in oil production to biofuels from sugar cane (ethanol), rapeseed or soy (biodiesel).

The greatest drawback of electric motors is the fact that the amount of energy in affordable batteries generally only suffices for shorter journeys – and recharging tries the patience of drivers. This disadvantage could be compensated by photovoltaic or fuel cells. Thus for example the fuel cell converts the energy carrier – mostly hydrogen – directly into electrical energy in the automobile. However this type of drive still requires some development work. Fuel cells have not yet reached large-scale production maturity.

Regardless of the type of drive, the weight of the vehicle itself is an important aspect for ecological driving: The lighter an automobile is, the lower its fuel consumption is. So it is no wonder that weight-saving plastics are used in the interior, mechanical parts and also in the engine. In 'old' combustion engine systems for example, the fuel tanks are usually made from plastic – the same applies of

course for the new fuels that demand novel solutions depending on their properties. Plastic moldings are in demand in electric drive systems for battery holders and cases or as pumps for the cooling system with air or water. A fuel tank is normally dispensed with – unless the vehicle is a prototype with fuel cells. In this case, the demands on the plastics are especially high: Specialty grades can be found in the membrane of the cells and in the tank for the highly inflammable hydrogen. In future large sections of the fuel cell itself can be produced from high-performance polymers like Vectra® LCP and Fortron® PPS instead of metals.



Frank M. Rinderknecht, founder of Rinspeed: "The major topic in the past years was sustainability."

## Rinspeed – Crazy Cars from Switzerland

Teenagers tinkering with bicycles and tuning mopeds is not particularly unusual; especially not in Switzerland – the country of inventors. In the case of Frank M. Rinderknecht from Zurich (Switzerland) it could safely be interpreted as an early sign of a creative obsession resulting in the newest concept car 'UC?' from Rinspeed. "I always had real fun making apparently impossible things possible", says the Rinspeed founder grinning. And it does not bother him to be thought of as crazy. "Driving people crazy – and that is just what we do with our concepts: We demonstrate the feasibility of new ideas so that the market can take up on them and develop them."

As a 22-year old mechanical engineering student at the Swiss Federal Institute of Technology in Zurich, Frank Rinderknecht founded the company Rinspeed which

initially imported sunroofs and produced cars for handicapped drivers. In the following years this young company flourished and became a design studio pool: Commissions initially came from makes such as VW, Porsche or Nissan for whom Rinspeed has presented a new concept car every year since 1991. Since 1995 there have been quite a few of their own models that have a tradition of being particular head-turners at the Geneva Autosalon. In the early 90s Rinspeed also moved from Zurich to the nearby small town of Zumikon (Switzerland) with its 5,000 inhabitants to develop dream cars in larger and more representative premises.

Creativity seems to thrive especially in this quaint, small town: Among the design projects there are exotics such as the Rinspeed Nissan SpeedArt by Rolf Knie

painted with 420 circus horses, the Rinspeed Senso of 2005 that senses the driver by registering his pulse rate and driving and if necessary exerts a calming effect on the driver – and to an increasing extent the environmentally friendly models with alternative drives.

"The major topic in past years was sustainability. Our visions revolve around new drive concepts and forms of mobility", says Frank M. Rinderknecht. "The 'UC?' is a good of example of this" – and also a comparatively realistic one. Rinspeed created a furor two years ago with the sQuba submersible car that could move like a fish in water. The environmentally friendly aspects of the vehicle with zero emissions and energy-saving LED lighting technology almost disappeared in the background. But this crazy thing certainly surfaced in an inspiring manner.



## Lightweight Construction Unlimited

The Swiss company Esoro has participated in the development of the Rinspeed concept car projects for years. Esoro engineer Andreas Rüegg has worked as a developer in particular on the component concept for the trunk and battery reinforcement of the new UC? using engineering plastics from Ticona. Why this material in particular was used, what the UC? means to him and where the future of plastics in automotive construction lies in his opinion – he spoke to 'inform' about these topics in an interview.

**// Mr. Rüegg, you not only contributed to the design of the new concept car from Rinspeed but also to previous Rinspeed concept cars. What is the attraction of these vehicles for you?**

The UC? was developed by the Esoro Concept-Car Team. The concept cars are always very exciting and challenging development projects. At the same time, ideas can be realized that permit a look into the future without any consideration to series production. My contribution to the UC? related to the processing and component concept for the trunk and battery reinforcement with Celstran tape

material. Lightweight construction is of special importance for the battery box and the Ticona materials are therefore just right. These materials also offer other advantages such as insulation, design freedom and great rigidity.

**// What is so special about the UC?, the new concept car?**

The UC? is a very mischievous little run-about. A car that is devoted to short-distance travel but it also provides a concept for long-distance travel. The UC? is small and maneuverable and therefore a good candidate for constructing to lightweight which considerably improves the efficiency of the environmentally friendly electric drive. That is the reason for the use of Ticona lightweight materials made from fiber-reinforced plastics. In addition there is no steering wheel; the UC? is steered



with a joystick – which also represents a revolutionary idea.

**// Apart from electric vehicles there are a number of other alternative drive concepts. Which concept has the greatest potential in your opinion?**

We see the greatest potential in hybrid vehicles in the near future because individual and universal solutions towards electrification and reduction in consumption are possible with a battery-driven electric motor and efficiently used gasoline engine without requiring additional infrastructure. Of course this should be realized in a lightweight vehicle since weight is one of the keys to energy efficiency. We recommend focusing on the essentials to permit true lightweight construction.

**// How did the collaboration with Ticona come about?**

We have long-term contacts with Ticona since we have been concerned with the process and component development of fiber-reinforced thermoplastics for more than ten years. This collaboration has intensified

in recent years since Ticona now also provides tapes (unidirectional, endless fiber-reinforced thermoplastics); a material that has considerable potential in lightweight construction particularly in connection with LFTs. This is how the exciting collaboration on the UC? came about.

**// Ticona supplied a sandwich board for the battery holder in the UC?. What advantages do you see in the use of Ticona plastics in the new concept car?**

Above all, electric vehicles must be light so that the smallest possible battery achieves the greatest possible range. In this sense, the super-light and rigid sandwich board is an ideal material.

**// Cue 'plastics in automotive construction': Plastics now frequently replace metals in automobiles – for various reasons. What percentage of an automobile will be plastic in 20 years?**

The proportion of plastics in automotive construction will continue to increase. Fiber-reinforced plastics and multi-material concepts

will grow disproportionately. There are already the first examples in aircraft construction of up to 50 percent fiber composites. The important issue now is to develop even more efficient production processes to further increase the amount of plastic in automobile construction as well.

**// High-performance plastics are today already tailored to particularly specialized applications. What demands will the automotive industry place on high-performance plastics in the future?**

Cost is almost always top of the list in automobile construction; so this will also be one of the most important requirements for high-performance plastics. There is great potential in the processing of thermoplastic high-performance materials to keep the overall component cost within an inexpensive range by using efficient production processes and integrating functions.

**// Automobile construction changes rapidly. What are the coming trends and changes expected in the next five years?**

The focus will primarily be on lightweight construction and reducing costs in the near future. The challenge now is to achieve this with the existing fiber-reinforced plastics and cleverly worked out production concepts. The achievable function integration of these materials will play an enormous role.

**// [www.esoro.ch](http://www.esoro.ch)**





Representing the Ticona team, Wolfgang Wieth (right) was awarded the Celanese Values Award by Celanese CEO David Weidman in Texas (USA)

## Internationally Successful

*// The new generation of impact-modified Hostaform® POM S wins one of this year's Celanese Values Awards. The Ticona project team responsible for the development of the new POM grades receives an award in the category 'Customer-oriented Growth and Innovation'. The Values Awards advertised within Celanese are presented in five categories.*

The Celanese Values Awards were again presented in Dallas, Texas (USA) in January. These annual prizes are awarded to successful project teams within the Celanese Corporation for their innovative performance. In awarding these prizes Celanese would like not only to honor successful teams and research projects but also to inspire ambition and passion for other projects. Ambition and passion that are put into every project at Ticona; because Ticona can only grow with its customers and

remain their partner in product development by continuing in development, innovation and increasing know-how. And especially the focus on customer's wishes is important to Ticona. The delight at the success in the category 'Customer-oriented Growth and Innovation' is correspondingly great over the entire company.

Ticona receives the prize for its new impact-modified POM grades Hostaform® S. They deliver greater production efficiency with improved properties – an unbeatable combination that exactly meets the requirements of many customers. The team behind this innovative product collaborated globally during the development: Employees from Asia, the USA and Europe were involved – an indication of how well global thinking and action works at Ticona. Wolfgang Wieth from Hostaform Product Marketing for Europe accepted the award on behalf of the team. His team

colleagues are: Ken Blakey (Sales US), Michael Hoerr (POM Marketing EU), Chris Klinger-Lohr (POM Product Marketing Asia), Lowell Larson (POM Product Development US), Jason Lipke (POM Product Marketing US), Deven Patel (POM Marketing US), Uwe Wolter (Sales EU), Ursula Ziegler (POM Product Development EU).



The foamed instrument panel of the new BMW 7 offers a weight reduction of 2.82 kg compared to the old BMW 7

## The Discovery of Lightness

We read about new applications for plastics in automobiles every day and therefore the proportion of plastics in cars should be increasing. Yet we have noticed that the relative amount has fallen in the newest generation of automobiles! A comparison of the Golf V with the new Golf VI shows a decline in the amount of plastics used by 29 kg. This drop is even more obvious from the old BMW 730i to the new BMW 740i at 113 kg although the number of applications increased in both automobiles!

Primarily the decrease in mass has two causes: On the one hand the design of the components is more suitable to plastics and on the other hand the replacement of heavy with lighter plastics. Thus, for example, the developers of the Golf dispensed with talc in the polypropylene or the BMW designers consistently replaced compact injection molding with foams, wherever possible.

VW and BMW demonstrate impressively in their new models what is possible with light materials in series production. So it is clear: Plastics are moving on to the next round, away from simple steel replacement towards light-weight and intelligent components. Discover the potential lightness in your components!

*Best regards,  
Alexander Büchler  
Editor of Polymotive, Magazine for Polymers in the Automotive Industry*



Alexander Büchler, Editor of Polymotive

PS: Are you interested in the comparison of the plastics proportion old/new Golf and BMW 7 series? Take a look in the archive of [www.polymotive.net](http://www.polymotive.net), July/August 2009 issue (Golf) or January/February 2010 (BMW 7 series).

*To read the magazine in high-resolution quality, enter the issue code "Ticona". This code is valid until May 31, 2010.*



Pleasant Climate  
in the Greenhouse

Celstran® LFT Makes Fans Lighter

*// Ease of processing, reduced costs and high resistance: These are just some of the arguments that won over a Dutch manufacturer of screen systems and greenhouses to Hostaform® POM 27021 14. It is not least of all the high quality of the material that now ensures the best climate in greenhouses.*

Holland Scherming B. V. is now using attachment clips made of Hostaform POM® 27021 14 for the construction of greenhouses. These clips are produced by Attema B. V. Kunststoffenindustrie in an injection molding process and replace the metal clips previously used. The very clear advantage is: They only require one component instead of three thus reducing material and assembly costs. Hostaform® POM 27021 also has ideal properties for use in greenhouses where

there are constantly high temperatures and humidity as well as the materials being frequently exposed to direct sunlight. Hostaform® POM 27021 withstands these extreme climatic conditions with high resistance against thermal and oxidative degradation, UV stability and durability. The chemical resistance against solvents, fuels, strong alkalis and zinc-coated sheet as well as against caustic solutions and hydrolysis make this material the perfect partner for this application.

Hostaform® POM C 27021 excels with its easy processability. This copolymer has excellent flowability for complex precision parts. It can therefore be used in many sectors: From vehicle construction through medical engineering to consumer and household products. Short cycle times make cost-effective

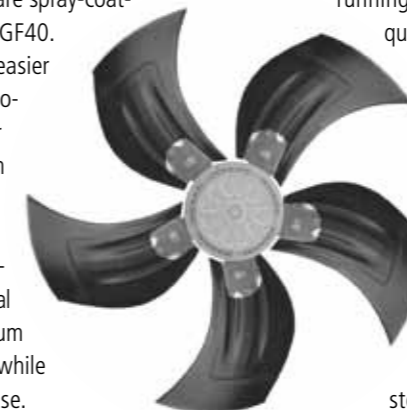
production possible. Savings compared with metallic components also result from the possible combination of several elements and functional integration such as in the case of the attachment clips for greenhouse construction.

*// [www.hollandscherming.nl](http://www.hollandscherming.nl)*



*// The long fiber-reinforced thermoplastic Celstran® LFT wins through by combining outstanding resilience with low weight: Absolutely ideal for almost any industry. This high-performance plastic is entering into a symbiosis with aluminum in the construction of fans – for absolute stability.*

Lighter and quieter: That is the motto in the construction of fans used for example in refrigeration and air conditioning, in heat pumps or exhaust air systems. ebm-papst, manufacturer of motors and fans, relies on glass fiber-reinforced Celstran® PP-GF40 in combination with a high-strength aluminum alloy in its HyBlade® axial fan. The blades are produced in a hybrid construction: Preformed aluminum sheets for the blades are spray-coated with Celstran® PP-GF40. Thus it is a whole lot easier to create fan blade geometries optimized for flow characteristics than with conventional aluminum pressure casting. These geometries ensure that the axial fans run at the maximum volume flow possible while causing minimum noise.



The mix of materials in the axial fan from ebm-papst combines the stability of aluminum with the lightness and unlimited plasticity of Celstran® LFT. This lightweight material reduces the weight of the fan blades more than 40 percent while maintaining the same stiffness in comparison with conventional aluminum pressure casting. And this low weight makes itself felt especially when the fan is running: Much lower forces are required for start-up and operation. The Celstran® PP-GF40 coating already demonstrates its advantages in production: In contrast to individual metal component construction, the blades no longer have to be coated – this saves a complicated production step and thus costs and time.

At the same time the long fiber-reinforced thermoplastic protects the blades against corrosion and ageing. The fans maintain their efficiency over years without the risk of any damage to the coating. And of course this minimizes the amount of maintenance required. Celstran LFT retains its excellent resistance and outstanding mechanical properties over a large temperature range making it ideal for use in refrigeration and air conditioning systems as well as heat pumps.



## Hot, Hotter, Fortron® PPS

*// One criterion is of particular importance when plastics are used in household appliances: Heat stability. Plastics must withstand permanently the extremely high temperatures that occur in cooking ranges or dishwasher. A case for Fortron® PPS which offers excellent properties even at intense heat – and that is not the only reason it is a perfect replacement for metal in many applications.*

There are in part very high temperatures in dishwasher blower air ducts. BSH Bosch and Siemens Hausgeräte GmbH are therefore relying on Fortron® PPS 1140L4 from Ticona for the air ducts in their new dishwashers. The 40 percent glass fiber-reinforced polyphenylene sulfide grade is replacing corroding metal parts because it fulfils all the requirements in this area: In addition to high stiffness and hardness it also has excellent dimensional stability at high temperatures as well as low water absorption and creep resistance. It is also inherently flame resistant and can withstand a continuous service temperature of 240 °C. That alone makes Fortron PPS® 1140L4 an all-round talent – particularly for kitchen appliances. But apart from the excellent product properties, this polyphenylene sulfide grade offers great advantages in production compared with metal moldings: It ensures lower costs in the manufacture of moldings, has excellent weldability and provides the greatest possible freedom in design. No finishing of the components is required.

This special grade is therefore virtually irreplaceable in the kitchen. And the polyphenylene sulfide Fortron® PPS from Ticona is also just as suitable for many other applications. Its excellent thermal and chemical resistance is in great demand especially in hot, corroding environments. Various industries such as chemicals and pharmaceuticals are thus focusing on this material and using it to replace light metals, duroplasts or other thermoplasts to an increasing extent. These properties also pay off in the automobile industry. Because Fortron® PPS is resistant to fuels, antifreeze, oils and brake fluids – even at the high temperatures in the engine compartment. It is thus used in intercooler ducts in modern automobiles with diesel engines since there it must withstand a continuous temperature of 200 °C. That sounds like high performance – just a matter of course for Fortron® PPS.

## Uncompromising Stability

*// Polyacetals (POM) have inherently very good lubricity. They are therefore preferred for use in transport rails. However, that was not possible until now if heavy loads were to be borne. A new production process by Ticona now changed this and provides Hostaform® POM LGC90-QX with a strong 'glass fiber skeleton'.*

The new Hostaform® POM LGC90-QX obtains this glass fiber skeleton in a pultrusion process: uniformly long fibers are arranged at regular intervals and are completely enclosed by the polymer. This process can be applied to almost all crystalline and non-crystalline thermoplastics. In the case of Hostaform® POM LGC90-QX the glass fiber skeleton improves the already good dimensional stability, stiffness and impact resistance of the material: It can be used without problem wherever heavy weights are applied.

These excellent mechanical properties mean it stands out from glass fiber-reinforced polyamides in particular. This material also has a higher service temperature (100 °C) than other alkene-based long fiber-reinforced products. These and other advantageous characteristics such as a very good lubricity and good chemical resistance especially against oils and fuels makes Hostaform® POM LGC90-QX the ideal material in mechanical engineering and automotive construction because high resilience and optimum long-term properties are sought after in many snap-fit connections.



## From Bobby-Car to Motor Sport

*At this point we want to show plastics from a different perspective: What does a racing driver think for example about plastics, where does he come across them and what role do they play in his life. Inform asked up-and-coming racing driver Tim Sandtler these questions.*

*// What do you think is a typical plastic product?*

In the first place I always think of PET bottles because I come across them every day.

*// How would you describe plastic?*

I mostly think of the properties of plastic that I am familiar with from mechanical engineering: Plastic is resistant, above all very light and extremely hard.

*// What is your favorite plastic product?*

Unfortunately I no longer have it – but it was important in my childhood: My Bobby-Car. A typical plastic product that influenced my whole life. After all it led me to motor sport at some point.

*// Materials play an increasingly important role in motor racing. What percentage of the success is actual driver performance and what percentage is material?*

Motor racing is not, for example, like soccer in which almost everything depends on the performance of the player. In my estimate: 70 percent of success in motor racing is driving performance; the car accounts for 30 percent. Unfortunately this also means that the material will always tip the balance in the case of two equally good drivers. Therefore the development of new technologies is very important to racing drivers. But this in turn depends greatly on the racing team's budget.

*// What role do plastics play in motor racing?*

Plastic is very important especially for the safety of the driver. Plastics are not only used in the car but also in the equipment. For example the helmet: this comprises fiberglass; that is a fiber-reinforced plastic. The visor, also made of plastic, is just as important and life-saving as demonstrated

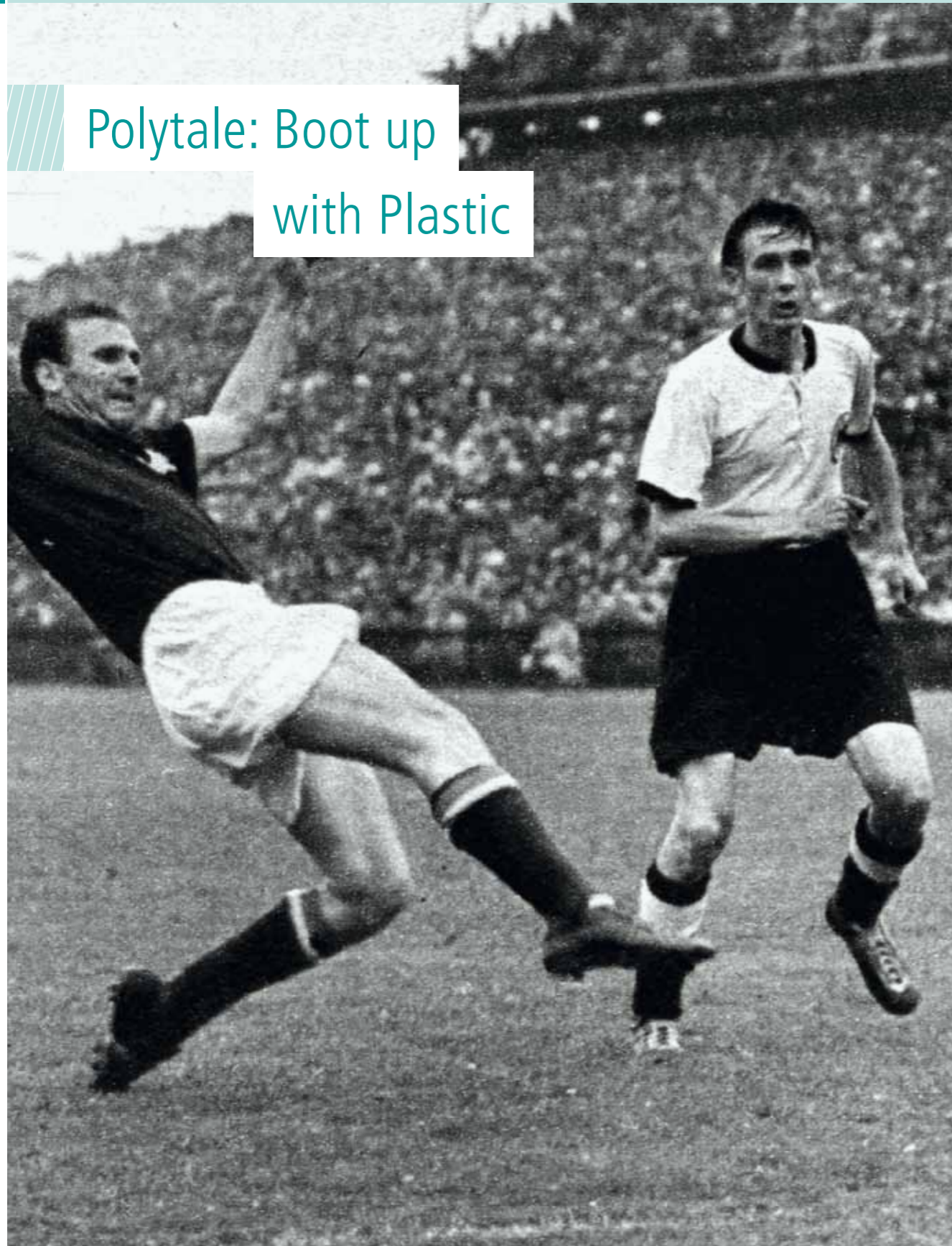
in some accidents in the last Formula 1 season. Lightweight construction using plastics is another important topic in motor racing. Plastics are used in the body in particular because they are extremely light.

*// What have you always wanted to know about plastics?*

My studies have already answered most of my questions about plastics. And I am aware that plastics play an enormous role in almost every aspect of life today. We often do not even notice that products contain plastic. My question would then be: In which areas are there things that do not consist of plastic?

*// [www.tim-sandtler.de](http://www.tim-sandtler.de)*

Tim Sandtler was born in Bochum (Germany) in 1987. He has been active in motor racing since 1997; initially in karting, later in Formula BMW and in Formula 3. In 2010 he was voted Porsche Motor Sport Talent during a talent trial. He is currently studying mechanical engineering at the Bochum University of Applied Sciences.



Polytale: Boot up with Plastic



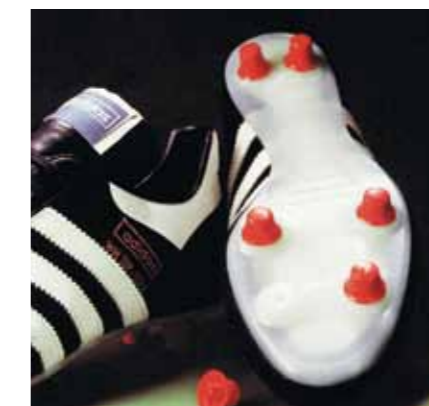
*Why the screw-in cleats of the “Miracle of Bern” still move hard men to ecstasy yet are actually old hat.*

When witnesses report of Germany’s triumph at the soccer World Cup in Switzerland in 1954 they get teary-eyed, enthuse about the old school and sooner or later reveal in conspiratorial tones the alleged secret of success: The screw-in cleats from Adidas. None of that is true! At least not all of it; the “Miracle Eleven” with the “Hotshot” Toni Turek in goal did really all wear the same boots from Adi Dassler and the cleats with the screw-in mechanism were enormously innovative. But: That wasn’t the real reason; as disclosed by Horst Eckel, the then 22-year old outside right under Sepp Herberger, recently to the soccer magazine “11 Freunde”: “We had the screw-in cleats so we were a bit faster. But that didn’t have anything to do with the result of the match.”

Maybe the historic victory was instead based on the cleat material: This was an extremely light polyamide 12 (nylon 12) and did not soak up water in the persistent rain in Bern. The Germans’ shoes thus not only provided much more purchase but also only weighed

around 360 to 700 grams thus only a fraction of the weight of the Hungarians’ shoes with traditional cork studs. Allegedly the shoes of the favored opponents known for their otherwise filigree game tipped the scales at a “full 1.5 kilo” as can be gleaned from “11 Freunde”.

Since then football shooting shoes have been unimaginable without plastic. At the World Cup in 1974 for example, almost all the players in the 16 teams took to the field with cleats made of Hostaform® POM from Ticona. As is well known, the Germans took the title again – their feet in the lightest football boots at that time, a little more than 200 grams.



*„We had screw-in cleats so we were a bit faster.“*

Horst Eckel, outside right



Today, success in chasing the round leather ball is more than ever a question of the right equipment. Plastics above all seem to repeatedly ensure that small but decisive advantage. But there is still a lot of scope for creating legends concerning cleats of the brand “Miracle of Bern”. We will still be experiencing that “Not even the opponent’s cleats in his face” stop a striker (“Eurosport”), a team “unwraps 17-mm monster cleats on a slippery playing surface” (“Bild”), the cleats “make the acquaintance of the opponent’s thigh in passing” (“Reviertour”) or “sods of grass become grooves of a record under his cleats” (“Süddeutsche Zeitung”). And that all seems so gloriously magical ...



## Clothing for Extreme Cases

*// Synthetic fiber has revolutionized the clothing industry. Special clothing as used for leisure, sport and work in particular is based today more than ever on synthetics. These contribute greatly to the properties that characterize these garments: From elasticity and durability through low weight and high wearer comfort to protection from certain substances and extreme temperatures. Fortron® PPS is the competent partner in extreme cases – for good reason.*

Protection and flexibility – in certain professions an ideal combination of both is regarded as the most important requirement for workwear: Workers exposed to heat or fire, chemicals, oils or similar substances need clothing that affords special protection. But freedom of movement is also necessary. Klopman International, one of the largest European manufacturers of polyester / cotton blends for workwear and protective apparel, together with Ticona has developed a new high-performance fabric – SUNGRAZER – that combines flame retardancy with anti-staticity perfectly. This innovative fabric comprises 40.5 percent Fortron® PPS, the first polyphenylene sulfide to be used in this textile sector. This inherently flame retardant and

chemical resistant material that is used at high temperatures is excellently suited for use in protective clothing.

Fortron® PPS is particularly convincing with its very high service temperature; it withstands up to 270 °C short-term. This polyphenylene sulfide proves itself in this property together with the excellent chemical and solvent resistance for use in various industries such as chemical or pharmaceutical, in the automobile industry or consumer and household products. Fortron® PPS gives the new Klopman fabric SUNGRAZER, with the blend of 59 percent cotton and a slight amount of antistatic material, excellent tear strength, a natural degree of elasticity, excellent dimen-

sional stability as well as high resistance to wear thanks to pronounced abrasion resistance. The result: Superior wearer comfort even after repeated laundering. That is a good combination of protection and flexibility in any event.

*// [www.klopman.com](http://www.klopman.com)*



*// The possibilities of pursuing sports are virtually unlimited: From classics like skiing, snowboarding, cycling or jogging to the trend sports snowbiking, kitesurfing or speedminton. At present sport could be experienced at the Winter Olympics in Vancouver. But sport and leisure activities today are primarily so varied because plastics make new products and applications possible again and again.*

Faster, higher, further: This motto applies to sport just as much as to the development of plastics – especially where these two meet. Thus cinder tracks today are a thing of the past because athletes can run much faster on plastic. In 1952, Bob Richards pole vaulted to the world record at the Olympic Games with a bamboo pole; Sergej Bubka set the current record with carbon fiber-reinforced plastic – almost two meters higher.

### *// Aiming high*

The Winter Olympics in Vancouver (Canada) demonstrated once more: Winter sports would not have reached today's heights without plastic. Leisure ski and snowboard manufacturers have long relied on the polyethylene GUR® because this resilient, ultra high molecular weight material has excellent slip prop-

erties. It has now moved into professional circles for this reason: The sports equipment manufacturers Isosport and Fischer together with Ticona developed a jump ski with GUR® UHMW-PE acting as a sliding layer. The excellent resistance and outstanding slip properties are particularly reliable in this case: They help achieve higher speeds on the ski-jump thus ensuring increased jump distance. So that it feels like flying.

### *// Light and resistant*

Similar to the ski and snowboard market, the cycle industry relies heavily on constant new developments and innovations. Professional cyclists in particular attempt to increase their performance by improving their equipment. And this trend is also noticeable among recreational cyclists. Manufacturers are confronted with the task of designing components of great stiffness and strength but of extremely low weight. The bicycle manufacturer Vista, CA, solved this problem with the help of Celstran® PA66-CF20-03 and thus designed the innovative SPIN® bikes with only three spokes. The use of the long fiber-reinforced thermoplastic Celstran® LFT permitted significant reduction of the weight of the individual wheels while ensuring the required high impact strength and dimensional stability. BMX, mountain bike or even for the wheels

of a wheelchair – Celstran® LFT always gets you moving.

### *// Accurate and stable*

Precision is a basic requirement in golf. Talent and ability primarily determine the accuracy of a stroke but the right material is also imperative. Fortron® PPS in the shaft of a golf club helps the player execute his stroke even more precisely because it improves stability on teeing as well as the energy transfer. Perfect ball control and strokes succeed over great distances and can be executed precisely with vastly differing stroke speeds. And last but not least Fortron® ensures reliable vibration transfer to the player's hand and thus the right feeling for the ball.



## Passing on expertise

// Ticona employees were also present at quite a number of events and talks in the first few months of 2010, passing on their special expertise and knowledge.

**B/S/H/** *Successful product training at Bosch-Siemens-Hausgeräte on 22nd January: More events requested*

The employees at this Bosch-Siemens-Hausgeräte (BSH) dishwasher factory in Dillingen (Germany) were all in agreement: This in-house training event was a complete success! On 22nd January 2010, the Ticona employees Thomas Kleinstrass and Guido Latz informed the 45 participants from the construction department about the Ticona product portfolio. Alongside a general overview of the product advantages and processing, special solutions for domestic appliances were also presented. The overall tone from the participants was extremely positive and BSH even wants the product training to be repeated. Presently, also, detailed discussions have begun about new products.

**VDI** *VDI injection moulding conference, 9th–10th February 2010, Baden-Baden (Germany)*

Dr. Ulrich Mohr-Matuschek referred here to the theme of "Injection moulding of consumer products" and Dr. Tilo Vaahs spoke about "The end customer defined – the requirements are increasing".

*Talk at the Fortress Marienberg on 25th February 2010, Würzburg (Germany)*

Dr. Achim Hoffmann talked here about "LCP – the material class with finesse".

**EJOT** *Talk at the EJOT on 9th March 2010, Bad Laasphe (Germany)*

Eric Folz referred here to the theme of "Lightweight construction through the implementation of technical plastics".

**SKZ** *Talk at the "Plastics in the sport and leisure time sectors – function meets design", 18th–19th March 2010, Garmisch-Partenkirchen (Germany)*

Dr. Tilo Vaahs informed the participants about "High performance plastics and the aesthetics of functionalism". The focus of the talk was the definition of functionalism and its effects, a megatrend analysis and the prioritising of needs as well as case studies from the world of sport and leisure.



## Plastic Improves the Climate

// Less CO<sub>2</sub> thanks to plastic: This is one of the reasons why many industries are giving preference to plastics over other materials. A highly topical subject of great significance – and therefore the focus of the Board Meeting of the Plastics Trade Association in the House of German Business in Berlin (Germany).

"Plastic saves five to nine times more CO<sub>2</sub> in use and recycling than is released during production", according to Dr. Günter Hilken, Chairman of PlasticsEurope and also Chairman of the Plastics Trade Association (WVK) since early this year, at the second extended Board Meeting of the WVK in February.

The Plastics Trade Association was founded in fall 2009; the sponsors are PlasticsEurope Germany, the Central Federation of the Plastics Processing Industry, the Trade Association of Plastics and Rubber Machinery in the VDMA and the BKV Platform for Plastic and Recycling. The aim of the WVK is to improve public perception of the German plastics industry and represent interests across the industry. Thus the second Board Meeting focused on

issues of resource efficiency and climate protection.

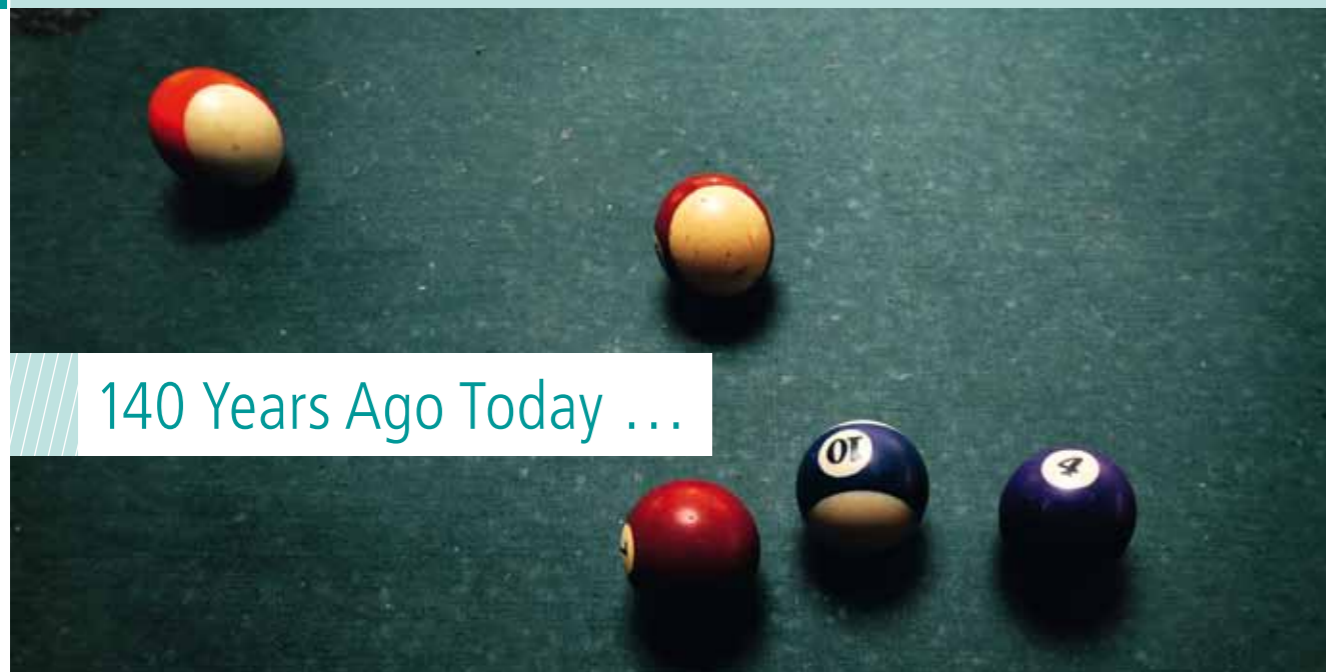
In light of climate change, Dr. Hilken emphasized the decisive role plastics play in helping to save energy and thus protect resources. The advantages of plastics in climate efficiency take effect for instance in insulation, in lightweight construction or in the use of renewable energies.

Advantages that are now indispensable in automotive construction for example. In this case, weight is often decisive for the carbon footprint. However automobiles have tended to become heavier instead of lighter in recent years due to the additional safety and comfort components. The solution: The use of high-performance plastics to replace markedly heavier metal. And one material such as the long fiber-reinforced thermoplastic Celstran® LFT, which is used for example in instrument panels, is also very much easier and more environmentally friendly to process.

Industry and politics are also aware of these advantages of plastic and wish to make greater use of the potential for climate effi-

ciency and keep this within Germany. "Effective climate protection needs innovative technologies. German companies are world market leaders in climate protection technologies", as Dr. Carsten Kreklau of the Federation of German Industries (BDI) commended at the Board Meeting of the WVK. And Werner Rensing, Head of the Department of Industrial Policies in the Federal Ministry of the Economy and expert in climate protection added that production in Germany must be safeguarded: "Nobody profits when excessive demands lead to production moving to countries in which climate protection is of no importance."

Efficient climate protection technologies, high-performance plastics and domestic production: Plastics producers here will be in even greater demand in the future. They are already well prepared.



## 140 Years Ago Today ...

### ... Or: How the First Thermoplastic was developed.

Plastic – synthetic material; a term that is apparently self-explanatory. At least in the way we understand it today: Material in which the fundamental component is synthetic, that is artificial or semi-artificially created polymers. But their predecessors were in no way ‘artificial’: The precursors of plastic were resins such as gum arabic or thickened tree sap. Apart from that, animal horn has been changed into a plastic, moldable material using special processes since the Middle Ages. So is it completely natural after all?

With the advent of the Industrial Age, an increasing number of researchers dedicated themselves to finding a material that could be converted into a moldable mass but would then solidify again. The aim was to produce consumer goods in large amounts easily and inexpensively. For example billiard balls; in the late 19th century these were made from ivory – a material that was neither cheap nor easy to obtain. This was exactly the reason why Phelan & Collender in the USA advertised prize money in 1865 for the person who developed a substitute material

for the expensive ivory in billiard balls: 10,000 dollar beckoned to the winner! Spurred on by this great prize, the American chemist John Wesley Hyatt among others got to work on development. In 1865 the son of a blacksmith patented billiard balls made of compressed remnants covered in shellac and ivory dust. However these balls did not result in the characteristic ‘Clack’ when they hit each other. In 1867 Hyatt improved the patent with a collodion coating. Now the balls caused a slight explosion on impact. The owner of a saloon in Colorado wrote to Hyatt a short time later: „I don’t mind, but every time the balls hit each other, all the men in the room draw their revolvers.“

The landmark invention came in 1868: Hyatt mixed the world’s first thermoplastic from cellulose nitrate and camphor and called it ‘Celluloid’ – a combination of cellulose and the Greek suffix ‘oid’ (similar). In 1870, exactly 140 years ago, he had this proprietary name registered. At long last the world had a resistant material that could be poured into a mold after heating and which kept this shape when cooled. Celluloid could also be colored and given texture – and it could be re-shaped after warming again. Hyatt also invented the first injection molding machine

in 1871. He later lost the patent for celluloid in a patent dispute – this opened up the market for other manufacturers of thermoplastics. And this material rapidly proved to be the ideal material for the machine age. The first products appeared soon after: Denture plates, dolls, combs and jewelry among others. Celluloid however became best known as the basic product for photographs and films.

We cannot image today’s world without thermoplastics – but they have fundamentally changed. John Wesley Hyatt laid the foundations in those days; today thermoplastics as so diverse that they are suited to almost any application imaginable – also thanks to their excellent modification possibilities. Thus, for example Hostaform® POM is available as metal-effect and replaces metals in various applications as Hostaform MetaLX™. The long fiber-reinforced thermoplastic Celstran® LFT in contrast convinces when processed to tapes in automotive and aircraft construction – in this case it supports the current trend towards light-weight construction. Composites in metal-effect and in aircraft: Hyatt probably never even dreamt of such materials 140 years ago, when he invented the first thermoplastic.

## Put it in your diary: A look at upcoming events

*The upcoming weeks are filled with trade fairs, meetings and conferences. Here, inform presents the most important ones to you:*

- 13.–15.4.** **JEC** In Paris, the largest composites trade fair takes place. Ticona will receive, together with partners, the coveted JEC award.
- 19.–22.4.** **Chinaplas** Ticona will also be present in Shanghai, China with a trade fair stand at the most important plastics and rubber trade fair in Asia.
- 19.–23.4.** **Hannover Messe** Under the new motto „Efficiency – Innovation – Sustainability“, the next HANNOVER MESSE will be showcasing innovations, new developments and technologies, alongside new materials from the world of industry.
- 28.–29.4.** **VDI Medizintechnik** The VDI symposium in Friedrichshafen (Germany) is aimed at experts who are engaged in the manufacture and processing of plastics for medical products.
- 17.–18.5.** **“Technical and high-temperature-resistant thermoplastics, blends and nanocomposites”** The event held in Regensburg (Germany) is organised by the Ostbayerischen Technologie-Transfer-Institut e.V. under the motto “Plastic – the raw material of the 21st century”.
- 18.–19.5.** **Plasttechnik** This trade fair – meanwhile the most important meeting point of the plastic industry in Nordic countries – takes place in Malmö.
- 8.–11.6.** **Proform** The specialist trade fair for punching and injection moulding is held in Dortmund (Germany).

### In the next edition of inform

A look at the autumn edition ...



In autumn’s inform, there is obviously only one theme to talk about: the K! trade fair. Naturally, Ticona will be there – under the motto “Count on us!”. Read what this motto is all about, how Ticona will be presented at the trade fair stand and also what the visitors can expect from the most important trade fair of the year. We’ll also have the latest product introductions, examples of use from industry and interesting articles about the sector and products.

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