



MIXING TOGETHER

MAGAZINE OF THE HF MIXING GROUP

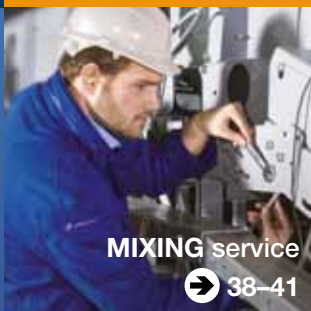


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OUTLOOK 2014



Prof. Andreas Limper and Mark Meulbroek

Valued Business Partners, Dear Colleagues of the HF MIXING GROUP,

The world 'is continuing to gather pace'!

The importance of mobility is growing in all four corners of the earth. The pent-up demand in the world's growth regions is huge. Just as big are the sales figures for the automobile industry on account of a shift towards these markets. The international tyre manufacturers, who represent the largest customer segment for the HF MIXING GROUP, are adapting to these market developments. Production capacity is shifting, new factories are opening in growth regions and tyres are being developed for local markets and sold there. Our MIXING Service article underlines how we at the HF MIXING GROUP are supporting these developments locally – and doing so on a permanent basis!

One development is dominant for tyre manufacturers in the traditional markets – the increasing importance of so-called premium tyres, also known as high-performance tyres. Innovative tyre compounds of a very high quality are continuously being produced in ever shorter development cycles and are set to be manufactured with increasing efficiency. In MIXING know-how, Michael Haupt, head of tyre development at Porsche, provides an insight into the requirements in relation to high-performance tyres from the perspective of the sports car manufacturer.

This issue of HF MIXING TOGETHER focuses on our customers' key questions – and answers them with the various approaches to solutions adopted by the HF MIXING GROUP. Since mixing is an interdisciplinary technology,

these approaches are of interest to all of our customers across the board, from manufacturers of tyres and technical rubber goods to producers of cable and brake lining compounds. After all, irrespective of the applications, all our customers have one thing in common – they tend to be looking for a complete solution with the help of a reliable partner rather than an individual solution from a supplier of machinery. At the HF MIXING GROUP, we have assimilated this desire. As an efficient group of companies developing solutions for mixing elastomers and as a global supplier of continuous mixers for polymers, we are currently devoting ourselves to this subject with more than 1,000 employees. Whether an individual machine is needed or a complete system with automation – everything from one single source is our motto!

In the article 'The MIXING GROUP's world', we present our three technical centres and the associated added value they bring, whether directly for our customers or indirectly via the opportunity they provide to continually enhance our core products. We have the innovative edge and we want to keep it that way!

MIXING markets and MIXING highlights look at the tandem process and the new ASMACool rollers and explore the most efficient solutions for mixing temperature-sensitive tyre compounds.

However, you should be under no illusion: we are not only able to mix rubber. The introduction of UMIX, the universal kneader developed by the HF MIXING GROUP, can be used for a considerable number of applications, thereby expanding both our and your mixing expertise. We are of particular interest to the plastics industry with a completely different product: the continuous mixer is currently the most energy-efficient machine concept for producing highly filled master batches, whether black or white.

We are happy to allow you to take a look behind the scenes: MIXING locations and MIXING members present two important pillars of the HF MIXING GROUP: Farrel Ltd. and HF NaJUS.

The world 'is continuing to gather pace' – and the HF MIXING GROUP is keeping up with it!

Mark Meulbroek

Prof. Andreas Limper

Managing Directors of the HF MIXING GROUP

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Well rounded

A meeting with Michael Haupt, head of strategic tyre development at Porsche.

Tyres are often an underestimated component in vehicle design: they represent the only contact with the road, have considerable influence on the safety and stability of the vehicle and determine the driving experience to a significant extent. Just as complex are the requirements in relation to tyre development – especially in the sports car sector. The HF MIXING TOGETHER editorial team wanted to know more details and set off to meet a representative from the sports car manufacturer par excellence.

We have an appointment with Michael Haupt, head of strategic tyre development at Porsche. When the name Porsche is mentioned, you generally think of Zuffenhausen. Haupt and his team, however, are based in the development centre in nearby Weissach, whose size impresses us as soon as we arrive: there are a number of multi-storey buildings, an in-house test track and several large parking spaces on this patch of green land.



Michael Haupt, head of strategic tyre development at Porsche.

Michael Haupt has been working at Porsche for 17 years and is currently responsible for strategic tyre development. When he first came to Porsche, it was a completely different company: ‘There was only the 911 back then; the Boxster was still in the development

stage.’ Tyre development was also less complex. ‘We now develop tyres for all models: the 911, Boxster, Cayenne, Panamera, Macan – which has recently been unveiled to the general public – and occasionally for the GT vehicles 911 GT3 and 911 GT2, as well as for the plug-in hybrid 918 Spyder high-performance sports car. For the latter, we work in collaboration with the sports car division. Only the slick tyres for racing sport vehicles are developed by the motor sport division.’

A development time of 48 to 60 months for one tyre

What specific form does tyre development take at Porsche? ‘On new models, we develop the tyres from the vehicle’s concept phase until it is ready to go into production. Since the wheels and tyres significantly define the look and design of a car, they are always looked at right at the beginning of the vehicle’s development. Due to the fact that we do not produce any tyres ourselves, or engineer them in detail, we tell the tyre manufacturer how the tyres should be composed so that it is specially tailored to the vehicles. To this end, we get together with all the major tyre manufacturers at a very early stage and consult with each other using all the basic data. At this stage, the CAD program has already created the so-called package models, which show how the vehicle will look. We know the weight, top speed and axle data – all essential parameters for designing tyres and defining the air pressure. As such, the tyre is initially evaluated virtually without any actual tests taking place. Once the package has been approved, the overall design of the vehicle is fixed. We then draw up the specification documents with all the criteria. This may include aspects such as reduced rolling resistance and faster lap times.’ It takes between 48 and 60 months to develop one tyre – depending on whether it is a model facelift or a completely new development. The core development, actually testing the vehicle, takes two years.



Every newly developed Porsche must prove itself first on the racetrack. The tyres are an essential element of the overall performance.

The core development work

The actual development phase begins when prototype vehicles are available. 'We then conduct tests together with the tyre manufacturers on different tracks. We do these joint tests to ensure that the same conditions prevail for every tyre – in other words, we make sure they are tested at the same time, in the same place, with the same vehicle, on the same track.' The in-house test track in Weissach, however, is not suitable for testing tyres. It is too small and the weather conditions are not ideal. 'The tests are often conducted in southern Europe. The sun shines there, so we have optimal conditions for testing how the tyres handle in dry conditions and when changing lanes,' says Haupt. The tyres on the 911 and Boxster sports cars are tested on the Northern Loop of the Nürburgring and in Nardò, the world's fastest test

track owned by Porsche Engineering. 'Both tracks are challenging and make high demands on the tyres.'

A tyre must meet 33 testing criteria

At top speeds, it is tested whether the tyres give the vehicles sufficient stability, how they handle when driving in wet conditions and braking in dry conditions, how they affect the comfort of the ride, etc. Haupt and his team work together with the tyre industry to go through a total of 33 different testing criteria. The test drivers are given an evaluation form on which they can give each criterion a mark between one and ten. 'A mark of ten is outstanding and only very seldom given. Eight or nine is the level needed for approval and a mark of four or five is not acceptable. In such cases, the design needs to



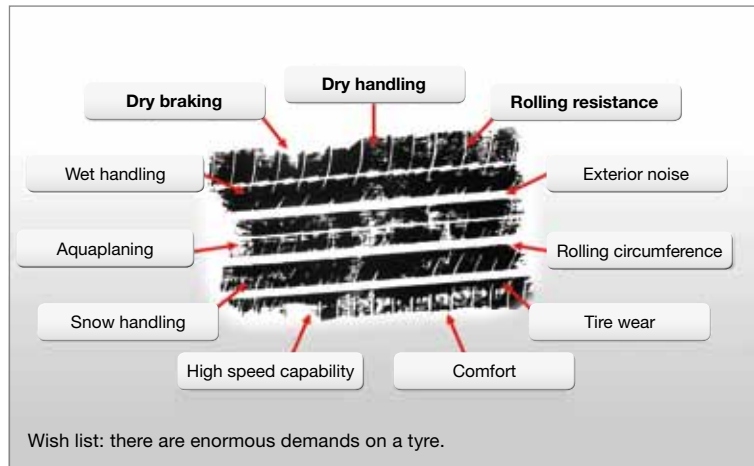
be reworked.’ The tests are carried out on every tyre dimension, each of which has its own specification document with certain requirements.

During the European summer, winter tyres are tested in New Zealand; the summer tyres are generally tested in Europe. Porsche conducts the wet handling tests on test tracks belonging to manufacturers in the tyre industry. The logistical work involved is immense: several lorry loads of 200 or more tyres and five or six test vehicles have to be planned and moved around. ‘We don’t just test on racetracks, however. It goes without saying that our cars also have to be tested on A roads and motorways. This is done in the context of so-called endurance tests.’ If all the criteria have been met after the tests, Porsche grants its approval to the tyre manufacturer. The tyre is then given an N label, the Porsche seal of approval for tyres. ‘Once the tyre goes into series production, new problems can suddenly arise for the manufacturer, because it is one thing producing 20 prototypes, but quite another manufacturing 2,000 tyres,’ says Haupt, briefly outlining the problems associated with series production.

Performance versus comfort

The extended model range has changed Porsche’s approach to tyre development: ‘We come from a pure sports car segment,’ explains Haupt. ‘Accordingly, our aim was always to be the best in class when it came to performance, braking in dry conditions and lap times. It is important to us that we hold the record for the fastest lap time on the Northern Loop of the Nürburgring. This is currently six minutes and 57 seconds in the 918 Spyder. In other words, we also have to be extremely performance-oriented when developing tyres. However, as a result of models like the Cayenne, the Panamera and soon also the Macan, we are faced with the challenge of improving the balance between comfort and performance. That goes for many components on the car and also for the tyres.’

A shift in the markets has also contributed to the complexity of Haupt’s remit: in China, for instance, Porsche customers tend to drive their vehicles more frequently in urban regions where there is often stop-and-go traffic. ‘We have to pay greater attention to comfort and exterior noise here.’ Other challenges are issues such as reducing CO₂ emissions and improving rolling resistance, areas on which Porsche has worked hard in recent years with the tyre industry. ‘In terms of tyre development, on the one hand, we must achieve the best lap times and good braking distances, aspects which call for a compound that provides excellent grip. This is associated with a high degree of hysteresis, however,



which is manifested in poorer rolling resistance. On the other hand, we have to develop tyres whose compound reduces rolling resistance and thus CO₂ emissions.’

In this regard, Haupt and his team are constantly calling for the tyre manufacturers to use new technologies and materials, because the tyre has a very big influence on reducing CO₂ emissions. ‘There will be a continued focus on cutting CO₂ emissions in future, because such aspects are crucial in terms of the social acceptance of our vehicles,’ says Haupt.

It’s all about the compound

Since the tread compound is responsible for 50 to 60 per cent of the rolling resistance, a tyre manufacturer must constantly break new ground when developing compounds. ‘There is a tendency towards using ever more complex compounds as well as the dual tread compound, which involves either distributing two compounds horizontally across the tread – in other words, on the inner and outer area of the tyre – or vertically using a so-called cap-and-base compound. Different compound properties in conjunction with complex production technology mean that the manufacture of tyres



Alternative engines are even finding their way into high-performance vehicles (pictured: the Porsche Panamera S E-Hybrid).

is becoming an evermore complex operation.’ Furthermore, Haupt sees a trend towards using organic raw materials in order to ensure greater sustainability in the development process.

The challenges of the future

Besides the increasing demands already mentioned, Haupt expects one thing in particular in the future: further legal provisions. ‘It won’t be long before the issue of tyre labelling explodes. For every tyre, in a similar way to refrigerators, we are compelled to state the fuel efficiency class, wet grip class and rolling noise class, together with the corresponding values. Unfortunately, these labels look different from one country to the next, which presents us with a demanding task.’

External rolling noise reduction will soon also be specified by the EU. That is a particular challenge for a sports car manufacturer with wide tyres. ‘At Porsche, this means that we will have to reduce the noise of the tyres by three or four decibels over the coming years – a huge challenge which once again necessitates technological changes in the tyre industry, because the tread and the compounds will have to be modified. As a result, I am

also convinced that, in terms of performance, there will no longer be any scope for developing further major enhancements in future.’

It is clear to us that the challenges faced by Haupt and his team are diverse. The sphere of activity in which they are operating is subject to constant tension, so his following statement comes as no real surprise: ‘It all involves a great deal of work. Yet the real art lies in bringing everyone together, both internally at Porsche, e.g. to coordinate the control systems and chassis, and among the Porsche employees and tyre manufacturers. There is increasing complexity; people have to communicate with one another – and that takes place at an incredible speed these days.’

As we take our leave, Michael Haupt gives us a piece of good news to take back to the HF MIXING GROUP: ‘I do not envisage that we will see a rubber-free tyre within the next six to eight years.’

We wish to thank Michael Haupt for talking to us and giving us an interesting insight into his work!

MIXING news

What is new at the HF MIXING GROUP locations around the world? We report on what has been happening.

New bed-type milling machine commissioned

➔ Farrel, Rochdale, Great Britain

Preparations for the latest member to join the machinery at Farrel Ltd. in Rochdale took quite some time, but the moment eventually came in October: the new Correa 7 M, a milling machine with a travelling column, manufactured by the Spanish company Correanayak, finally entered service. In the months leading up to that point, the foundations were prepared for the newcomer: to this end, a two-and-a-half-metre-deep hole was dug, during which an interesting artefact was unearthed: the team found the remnants of an old brick chimney which had evidently once stood here. The concrete and steel foundations were then cast and the machine was mounted on them once they had set.



The new 'all-rounder' in Rochdale: the Correa 7 M milling machine.

Those responsible for choosing a new machine especially focused on the functionality and the component geometry, but they also paid close attention to health and safety aspects. It is the first bed-type milling machine of its kind at Farrel Ltd. to feature two workspaces, guaranteeing completely safe operation according to the manufacturer from the northern Spanish city of Burgos. The machine was transported from Spain to Wales

on two large trucks and a team set to work on assembling it as soon as it was unloaded. The bed of the milling machine was in the correct position after just two days and the mortar could then be applied. Once the bed had been assembled, the travelling column was immediately installed. John Saxon from the machinery department and engineer Jonathan Gudgeon spent a week in Spain beforehand to acquaint themselves with the finer details of operating the machine. In future, it will be just as possible to drill, groove and mill as it will be to turn profiles. From a technical perspective, it is a bed-type milling machine with a rotary table – the travelling column is seven metres long, 1.25 metres deep and two metres high. One special feature of the machine is its universal milling head which can move in five directions. The universal milling head is capable of 4,000 revolutions per minute with an output of up to 24 kW. The machine has two workspaces, a rotary table and a tailstock. The coolant is added at a pressure of up to 32 bar and 40 milling and drilling bits are changed automatically.

The machine was commissioned in September and began production in October. It replaces the old Mandelli machine and will relieve the burden on the existing Butler. The colleagues in Rochdale cannot wait to see all the things the newcomer can do and will use it to try out some new applications!

Workout after work: Employees' fitness studio opens

➔ Harburg-Freudenberger, Freudenberg, Germany

An increasing number of firms are taking an interest in preventive health care measures for their employees and setting up company sports programmes. Fully in keeping with this trend, Harburg-Freudenberger Maschinenbau GmbH has now opened 'STARK by HF MIXING GROUP' in Freudenberg, a modern fitness studio for its employees.



As a sports studio, 'STARK' not only offers exercise machines for strengthening muscles and increasing stamina, but also courses which make demands on the body and soul in equal measure. The current programme, for instance, features popular training courses to improve stamina, such as 'Drums' or 'Stamina workout', but there are also courses designed to strengthen the back, abdomen and pelvic floor, such as 'Pilates', 'Abdomen and back' or 'Abdomen 30'. Those who prefer to train even more intensively can also join the 'Bodypump' course, a barbell training programme. Besides the various courses, which incidentally are always changing and can also be adapted to meet the needs and wishes of the employees, there is, of course, also the option to train individually on various exercise machines set up in a circle and have a specially tailored training plan drawn up under the specialist guidance of three physiotherapists, Jennifer Wagener, Tobias Gertz and Ronja Krumbain from the RPP outpatient therapy centre in Oberberg. A number of cross-training machines and ergometers are available for stamina training.

Opening hours:

'STARK' is open weekdays from 6 a.m. till midnight and on Saturday and Sunday from 8 a.m. till midnight.

It's official: Global market leader from southern Westphalia

➔ Harburg-Freudenberger, Freudenberg, Germany

The Chambers of Industry and Commerce in Arnsberg, Hagen and Siegen have now published the second edition of the anthology entitled 'Weltmarktführer und Bestleistungen aus Südwestfalen' ('Global Market Leaders and the Best Services in Southern Westphalia'). It features a portrait of 140 companies that manufacture a product of international relevance which



is dominant in its market. Among the high-calibre ranks is Harburg-Freudenberger Maschinenbau GmbH as a globally leading manufacturer of kneading machines and complete mixing room solutions for the tyre and technical rubber goods industry. Among the reasons given for its inclusion, the anthology states that HF has set milestones in the efficient production of high-performance tyres with the tandem process. As such, the company has made an important contribution towards meeting requirements in relation to the new EU tyre label. Energy efficiency and safety of vehicles have been improved thanks to products and systems from the HF MIXING GROUP.

UMIX production returns to Freudenberg

➔ Harburg-Freudenberger, Freudenberg, Germany

On 1 July, Harburg-Freudenberger Maschinenbau GmbH took over the 'Universal kneader' business unit from Coperion GmbH. As a result, HF can now supply new systems featuring technology developed by Coperion, as well as servicing and spare parts for the machines. With this acquisition, the company is strengthening its own product portfolio of mixer designs and broadening its field of application. The universal mixer, which is marketed under the name UMIK as a distinct product group, had already been built in Freudenberg up until 1985. At the time, the predecessor companies of Coperion and Harburg-Freudenberger were still united under the same roof as Werner & Pfleiderer. UMIK mixers differ from other classic internal mixers on account of their lighter design, lower investment costs and the fact that they can be used for mixing goods with lower viscosity (see page 30 for more detailed information on UMIK).

Otto Huth now in charge of the Italian operation

➔ Pomini Rubber & Plastics, Rescaldina, Italy

On 1 January, Otto Huth took over from Riccardo Curti at the head of Pomini. Curti retired at the end of last year and in future will support the HF MIXING GROUP as a consultant. The new man in Italy is a qualified engineer specialising in plastics technology and lived most recently in Switzerland. In the last decade he initially transformed the Huber+Suhner mixing works into a business unit. Following its subsequent divestment as Compounds AG, this was taken over by the now 51-year-old. Compounds AG is a manufacturer of compounds for technical rubber goods and discontinuous vulcanised rubber profiles. In 2008, under the aegis of Otto Huth, a new factory for mixing and extruding was built, which is among the most modern of its kind in Europe. 'Managing Pomini RP and thus also the business

unit twin-screw discharge extruders represents a very interesting challenge for me,' says the new managing director. 'I am motivated by the balance of cultural differences between the various locations on the one hand and the opportunity to work in a committed and efficient team in Italy on the other. I also like the technical standing of the HF MIXING GROUP, its international set-up and its global customer base.'

Relocation to a new and modern building

➔ Pomini Rubber & Plastics, Rescaldina, Italy

In April, the employees of Pomini RP moved from Castellanza to a new and modern company building in Rescaldina. 'This move was a big change – especially in organisational terms,' reports the former managing director Riccardo Curti, who had left the company at the end of last year, but still oversaw the move in spring. The change of location has mostly been viewed positively by the employees in the Italian business unit. 'The move allowed us to grow together more as a group,' recalls Chiara Turconi from the sales department. 'Our daily work activities are now completely independent of the company Pomini Tenova. The new offices are nice and modern – in perfect keeping with our attitude to life.' Silvia Ravezzani from the ISO department, who has been working for the company for two years, sees things in a similar way: 'When I saw the new building for the first time, I was very impressed. It is modern, bright and elegant. That also describes Pomini and the lifestyle of its employees. The Italian style of the building suits us perfectly.' Stefano Ferrarato from the engineering department looks back rather wistfully at the move: 'For people like me, who have been with the company for a long time, leaving the historical Pomini site was



New managing director:
Otto Huth, engineer specialising in plastics technology.



The new Pomini site in the Italian municipality of Rescaldina is a sight to behold!



The offices in Italy: modern, bright and inviting.

like being uprooted, but I now view the new start here positively – like being born again.’ His colleague Raoul Sbrozzi from customer service adds: ‘At first there was a brief feeling of being disoriented along with a few nostalgic moments – which is to be expected after so many years in Castellanza. However, I have now acclimatised perfectly: the new site is modern, big and bright, and the location is nice and quiet. Everything is getting better by the day and I am happy. Fortunately, one thing has not changed: the people I work with every day.

BR 1600 BANBURY® mixer available at the customer demonstration facility

➔ FARREL POMINI, Oxford, USA

A new BR1600 BANBURY® mixer has recently been commissioned and is available for demonstration in the HF MIXING GROUP / FARREL POMINI laboratory and customer demonstration facility in Oxford, Connecticut, USA. The ASTM-certified mixer is equipped with ADVISE® ES mixer control and data acquisition software, which is HF MIXING GROUP’s latest mixer control and data acquisition and management software. In support of the mixer is a 6 inch x 13 inch roll mill for post-mixer sheeting of the product. The BR1600 is very well suited to both laboratory and small production environments for rubber and plastic batch mixing. Specific applications include compound development, raw material analysis and quality control documentation, mixing procedure development as well as employee training. The mixer available for trial and demonstration features 2-wing standard rotors and a 3-zone water-based temperature control system for independent control of the metal temperature of the rotors, sides and door top as well as a 40 hp (35 kW) variable frequency AC motor and drive. To ensure a pleasant environment, there is a dust and fume enclosure that connects to an extraction system.

The operator interface and remote workstation for multiple mixer recipe management and analysis provide a full capability mixer control. It’s possible to supply multiple input data from production mixers for comparative analysis, providing a real world reference during a trial phase. The ADVISE® ES software the customer experiences during trial is extendable to multiple lab or production mixing lines.

For trials, demonstrations or more information, please contact mixing@hf-group.com or www.farrel-pomini.com/contact.

New assembly hall for batch mixers

➔ HF Rubber Machinery, Topeka, USA

Work on a new assembly hall was completed in mid-November at HF Rubber Machinery in Kansas – perfectly timed to coincide with the strategic decision to consolidate the North American batch mixer business unit in Topeka and serve customers in this sector from here. The new hall covers 5,600 square metres in total and is more than 13 metres high. It provides room for a 1,700-square-metre warehouse, has a 600-square-metre workshop area and five assembly areas, which take up a total area of 1,600 square metres. Seven or eight mixers can be assembled here at the same time. The hall also provides sufficient space for storing supplies, painting, final assembly and dismantling used mixers. In addition, there is a sandblaster and an office area complete with conference room. It was possible to assemble the first mixers here after the warehouse had been relocated to the new hall at the beginning of the year.



CP4000 Series II™ Compact Processor introduction

➔ FARREL POMINI, Oxford, USA

FARREL POMINI enhanced its line of CP Series II™ Compact Processors with the larger format CP4000. When we thought about developing a larger sized processor, everyone on the team was in agreement that it needed to be the most efficient CP designed to date. We strove to design a processor that was efficient in the key areas of processing, energy and maintenance. The CP4000 is arguably the most efficient we've produced with up to 60 per cent higher production capacity over the next size CP2500 and a compact footprint that's only marginally larger than the CP2500 footprint. The Compact Processor is an integrated continuous mixer and extruder system with an extremely wide range of applications including compounds with high levels of fillers and colour master batches. The CP4000 is the largest possible machine that can follow this format.

The CP4000 bridges the gap between our two most popular equipment models – the CP2500 and the 9UM plus 12" Extruder enhancing our options for medium to large size master batch producers. It allows the efficient Compact Processor concept to be augmented with a higher capacity processor giving FARREL POMINI significant throughput advantages over our competition complementing the existing quality and energy efficiency benefits.

The CP4000 scales up directly from the CP550 available for demonstration and testing in the USA and UK laboratories. Scale-up ensures that what a customer experiences when running a lab trial is what they can expect on a larger scale on the CP4000.

New website launch

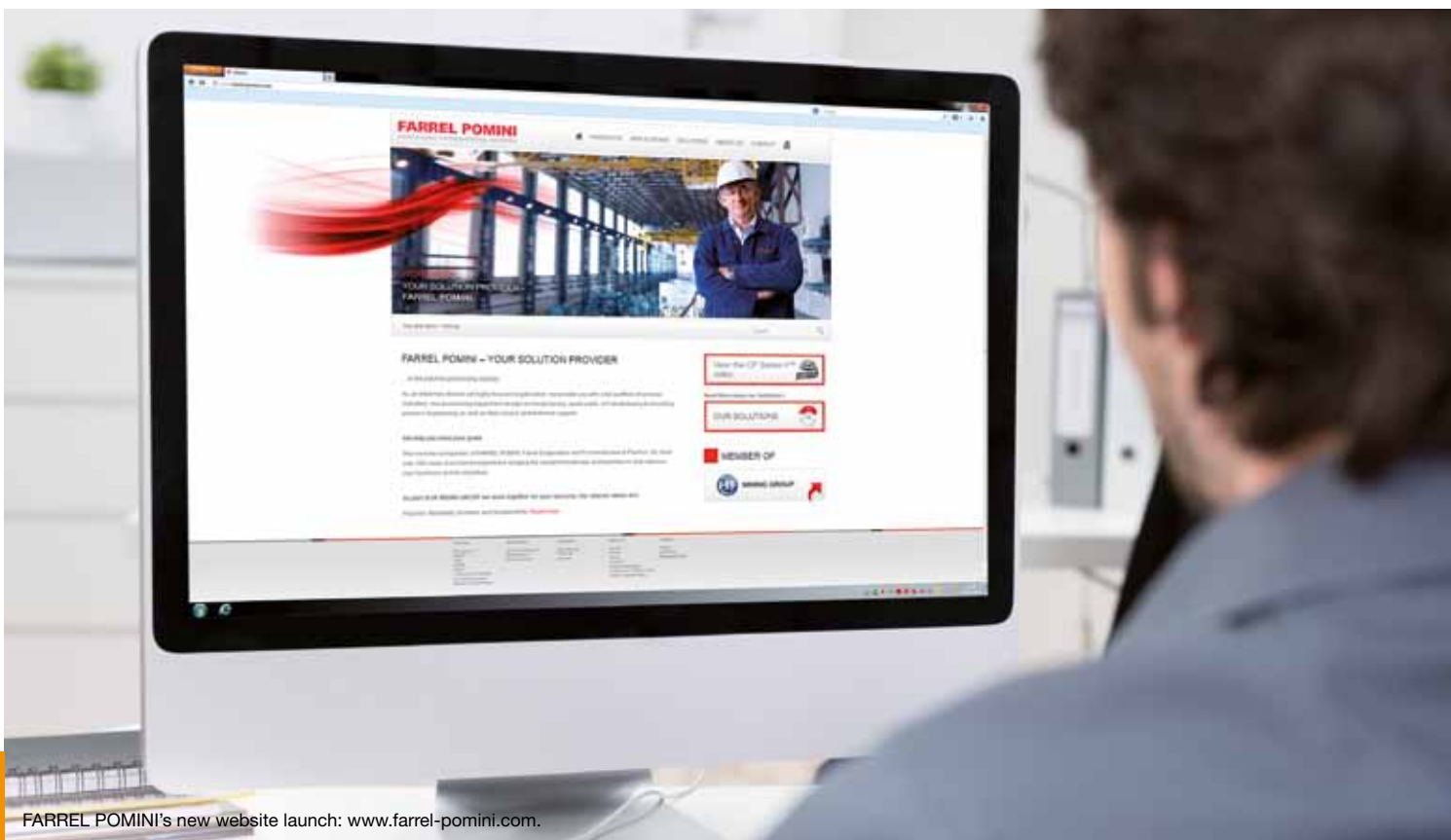
➔ FARREL POMINI, Ansonia, USA

FARREL POMINI has launched a new website: **www.farrel-pomini.com**

The website showcases the FARREL POMINI product line, including a library of product brochures in a variety of languages available for download. In addition, the site offers information about aftermarket services, employment opportunities, industry event participation and an inquiry form to facilitate visitor requests for information about products and services.

The crisp, modern website was developed in partnership with image experts Welke Consulting Group and the FARREL POMINI marketing department. The content was based on input from several departments. With this new website, farrel-pomini.com and hf-mixinggroup.com now have very similar, user-friendly formats.

'We're happy to have such a dynamic site where we can demonstrate our areas of expertise and the solu-



tions we have to help companies meet their market challenges,' says Paul Lloyd, business unit director.

CP product video

➔ FARREL POMINI, Ansonia, USA

FARREL POMINI launched their first product video about the Compact Processor, the CP Series II™, and is available for viewing on www.farrel-pomini.com and YouTube. The CP Series II™ is an integrated continuous mixer and extruder system with virtually unlimited applications. The CP Series II™ is a proven solution for compounding colours, master batches, PVC technical polyolefins and engineering polymers.

'We're delighted to have such compelling product information available in a way that is completely user friendly and accessible to companies looking to explore this technology. When viewing on their own, the video can provide customers with a summary understanding of the Compact Processor and its benefits, as well as serving as a tool for our salespersons and technical employees when working individually with customers,' says Paul Lloyd, business unit director.

The video development was overseen by Kurien Thomas, FARREL POMINI engineering manager. It took several months to develop the script and video images that would best detail the CP's features and benefits.

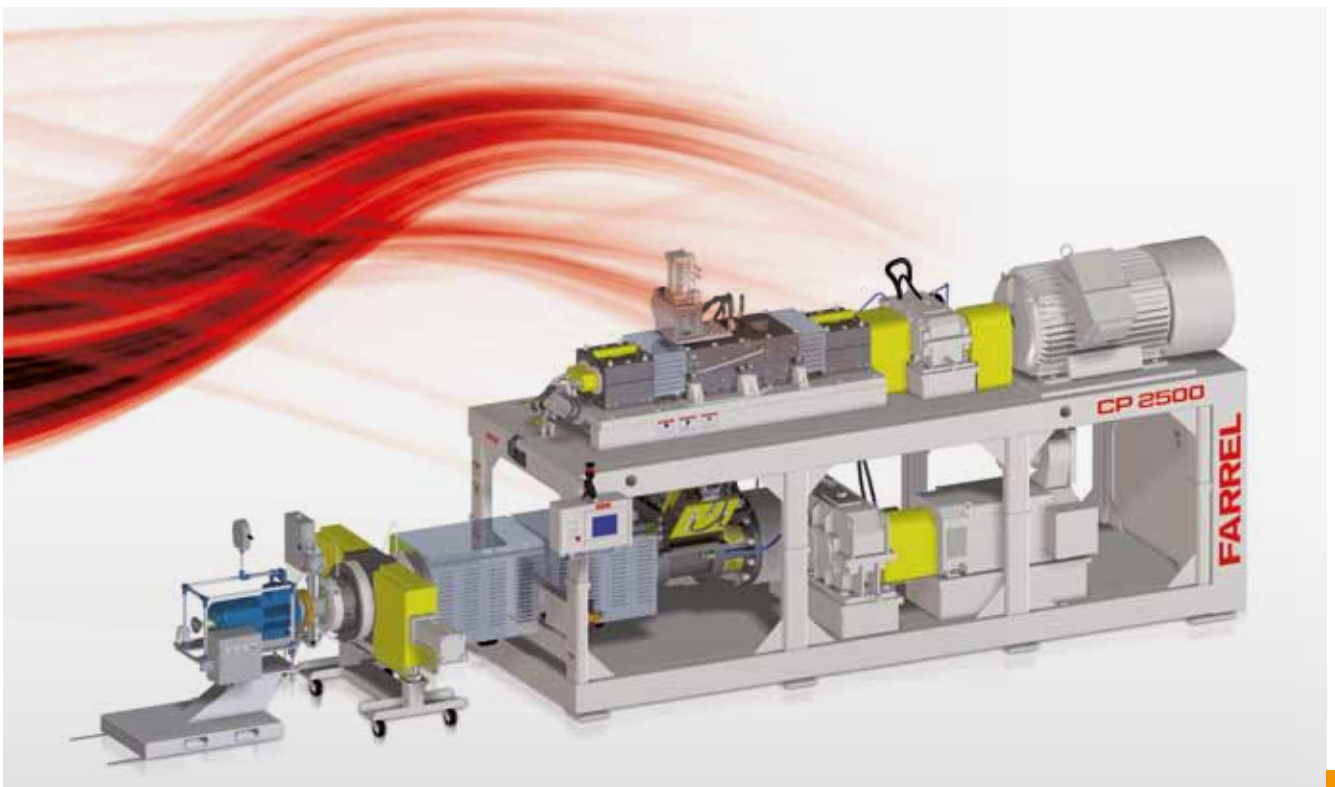


Steve Peterson.

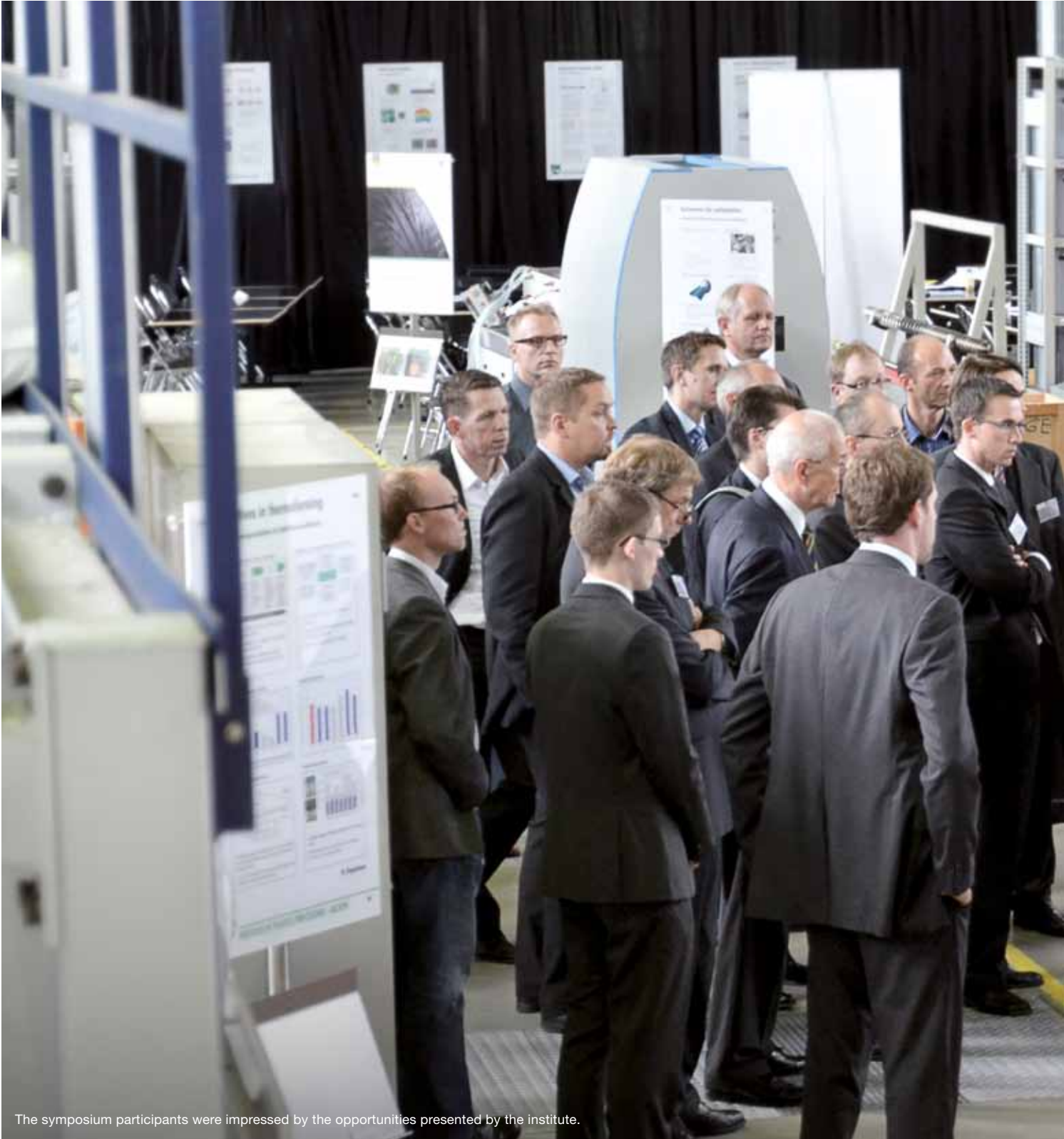
Business unit director retirement

➔ FARREL POMINI, Ansonia, USA

Steve Peterson, Vice President/business unit director of FARREL POMINI since its inception in 2011 retired in December 2013. Steve started with Farrel Corporation in 1969 and worked in many capacities throughout his career including field sales and Vice President of Engineering from 2005 to 2011. Steve will return on a consulting basis in 2014 where his vast experience and knowledge of the plastics industry will continue to be a tremendous asset.



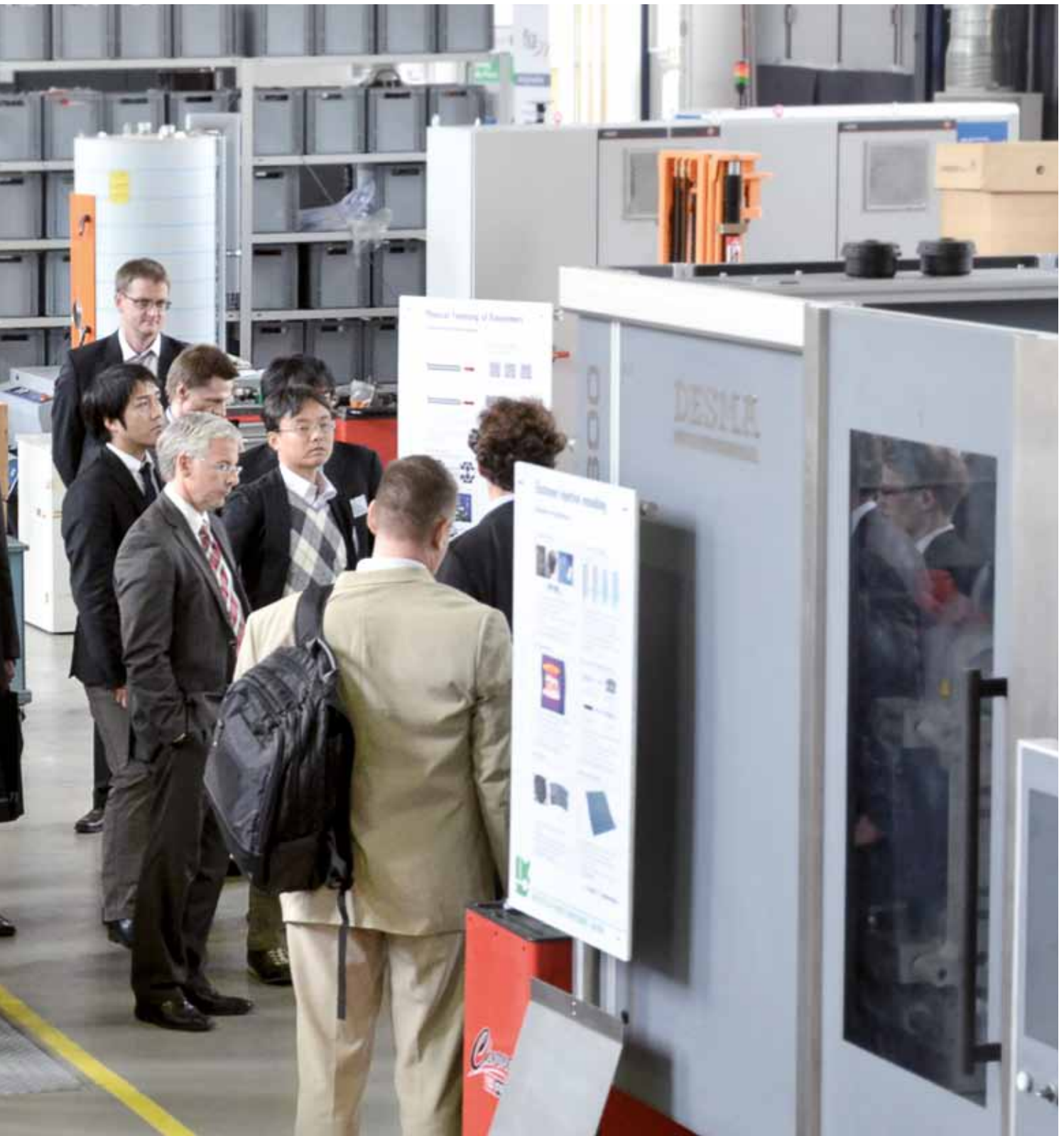
Discover top technology in the new CP Series II™ – easy to do from anywhere with the product video.



The symposium participants were impressed by the opportunities presented by the institute.

Squaring the circle

Researchers, the automobile industry and tyre manufacturers discuss the tyres of the future at 'Science meets Tires'.



Let's make one thing clear from the start: the wheel is unlikely to be reinvented anytime in the foreseeable future. However, potential for development in the area of tyre technology doesn't look as if it will be fully exhausted for quite some time yet. This assertion was certainly more than clear at the 'Science meets Tires' conference, the annual summit for the international rubber and tyre industry.

Representatives from research organisations, the tyre industry, automobile manufacturers, mechanical engineers and measuring equipment and software suppliers got together in Aachen at the beginning of September to present and discuss the latest insights, innovations and requirements in relation to the 'tyres of the future'. The IKV (The Institute of Plastics Processing) and the IKA (The Institute of Automotive Engineering) from RWTH Aachen University hosted the event.





The large number of issues, research findings and developments presented provides a good idea of how complex tyre technology already is these days.

Optimally incorporating all the different requirements in one tyre is really very much like trying to square the circle. That's because improving certain features such as safety and comfort runs almost contrary to other desirable characteristics. The best possible grip is needed, for instance, to achieve true running and short braking distances. However, this leads to greater rolling resistance, with the undesirable effect of higher fuel consumption. Add factors such as the desire for comfort, performance, low wear, robustness and recyclability to the equation and the kind of challenges facing tyre technology in the future soon become clear.

Political pressure on the automobile industry, and thus also on the tyre manufacturers, is growing. One issue – which has long since been a high priority in the automobile industry – was common to all the speeches: sustainability. The wheel plays an essential role in the efforts of automobile manufacturers to build ever more

environmentally friendly vehicles. All the participants were in agreement on this fact. A growing number of states are introducing energy and environment labels like those commonly found on household appliances, buildings and also vehicles. In many countries, tyres are already classified according to parameters such as handling, braking distances in the wet, rolling resistance and rolling noise.

The automobile manufacturers' own research and development activities show the importance they attach to enhancing the tyre in the context of their overall strategies. Ford, for instance, has set up its own research team solely dedicated to tyre development as part of its sustainability offensive. Dave Klekamp is head of this team at Ford headquarters in Dearborn, USA. The insight into the work of his team, which he afforded those attending the 'Science meets Tires' conference, will have been surprising for one or two listeners. When developing tyres, Ford carries out in-depth studies in areas where one would usually only expect research institutes or the R&D departments of the major tyre manufacturers to operate. Klekamp's team looks at

alternative raw materials such as vegetable oil and works intensively on analysing different rubber compositions using potential new fillers, elastomers, polymers, etc., and evaluating their impact on the tyre characteristics.

Volkswagen has also been busy. Group head Martin Winterkorn introduced the 'Think Blue' strategy in 2010. The aim is for VW to become the most profitable, fascinating and sustainable automobile manufacturer in the world by 2018. In doing so, the highest priority is on reducing consumption and thereby cutting CO₂ emissions.

To achieve this aim, VW sees the greatest opportunity for leverage in reducing the rolling resistance of the tyres. 'At 42 per cent, the impact of rolling resistance on consumption is even bigger than that of aerodynamics (33 per cent),' said Dr Thees Breyhan from Volkswagen AG in his speech. Unlike Ford, VW very clearly formulates the aim as a task for the tyre industry: reduce rolling resistance by 19 (!) per cent by 2020 and do so without compromising on comfort, performance, wear or safety.

In many of the speeches at the event, it was clear that these requirements cannot be met by working on the

tyre design alone. In reality, the contact area between the tyre and the road on a car is not that much bigger than the size of a hand.

The efforts of numerous research teams on both the scientific side and the manufacturers' side are nonetheless concentrated on a better understanding of the interplay between tyre design, tyre material and road surface, with a particular focus on how the lateral and longitudinal acceleration forces impact on the tyre itself.

Such efforts are helped by ever improving measurement methods and technology. As in many other areas, development teams are relying ever more on a combination of empirical tests and simulation programs. Systems such as 'Ftire' and 'CDTire', presented by Prof. Michael Gipser and Dr Manfred Bäcker, use empirically established structure models, making it possible to design a tyre under 'simulated reality conditions', so to speak, at a very early stage of development. The advantage is obvious: influential factors such as isolated structural stress, traction, temperature, etc. can be modified and the effect on the tyre structure and tyre performance can be simulated without having to carry out costly and time-consuming modifications to test designs.



Among all the issues that were examined at the 'Science meets Tires' conference, the tyre material occupied a central role. Not for nothing are the tyre manufacturers' compositions kept just as secret as the original recipe of Coca-Cola. With Prof. Ulrich Glese from the German Institute of Rubber Technology in Hanover, an eminent authority in the rubber industry took the audience on a fascinating journey to the world of molecular chains. His speech especially looked at the highly complex chemical interactions between elastomers, fillers, silicates, polymers and other components found in rubber tyre compositions.

Above all, the focus of scientists is currently on the silica compounds and newly developed S-SBR polymers, which play a major role in shaping the material properties in terms of reducing rolling resistance. These components in particular place high demands on the

the tyre industry – particularly those who produce mixing and mixing room systems – there are some huge challenges in store for the future. The mixing methods must be capable of coping with the ever increasing complexity associated with producing the compound using new materials, while also being able to manage properties essential to the quality, such as dispersion and distribution, in the mixing process. Ultimately, the question still arises of how the results of research can be transferred to industrial series production in an economically effective manner.

A system which not only perfectly illustrates these demands from a process technology perspective, but also provides a highly efficient solution in economic terms is the tandem process, which was patented in 1989 by Dr Julius Peter, then chief technical officer at Continental AG. One mechanical engineer which has



Not all rubber is the same. Manufacturers and researchers are on the hunt for the perfect composition.

process of rubber mixing. The parameters of the mixing process must be precisely observed in order to guarantee the consistently high quality of the desired rubber properties. When it comes to the silica compositions touched upon by Prof. Glese, for instance, controlling the temperature during the mixing process is of crucial importance.

Put simply, the further development of the tyre goes hand in hand with the further development of the tyre material. Some of the approaches relating to the use of new or alternative materials were presented at the conference. For the manufacturers of the production technology in

perfected this process is the HF MIXING GROUP. Business unit director Dr Harald Keuter presented the key advantages of the principle to the professional audience. Essentially, this involves separating the two basic actions in the rubber mixing process: dispersion and distribution. Dispersion describes the breaking down of materials and in particular solid materials. Distribution, on the other hand, is concerned with achieving the most even mix of the different chemical contents within a compound.

By separating both of these tasks into two cascading mixing stages in 'tandem', both stages can be optimised



Dr Harald Keuter (HF MIXING GROUP) calculated a potential saving of up to one million euros by using tandem mixers.

to perform their respective task. As a result, the systems also achieve a higher throughput rate, which is reflected in significantly better economic figures. Taking the example of a fictitious average-sized car tyre manufacturer – with five tandem mixing lines and production of ten million tyres per year – Keuter calculated a potential annual saving of almost one million euros compared to a similar production set-up using conventional mixing lines. This creates an enormous competitive edge which is sure to resonate among the manufacturers in the hard-fought global tyre market. (See page 26 for more information on the tandem process.)

The wheel was invented more than 6,000 years ago and its basic function has remained unchanged ever since. The technological possibilities of the tyre, however, have certainly not yet been exhausted – as the ‘Science meets Tires’ conference clearly demonstrated. New developments are constantly emerging as a result of cooperation between research institutes, the tyre

industry, automobile manufacturers and technological suppliers like the HF MIXING GROUP. New measuring methods are also helping to gather ever more detailed information about the physical and chemical processes in tyre material, about the tyre structure and what happens at the interface where the tyre meets the road. As such, it will be interesting to see which findings and new developments will be presented at the ‘Science meets Tires’ conference in 2014.

One year on

The first 365 days under the same roof.

After one year together as part of the HF MIXING GROUP, the managers of the individual business units in the USA, Italy, Germany and Great Britain all see things the same way in many respects. In essence, there is broad acceptance of the brand among customers and employees, the shared values are practiced and the image as market leader is credible.

When several companies are brought together under a new name, big changeover processes are involved – internally, but also in relation to customers and the public image of the company. That is why we asked managers from four locations in the USA, Italy and Great Britain to tell us how they experienced the changeover, what has changed for them and what kind of feedback they have received from employees and customers.

‘The recall value of the brand is growing by the day and our principles are understood by everybody. The nice thing is that the employees understand these shared values as something that unites everybody from the various locations around the world,’ says Paul Lloyd, business unit director at FARREL POMINI in Ansonia, Connecticut, USA. ‘We have a consistent image on the market and among our customers – that has to be viewed as a positive thing,’ declares Riccardo Curti, former business unit director in Castellanza, Italy. A new name, a shared identity – and yet it is not just the ‘big picture’ that has changed, but also the many little things in the individual locations of the HF MIXING GROUP: while Ian Wilson, business unit director from Rochdale, Great Britain, is especially happy about the investment in the northern English production site and



The HF MIXING GROUP – four companies, one new name, one common identity.



Paul Lloyd,
business unit director at FARREL POMINI in Ansonia, Connecticut, USA.

the higher number of trainees that have been taken on, Paul White, site director from Topeka, Kansas, USA, is first and foremost content with the growth of his own location and its increasing stature: 'For us, 2013 was a year of transition, during which the entire North American production of the rubber mixers was brought under one roof in Topeka. The HF MIXING GROUP has invested two and a half million US dollars in production and expanding storage capacity at our location, and five new employees have been taken on. That is very pleasing and will increase our sales revenue and operating result. This strategic decision allows us to pool our strengths and serve our customers from one location – from one single source, so to speak!'

The changeover to a shared brand image has also been well received without exception among the business unit and site directors: 'I think our brand presence is good and our values are solid and credible – and that is very important. The values come across as very natural and appear in no way contrived,' says Ansonia chief Paul Lloyd, full of praise. His colleague from Topeka adds: 'I admit that I initially had my doubts as to whether the established brand presence actually had any value or whether it was just some kind of marketing trick which nobody really took seriously, but I soon came to realise how important the brand presence is: our employees in Topeka are able to identify with the brand; they feel part of the global HF MIXING GROUP family – and that wasn't necessarily the case previously. This sentiment is gradually becoming the norm and permeating everyday working life.' Their English colleague Ian Wilson is also getting a number of positive things out of the brand presence: 'I see myself as part of the HF MIXING GROUP – no longer as a Farrel employee.'

However, the elements of the brand presence perceived as especially important by the individual locations and therefore increasingly communicated to the employees are different: Rochdale and Ansonia primarily rate brand values. 'Our people at Farrel, Ansonia, were actually always familiar with the brand values and practiced them. Accordingly, it was just necessary for us to reinforce their conviction once again and raise awareness of the values by aiming to visually and verbally strengthen the values,' says Paul Lloyd. His colleague from Topeka, Paul White, adds a further point: 'We actually use all the tools of the brand presence. It may sound a little arrogant now, but it seemed to us as if the core message of the brand was already being practiced in Topeka. We have had to fight for our survival in Topeka a few times in the past and it is because of this fact that we know exactly what passion means. It is the same with reliability: we simply have to be a reliable partner to our customers to survive, otherwise the HF MIXING GROUP wouldn't exist in its current form.' Riccardo Curti's favourite aspects of the



Paul White, site director in Topeka, Kansas, USA.

new brand image relate to ambition and passion: 'Those are precisely the characteristics which we set as standards in relation to our expertise and our jobs,' says the Italian.

All business unit managers view a common awareness of the brand across all locations as indispensable. Paul White explains: 'The biggest advantage that can grow out of the brand strategy is undoubtedly the common understanding of the brand, which always shines through in the cooperation that exists between the individual businesses and locations. Previously we tended to have a "Me first!" mentality – it is completely different now. We feel much more like a unit.' The Briton Ian



Ian Wilson, business unit director from Rochdale, Great Britain.

Wilson sees it in the same way – and these positive changes are making themselves felt ever more strongly. Paul Lloyd from Ansonia is unable to confirm this. ‘But,’ says the Briton, who took on the role of manager at the FARREL POMINI business unit at the beginning

of 2013, ‘that may also have something to do with the fact that cooperation with other HF MIXING GROUP locations in Connecticut is not quite as pronounced as is the case at other locations, because, with the continuous mixers, we serve different target groups to the rest of the group.’

The process of finding an identity under a common brand is also an important issue for the employees – outsiders and customers may see this process and its outcome completely differently, critically and maybe even feel threatened by the strong position of the new, large company. That has been Ian Wilson’s experience, anyway: ‘Some customers have expressed concerns about the strong presence of the HF MIXING GROUP on the market. They are afraid that we will have a monopoly which we could exploit.’ His Italian colleague Riccardo Curti backs him up on this point: ‘The HF MIXING GROUP is perceived on the market as being a strong brand which holds a certain amount of sway. I think many people are worried about the



A strong, consistent image in communication and advertising activities documents the cohesion within the HF MIXING GROUP.

dominance of the group and are afraid of a monopolistic market position.’ Paul White sees things completely differently: ‘Yes, we have had feedback from customers, but it tends to be positive. People trust the group more. The two brand strategies pursued by Farrell and HF in parallel never really worked and raised doubts among customers in relation to our ethics. The “Best of the Best” one-brand philosophy works well and is accepted. The customer sees the HF MIXING GROUP as a market leader supplying highly specialised systems which also occupies a commanding position when it comes to research and development.’

One common image as a brand – is that an asset for the company? ‘Absolutely,’ says Paul White. He gives a clear answer while speaking on behalf of the other locations in summarising the market’s reaction to the rebranding: ‘The number of orders we have received, which has broken all previous records, speaks for itself, doesn’t it?’





Alexander Quast (centre) is the master of the technical centre and an expert consultant for his customers.

Where the best test

The HF MIXING GROUP offers its customers perfect testing conditions in a production environment at three different locations.

Companies in the rubber and plastics industry are constantly researching new products and materials. A new product has to undergo a whole series of tests before it is launched onto the market. These tests are indispensable. However, a manufacturing company generally doesn't have the opportunity to carry out all the necessary tests by itself. For one thing, its machinery is tied up in its own production planning and is often no longer state of the art. Even tests under laboratory conditions – as they are largely outsourced to research facilities and universities – can only simulate a result under real product conditions without actually reproducing them.

Above all, the interplay of the various factors involved in a mixing process – including the raw material and the way in which it is added, the actual mixing and discharging method, and any further processing stages – significantly influence the end result. That is why the industry is focusing ever more on choosing the right production

machines and systems in combination with the product being manufactured or the material being processed. In 2012 in Freudenberg, the HF MIXING GROUP opened what is probably the most modern research and development centre in the tyre and technical rubber goods industry. MIXING TOGETHER reported extensively on it in the last issue. Meanwhile, a new UMIX 80 TDH mixing system has increased the testing options at the site. Both single drives powering the tangentially running sigma blades on the UMIX can be adjusted to run at between five and 50 revolutions per minute by means of a continuously variable speed control, both in synchronous and friction mode. With a capacity of 80 litres, the mixing chamber is designed to operate under negative pressure and can be adjusted to work at up to 230 degrees Celsius. Accordingly, the UMIX also offers supreme flexibility and adds another interesting option to the range of machinery at the technical centre. All machines and weighing equipment



Laboratory tests under production conditions: only in the HF technical centre in Freudenberg.

in the Freudenberger research and development centre are operated using the HF automation system ADVISE® ES. This superordinate system takes care of the entire process management and documents all the available process data such as weighing reports, rotor speeds, compound temperatures and power consumption. This permits precise analysis and processing of the mixing results.

The conference and training rooms, which are now also ready, are equipped with state-of-the-art media technology. Besides being used for internal HF training courses, they are also used for lecture events and seminars with external cooperation partners and customers.

The head of the high-tech empire is Alexander Quast. The 28-year-old is the personification of the HF MIXING GROUP's brand promise: pure passion. Despite his tender years, the friendly man radiates remarkable competence and authority. At the age of 16 he embarked on his first training course to become a mechatronics engineer at Harburg-Freudenberger and subsequently worked all around the world as a service technician. In 2008 he returned to the classroom for two years at the technical vocational college in Siegen, from where he graduated as a certified electrical engineer. Since then he has worked on various research and development projects and has been managing the technical centre for a year. He says that the HF technical centre has



now become a kind of Mecca for the international tyre and technical rubber goods industry. Also striking is the increasing number of people interested in mixing renewable raw materials and other special applications. In these areas, too, the centre also provides the ideal testing environment.

**Highly modern and customer-friendly:
the FARREL POMINI process laboratories**

The counterpart to the Freudenberger technical centre is located in Oxford, Connecticut: just a few kilometres from the HF site, the FARREL POMINI offices, in Ansonia. The FARREL POMINI customer demonstration laboratory shows customers what is technically possible for continuous mixers. The modern laboratory in the USA was built almost two years ago at a cost of 500,000 US dollars. Within the HF MIXING GROUP, this business unit is responsible for machinery used primarily for plastic applications. However, this facility is used for more than just customer demonstrations, it is also the home of the FARREL POMINI research and development centre for the continuous mixer product series.

In addition to Oxford, FARREL POMINI operates another modern testing laboratory in Rochdale, Great Britain. Both facilities offer customers from around the world the opportunity to test their highly specialized processing needs for various materials under real conditions. Among the equipment available at both facilities is a CP550 processor, which provides options for underwater pelletising, stranding and other special applications. This CP550 Compact Processor from the CP Series II™ is a production-sized processor which routinely scales up machine conditions and product qualities to our larger production machines. It has a number of additional features for evaluating different configurations, geometries and mixing conditions. A CPXL chamber and CPXL rotors make it possible to demonstrate LCM technologies in the latest CPXL format.

The CP550 is part of a 'real' and highly modern process line which customers can use for conducting their tests. Both the Oxford and Rochdale facilities are equipped with a range of different feed-in options and offer various possibilities for the accurate filling and processing of pellets, powders, liquids and other raw materials. Latest design control and data acquisition systems are integrated with the laboratory equipment.

The testing availability offers a number of advantages to those interested in making a purchase: 'Our customers are able to see with their own eyes what they can expect

and also see that our products live up to their promises. They are taught operation techniques from our experts and can make their purchase with the peace of mind that they have chosen the right system for their market challenges,' says FARREL POMINI business unit director Paul Lloyd. 'We are delighted to be able to offer our customers so much with these laboratories,' he adds. It is now a standard for customers to be able to test their compounds in a realistic situation. It is an opportunity that many people use. 'We conduct several tests every month at each location. The money spent by the HF MIXING GROUP on these facilities has been well invested,' explains Paul Lloyd.



A CP 550 continuous mixer with various applications represents the heart of the testing centre in Oxford, Connecticut, USA.



A building full of expertise: the FARREL POMINI lab in Oxford, USA.





Whether a Manchester United or Manchester City fan, everyone plays in the HF MIXING GROUP shirt in Rochdale!

A look back: the history of the ‘rubber connection’ in Rochdale

Our location in Rochdale, Great Britain, has a very special history: machines used in rubber production have been built here for more than a century. Reason enough to take a closer look at the home and the colourful history of Farrel Ltd. as well as the origins of the legendary BANBURY® mixers.

Rochdale, home of Farrel Ltd., is in the north-west of England. The nearest city is Manchester, known throughout the world for its two great football clubs, Manchester City and Manchester United. Incidentally, Rochdale itself has a football club, known to the locals as ‘The Dale’, which currently competes in England’s League Two.

The town currently has a population of 220,000 and is named after the River Roch which flows through the middle of it. Its history can be traced back to the 11th century; the oldest documents still in existence date from 1242. Over the years, Rochdale has been twinned with various other towns around the world, including Peine and Bielefeld in Germany, Tourcoing in France, Sahlwal in Pakistan, Lviv in the Ukraine and Sylhet in Bangladesh.

The roots of the production facilities in Castleton, where Farrel Ltd. now produces a wide range of mixers, stretch as far back as the year 1900. Construction work began on the company building in 1897 on land which was completely undeveloped at the time. The



factory was built for David Bridge and his five sons and thus the company was also called 'David Bridge and Sons'. Back then a factory was built where machinery used for rubber production was made. Even though England still has a large number of traditional businesses established generations ago, it is nonetheless extraordinary that the company has been able to hold its own in the market over the years by specialising in such a niche area. David Bridge Ltd. prospered and employed many people from the surrounding area. In the first decade of the last century the new factory in Castleton already had a reputation which extended far beyond the region: licence agreements with the Birmingham Iron Foundry in Connecticut, USA, which was later acquired by Farrel, permitted the production and sale of the legendary BANBURY® mixer, initially throughout the Commonwealth (1918) and later worldwide (1926).

The BANBURY® mixer was one of the successful products which began life in Rochdale before going on to take the world by storm – and all of this happened almost 100 years ago. The mixer was one of the most important machines produced by Farrel at the time. It was named after its inventor Fernley H. Banbury, a British engineer who had emigrated to the USA a few years previously. He designed the mixer in 1916 while working for the Birmingham Iron Foundry in Connecticut. It was initially tested by the tyre manufacturer Goodyear. The BANBURY® mixer marked an important turning point in the success story of the company – from then

on, the rubber industry was barely able to get by without this pioneering invention.

The company continued to grow; in 1939 David Bridge Ltd. employed more than 1,000 people, who all worked in the same factory. One of these employees, Bernard Whitworth, who incidentally also helped to produce this article, even had 18 family members working at the company at times, and they were all taken on at the same time. Bernard Whitworth's links to his employer go back a long way – in 1910 his grandfather was employed to fit out a factory used for producing cast parts.

After the Second World War, 'Farrel Bridge' continued to grow in a way that also allowed it to include machines specially designed for processing plastics in its product range – plastic had previously been processed on the same machines originally used for producing rubber. In 1966 the Farrel Corp. was acquired in the USA by USM (United Shoe Manufacturers) and ultimately merged with the American group of companies Emhart ten years later.

The company mergers and acquisitions continued: in 1997 the Farrel Corp. bought Francis Shaw Rubber Machinery Ltd. in Manchester, mainly to acquire its Inter-mix technology. Over the period of a year the employees of Francis Shaw were gradually relocated to Rochdale and production of both firms was eventually merged here. The American Farrel Corp. acquired Skinner Engine and Gumix in 2002 and 2006. In 2008, barely one year after the company had been taken over by a private investor group, it was bought by Harburg-Freudenberger Maschinenbau GmbH and now continues its business operations as part of the HF MIXING GROUP.



The author of this article is Trevor Cunningham. He works as a control systems engineer in the automation department in Rochdale, UK.

One for all

Multitalents for the laboratory and production: UMIK universal mixing and kneading machines enhance the HF MIXING GROUP's portfolio.

A specialised solution is not always the best choice. There are applications for which one and the same mixer is intended to be used for various compounds and various mixing applications. This is the case, for instance, in laboratories or industrial applications where the batch sizes don't use a special machine to its full capacity. The UMIK universal mixer series is the right answer for achieving excellent results when mixing low- to high-viscosity media in varying compounds with minimal investment. The HF MIXING GROUP took over this product series from the Stuttgart-based Coperion GmbH in summer 2013. 'The UMIK series perfectly enhances our product range for those customers who produce small to medium-sized quantities and have to manufacture varying compounds on one machine at reasonable investment costs,' says Ulrich Gerhards, UMIK product group manager, welcoming the expanded product range.



Laboratory mixer.

With capacities ranging from 0.25 to 4,300 litres, the series covers a broad spectrum of possible applications. Besides pure mixing and kneading, the UMIK series can handle simultaneous processes such as moistening, plasticising, dispersing, homogenising, melting, cooling, degassing, evaporation, dissolving and reacting during the mixing process.

The function of the machine is based on a twin blade principle with two tangentially counter-rotating blades which, in interaction with the trough wall, produce an optimal shear rate in the mixture, thereby ensuring homogeneous mixing results. The temperature of trough and/or blades can be adjusted on many of the model sizes,



Tilttable production mixer.

which is just as interesting for laboratory and test applications as for temperature-critical mixing processes in industrial production.

The UMIK is available as a compact version for laboratories and a powerful version for industry. The product can either be discharged by tilting the trough or – on very small machines – by simply removing the trough. The option to empty the machine via discharge screws or bottom outlets is available on many of the model sizes. On request, the models can be supplied with additional components fitted, such as nozzles for pelletising or profile extrusion. Overall, the UMIK series has a range of impressive features, including its compact design, wide range of mixing applications, convenient operation, safe process management and various configuration options with respect to performance, functions and capacity. (Further information can be found at: www.hf-group.com/umik.)

Additional features:

- Two product lines for production and laboratory
- Product extraction by tilting, discharge screw or bottom valve – to be chosen*
- Multiple machine sizes from 0.25 to 4,300 l net volume
- Process control with temperature-adjustable troughs and blades*
- Blade geometry, material selection and drive design adapted to customer-specific process requirements*
- Profile extrusion via nozzle and pelletising possible for discharge screw versions*

* depending on version and/or size



Cool yet tough

ASMACool rollers – the non-stick solution from the HF MIXING GROUP.

Every new rubber compound and every new mixture component not only entails new properties for the end product, but also significantly alters the process behaviour of the material during mixing and further processing. Silica compounds have been tried and trusted in the manufacture of car tyres for a number of years, because many relevant factors, such as noise emissions, rolling resistance and braking distance can be positively influenced by their use. For the production of the basic rubber material, however, the use of silica additives creates completely new challenges in relation to the mixing process and how the finished rubber compound is handled, especially when it comes to master batches.

Complex chemical reactions between the individual components and additives take place during the mixing process. When silicic acid is used, this is grafted onto the filler surface during mixing by means of a compound such as silane and later (in the heating press) chemically bonded to the polymer. The properties of the finished tyre can be improved considerably as a result of this process. However, silica compounds prove to be highly adhesive on the mixing line. This means that the rubber compound 'sticks' more firmly to the inside of the mixing chamber, the discharge screws and the rollers on the roller die, which turn the master batch into a six- to eight-millimetre-thick coat that clings to the rolling mills and twin-screw discharge extruders.

The HF MIXING GROUP has come up with a solution to this problem in the form of ASMACool. Its combination of roller design and surface, and controlled roller cooling is new and totally unique. ASMACool stands for **Anti-Sticking MAximum COoling**.

The HF engineers discovered that merely controlling the temperature of the discharge rollers can only counteract the sticking effect to a limited extent, so the classic dilemma of wishing to have the cake and eat it had to be solved in a different way. Accordingly, in a series of tests carried out at HF, the interaction between the rubber mass and the roller surface was examined in-depth. The developers discovered that the gases released, especially by certain silica compounds, have a highly corrosive effect on the roller surface. As a result, the surface becomes rougher, which in turn helps the medium – in this case the compound – to stick to it.

Their answer was to use a special process to produce high-strength, corrosion-resistant hard plating for the rollers, which suppresses the aforementioned phenomenon to the greatest possible extent. The armour plating on an ASMACool roller is so hard that not even a foreign body such as a hammer or spanner can damage it. A further advantage is the fact that the rollers can be repaired on-site using build-up welding. This special anti-stick coating is currently only offered by HF. Virtually all the commonly used rolling mills and roller dies supplied by the HF MIXING GROUP can now be fitted with ASMACool rollers. It is a unique selling point which offers customers in the tyre and rubber goods industry significantly higher discharge yields, while also improving the effectiveness of the mixing lines, minimising maintenance work and unplanned downtimes caused by jammed rollers and generally increasing process safety. This development was not only conceived with a focus on silica compounds, but primarily against the backdrop of the increasing number of new raw materials and chemical components that will define the future of tyre and rubber production.



The basic principle behind the TANDEM mixer: the mixing stage (upper area) and kneading stage (lower area) work as an effective unit together.

Mixed doubles

The HF tandem process.

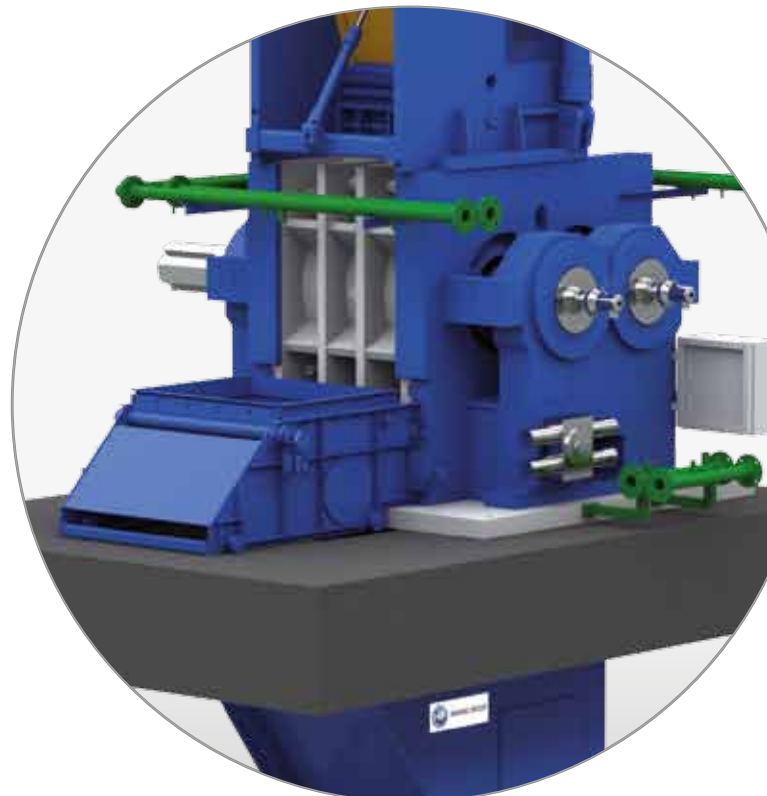
The widespread success of tandem technology began with an idea from Dr Julius Peter (Continental AG). He discovered that separating the two main tasks in the rubber mixing process – dispersion and distribution – carried a number of clear advantages. The tandem process was born out of this idea and was patented by Peter as long ago as 1978. Tandem technology involves connecting two machines in series – or more precisely, on top of one another, with each machine optimised to perform one of the two mixing tasks.

The first machine is responsible for dispersion, which means breaking down mixture components such as the fillers. Distribution takes place in the second machine (or stage), which involves achieving the most homogeneous mix within the rubber compound. If reactive compounds are processed, the chemical reaction also chiefly takes place in this machine. Both machines are connected in series so that they function together as one continuous mixing process. The ‘premixed’ material from the first stage is not temporarily stored, but immediately moved on to the second stage, which performs the concluding distribution task while the next batch of material is being premixed in the first stage. This perfectly synchronised, permanent two-stage process signifies a quantum leap in mixing technology. It soon became clear that it would not only result in enormous benefits in relation to the silica compounds used for manufacturing tyres – an area of development on which there is currently a great deal of focus – but also in relation to the numerous other mixing requirements such as remill and carbon black manufacturing stages.

Above all, the temperature profile which is absolutely essential for inducing the chemical reactions during the mixing process can be better controlled by separating the stages. Consequently, the properties and quality of the compound can be positively influenced. There is a further effect: by separating the tasks and concentrating on one at a time, and as a result of the relatively smaller compound weight in the larger lower machine, it can be operated at a higher speed. This improves the quality of the compound thanks to the higher gravitational forces and the greater number of times the compound is moved around.

Experience shows that a TANDEM mixer can improve the throughput rate by up to 25 per cent when working with carbon black compounds and even by up to 100 per cent with silica compounds. The resulting potential for cutting costs and increasing output is obvious. Depending on the mixing line, in an average-sized mixing room for tyre production (approx. 100,000 tonnes of rubber compound p.a.) this can soon add up to savings of almost one million euros per year.

The early decision taken by HF to focus on tandem technology and continue to optimise this process is paying dividends. The pioneering automation technology, the numerous, individually configurable applications and the exemplary global service network should also be mentioned. An increasing number of companies from the rubber and tyre industry clearly recognise the enormous benefits, because demand for the machines supplied by the HF MIXING GROUP is greater than ever.



MIXING 'on tour'

We attend all the important trade fairs and events around the world. The highlight of 2013 was 'K' in Düsseldorf (Germany).





A REVIEW OF 2013:

ArabPlast 2013

➔ 7–10 January,
Dubai, UAE

India Rubber Expo and Tyre Show

➔ 22–24 January,
Bombay Exhibition Centre, Mumbai, India

13th International CAR Symposium

➔ 29–30 January,
RuhrCongress Bochum, Germany

Interplastica 2013

➔ 29 January to 2 February,
Moscow, Russia

Tire Technology Expo 2013

➔ 05–07 February,
Exhibition Centre Cologne, Germany

Pneu Expo

➔ 12–14 March,
Eurexpo Lyon, France

Plastimagen 2013

➔ 12–15 March,
Mexico City, Mexico

Chinaplas 2013

➔ 20–23 May,
Guangzhou, China

JOBS SI

➔ 27–28 September,
Siegerlandhalle, Siegen, Germany

International Rubber Expo

➔ 08–10 October,
IX Center Cleveland, Ohio, USA

K 2013

➔ 16–23 October,
Exhibition Centre Cologne, Germany

5th German WPC Conference

➔ 10–11 December,
Maritim Hotel, Cologne, Germany

Plastivision 2013

➔ 12–16 December,
Mumbai, India



Joint trade fair premiere at 'K'

➔ 16–23 October 2013, Düsseldorf, Germany

The first joint appearance for an international audience: two HF MIXING GROUP brands – FARREL POMINI and the HF MIXING GROUP itself, appeared side-by-side in October on a stand at 'K' in Düsseldorf – a concept that was very well received among trade fair visitors. 'K' in Düsseldorf is the world's most important trade fair for the plastics and rubber industries, and a real must, especially for FARREL POMINI, because the HF MIXING GROUP would like to further raise the profile of this business unit and its innovative products in the plastics sector. The trade fair is held every three years in Düsseldorf and welcomed more than 218,000 industry specialists from around the world in 2013. More than 3,200 raw material producers, processors and mechanical engineers exhibited their products and systems for a total of eight days. FARREL POMINI displayed its CP1000 rotor as well as the latest technology CPXL rotors. FARREL POMINI premiered their new corporate theme – EFFICIENCY, the driving force of FARREL POMINI activities. The efficiency elements include energy efficiency, processing efficiency and maintenance efficiency, differentiating FARREL POMINI equipment in the marketplace.

The HF MIXING GROUP was there with its ADVISE® mixing room automation software and an interactive on-line presentation of its broad product portfolio. A selection of various plastic samples made from natural fibres represented a further highlight for many of the visitors to the stand, a sector which the HF MIXING GROUP is able to serve with its interconnected mixers.

More than 400 industry professionals visited the HF MIXING GROUP / FARREL POMINI stand. Visitors showed a great deal of interest in the innovative products and it was exciting to see the number of prospective customers who came to the stand. A sales agreement for a CP1000 was even signed during the trade fair.

FARREL POMINI commemorated the 50th anniversary of the continuous mixer at 'K'. This Continuous Mixer was first sold in 1963 and was initially developed for rubber compounding. However, the continuous mixer quickly found a niche in the processing of plastics compounds where its innovation continues. Nearly 1,000 have been sold on a worldwide basis.



A strong team at 'K': FARREL POMINI and the HF MIXING GROUP appeared together for the first time.



Seeking the best young talent for the HF MIXING GROUP: Melanie Jahn and Michael Müller at the JOBS SI recruitment fair.



Chinaplas 2013

➔ 20–23 May 2013, Guangzhou, China

FARREL POMINI exhibited at Chinaplas 2013 20–23 May in Guangzhou China. We were part of the US Pavilion and we displayed a variety of pellet samples, CP1000 rotors as well as the CP Series II™ product video. Alfred Cheung, Director of Farrel Asia Limited, presented the topic of continuous mixing. There were many visitors to the stand. One Asian customer finalised a CP2500 purchase at the exhibition.

We are so encouraged by the activity level and response to FARREL POMINI products, we have committed to a much larger stand in 2014 when the show will be held in Shanghai.

EXHIBITIONS 2014

14th International CAR Symposium

➔ 28–29 January,
RuhrCongress Bochum, Germany

Tire Technology Expo 2014

➔ 11–13 February,
Exhibition Centre Cologne, Germany

27th IKV International Colloquium Plastics Technology

➔ 19–20 March,
RWTH Aachen, Germany

Plásticos 2014

➔ 25–28 March,
Guadalajara, Mexico

Chinaplas

➔ 23–26 April,
Shanghai, China

MAPLAN Days of Technology

➔ 4–5 June,
MAPLAN Ternitz, Austria

Plast Eurasia

➔ 4–7 December,
Istanbul, Turkey



See it, touch it, talk about it – the HF MIXING GROUP/ FARREL POMINI stand at 'K' was a meeting point for the plastics and rubber processing industry.



Service 3.0

Regular maintenance, provident repair of worn parts and immediate help when it's needed: customers all around the world rely on the HF service team.



HF services worldwide

Customer service plays a key role for any company in the mechanical engineering sector. After all, nothing is worse for a customer than a machine not working at its best or even experiencing the failure of system parts. That is why top service has also been a high priority at the HF MIXING GROUP from the very beginning. However, demands have changed at a tremendous pace in recent years, driven by technological advancements and globalisation.

Besides development and sales, service is also crucial to the overall success of the HF MIXING GROUP. Ultimately, customers in the plastics and tyre industry depend on 100 per cent availability and a high degree of

operational reliability when it comes to their systems. Their production capacity is based on a shift operation, 24 hours a day, seven days a week. 'Unplanned downtimes can quickly lead to losses of 100,000 euros and more per day,' explains Reinhard Jenne, head of customer service at the HF MIXING GROUP in Freudenberg. Accordingly, his area of responsibility is primarily concerned with averting unplanned downtimes by taking preventive service and maintenance measures at an early stage.

To this end, Jenne must ensure that the HF service team can be contacted day and night and is able to act immediately in serious cases. Availability is guaranteed by the 24-hour service hotline. 'In a globalised world, taking immediate action is easier said than done. Although we





can coordinate many aspects from Freudenberg, we are not always able to act quickly enough in other parts of the world,' says the experienced service manager explaining the situation. 'For Russia, China and many other markets in which the HF MIXING GROUP is active, we have to apply for visas for our service staff and take into account the individual customs formalities in each case. As such, it is not always possible to guarantee a reasonable reaction time.' Being on hand locally is therefore indispensable.

Global service structure

HF has invested a great deal of time and money in setting up such regional service bases in recent years: Europe is generally covered by the group's own locations in Freudenberg (Germany), Rescaldina (Italy) and Rochdale (UK). In addition, the group also has its own service base in Paris, which looks after France, and a service office in Barcelona, which is responsible for Spain and Portugal. There is also a service base in Dubnica, Slovakia, which will increasingly take care of customers in Eastern Europe. As markets, Asia and South East Asia are becoming ever more important to the HF MIXING GROUP. As such, the best possible customer service must also be offered here. That is why HF has set up service bases for the Asian and South East Asian markets in Malaysia, China and India. South America is covered by its own service base in Brazil, while the whole of North America has its own company locations: HF MIXING GROUP Ansonia, Connecticut, and especially HF MIXING GROUP Topeka, Kansas – a location which not only carries out field service, but is also in a position to manufacture specific components for rebuilds and general overhauls. HF has its own service bases in a total of 14 countries. Some of these work with other local service partners to cover the various regional areas. Among other things, this also ensures that the HF service team can always communicate with its customers in their own language.

Through regular training courses and professional development, HF continually keeps the service team and external service partners up to date in relation to the product portfolio and technology. The range of services offered by the customer service team is wide: besides regular maintenance work and inspections, the service employees also carry out general overhauls, repairs and modernisation work on existing machinery and systems. They often also provide comprehensive technical advice on the general condition of the equipment or the mixing room. 'Besides the pure mechanics, complex hydraulic and pneumatic systems are playing an increasingly bigger

role in recent years,' reports Jenne. 'The degree of automation has risen massively and with it the amount of electronics and software.' Accordingly, the service employees also have to be trained in this area so that they can carry out tasks such as remote maintenance of machinery and perform upgrades or updates – especially on hydraulic control systems or control software for equipment.

One service being requested more and more by customers is advice relating to optimising the mixing room. 'Minimising operating costs and improving energy efficiency are issues that are occupying the manufacturers to an ever greater extent,' says Jenne. 'If necessary, our service teams advise customers on how existing systems can be modernised and optimised or tell them when it may be worth replacing their equipment with new and more efficient technology.'

The Equipment Life Cycle Indicator

To avoid unplanned downtimes and identify the necessary replacement of worn components or entire machines in good time, the HF MIXING GROUP has developed the Equipment Life Cycle Indicator, or ELCI for short. This is a recording, evaluation and documentation system for the maintenance and service history of a machine, which

the HF MIXING GROUP service team offers as part of corresponding maintenance agreements. By recording, evaluating and documenting everything, the wear behaviour of the machine can be tracked, making it possible to calculate in advance the remaining life of working parts – the so-called core components – on the internal mixer in particular. This gives customers much greater certainty when planning the next scheduled maintenance session, replacing parts or carrying out a general overhaul, but also in terms of being able to plan the corresponding investment budget and time needed at an early stage.

The HF MIXING GROUP service team consists of a total of 35 to 40 technicians based in Freudenberg, Rochdale, Castellanza, Ansonia and Topeka, plus ten to 15 employees at the HF MIXING GROUP's own service bases. It is made up of engineers, mechanics, welders, mechatronics technicians, electronics engineers and hydraulics and software specialists. There are also employees from local external service partners. Reinhard Jenne sums up the service team's motto and customer promise as follows: 'Whatever happens, whenever you call, wherever you are – you can count on us.'



Servicing machines on-site often calls for improvisation skills. The HF technicians are well prepared for that.

HF NaJUS: a reliable member of the big family

The production site in Slovakia is a real asset to the entire group and has potential for the future.

It is the latest addition to the HF MIXING GROUP family: HF NaJUS. The Slovakian company with its 300 employees joined the group of companies on 8 November 2012. The youngest member specialises in the production of components and special machinery. One particular focus of its activities for the group of companies also lies in this area.

The newcomer HF NaJUS may appear to play a subordinate role at first glance – with annual turnover of around 15 million euros, the Slovakian company previously owned by Rona, one of the leading companies in the glass industry, would appear to take a back seat. However, importance cannot be measured by means of the balance sheet alone: the new Slovakian site is primarily significant for the high number of manufactur-



HF NaJUS is solely a production site.

ing hours. Around 250,000 manufacturing hours in Slovakia are accrued producing components, assembly groups and complete machines. Of those, 60 per cent of the overall manufacturing capacity is for the HF MIXING GROUP.

'We have transformed ourselves from a company which almost exclusively supplied products as an extended workbench of the glass industry into a company working for a modern and financially healthy group of companies which earns its money manufacturing machinery. It is an opportunity for our employees to work in a stable production environment without constantly having to ask themselves what the future holds,' summarises Mario Chudy, commercial manager of HF NaJUS.

HF NaJUS is a company with a long tradition: when it was founded in 1929 its main focus was on the production of appliances and tools. There followed a period of more than 80 years during which the activities of the company were rather chequered. It was most recently involved in the glass industry and responsible for overhauling measures and producing spare parts for the parent company. In addition, the then ZTS-LR NaJUS a.s. served a market of external customers as a supplier of components, assembly groups and machinery. That was also the origins of the cooperation with the HF MIXING GROUP. HF NaJUS is set to continue serving the market for external customers and specialise in certain product groups in the third-party business.

However, the main focus will be on manufacturing components and special machinery for the group. In addition, it will also produce CONVEX™ machines for Pomini Rubber & Plastics. The latest member of the group is set to use 60 per cent of its capacity for the HF MIXING GROUP in future and make 40 per cent available to external customers. 'In terms of procurement we noticed an immediate difference after NaJUS merged with the HF MIXING GROUP,' reports procurement manager Roman Baláz. 'Our suppliers immediately showed a greater interest in the company, which was also reflected in the delivery periods. Internally, I have also noticed positive changes in the thinking and attitudes of our colleagues, which is undoubtedly due to the fact that visible and tangible investments have been made in the company,' says the procurement manager.

HF NaJUS is positive about the future. Around 300 committed employees work at the Dubnica site in Slovakia – 215 in production and the remaining 85 in administration. On an area covering some 20,000 square metres, the production halls employ people in the areas

of welding, smaller and medium-sized mechanical engineering, major mechanical engineering and assembly work. A broad range of modern machinery provides the ideal conditions for producing high-quality components for the HF MIXING GROUP machines. Opportunities for expansion may be possible in the event of further positive growth. There are also some very well-known names among the customers outside the HF MIXING GROUP, including Brückner, Federal Mogul, Neuenhauser Umwelttechnik, BWG, Bronx and Andritz AG.

'We are convinced that we will satisfy our new clients within the HF MIXING GROUP just as much as we have satisfied our external customers in the past. We will be a reliable member of the big HF family,' says Mario Chudy, commercial manager. 'As the latest experience shows: we are mixing well together!'



Mario Chudy, commercial manager, HF NaJUS, Slovakia.



Power play on 20,000 square metres of production space.



You are part of the HF MIXING GROUP

The HF MIXING GROUP has many faces.
We introduce you to some of them here.

James Jenkinson – the new head of customer services at Farrel UK, Rochdale, Great Britain

James Jenkinson became the new head of customer services at Farrel Ltd. in Great Britain in March 2013. Before that he was sales manager at a smaller technical firm. His CV was also enhanced by the eight years spent in Germany at ThyssenKrupp in Essen. Jenkinson was especially impressed by the strong growth seen at Farrel Ltd. over the last five years. 'That gives us breathing space to grow in the core areas and also optimise customer services decisively,' says the 53-year-old from



James Jenkinson, head of customer services at Farrel UK.



Ali Akbar – works in the automation department at Harburg-Freudenberger, Freudenberg, Germany

After completing his degree in Pakistan, Ali Akbar moved to Stuttgart to enrol on a Master of Science programme – after which he joined Harburg-Freudenberger in the Siegerland region where he currently works in the automation department. He is thrilled with the opportunity to be able to get involved in product development with a high degree of customer contact. ‘I really like my job, because it gives me a unique chance to hone my technical expertise and social skills in equal measure,’ says the married Pakistani from Lahore. His specific job is to attune products to the special needs of the customers, enhance them on the customer side and train customers how to use them. ‘Any machine is ultimately only as good as its operator,’ says Ali Akbar with a wink. ‘It’s an incredible amount of fun being able to support the users to ensure that they get the best out of the equipment.’ In addition, the 30-year-old is also involved in enhancing the increasingly more efficient control software, and it is something he does with passion: ‘For me, passion means continually working on producing

Wales confidently. He will use his role in this segment in future to help create a broader basis to ensure that ever more customers receive adequate spare parts, customer service, and technical and sales support. ‘We must be able to keep pace with the strong growth in new installations and adapt our service accordingly. There is definitely still room for us to optimise the content of our technical customer service and expand it by continuing to add services which meet future needs. That is a challenge which especially appeals to me.’ In his role as head of customer service, Jenkinson sees himself as responsible for all areas positioned downstream of sales: setting up and commissioning new systems, supplying spare parts, carrying out all assembly activities and repairing, overhauling and reconditioning used mixers. ‘My job as manager is thus wide-ranging – but at the moment I am primarily concerned with establishing a good customer service team for Great Britain, mostly due to the fact that our customer service network is continuing to grow throughout the world.’ The 53-year-old is married to an author of children’s books and has two sons aged 14 and 16. Jenkinson lives with his family in North Wales. The family loves nature and they regularly spend their holidays hiking in Scotland.



Ali Akbar, automation specialist at Harburg-Freudenberger, Freudenberg.

the best products and services for our customers,’ says Ali Akbar. He has a clear opinion on the various companies coming together to form the HF MIXING GROUP: ‘There is often no clear concept when companies merge, but at the HF MIXING GROUP the big plan is discernible, although perhaps not yet in every little detail. Naturally such processes always involve change for some departments and individuals, but in the case of most mergers there are ultimately benefits for everyone, evident in aspects such as being in a stronger competitive position, saving money as a result of synergies in technology, procurement and capacity, and when it comes to product development and securing the long-term success of the company. The benefits can already be seen in the case of the HF MIXING GROUP.’

Events, seminars and training courses

The HF MIXING GROUP is active everywhere – spanning teams and locations.

Doing things together enriches the individual, strengthens the sense of community among colleagues and brings people of different nationalities closer together. There have also been numerous activities and events of this kind over the past 12 months at the HF MIXING GROUP. We report on some of them here.

Football tournament: A shared passion for the beautiful game

➔ 6 July 2013, Rochdale, Great Britain

Summer 2013 was all about the beautiful game – no, not the rivalry surrounding the FA Cup or UEFA Cup. England played host to the HF MIXING GROUP's company tournament and fans of the sport travelled to Wales from Germany, Italy and Slovakia at the beginning of July to

play against colleagues from Farrel Ltd. The venue was the Curzon Ashton stadium on the outskirts of Manchester. It may not have been completely sold out, but countless fans turned up – mostly locals – giving Team UK a clear home advantage! International shirts and flags could be seen everywhere – a tournament which was every bit as good as the major football events of our time! The atmosphere was amazing, particularly when the hosts recorded a convincing 4:0 win in the opening game against a mixed international team of employees from Farrel, Pomini and HF NaJUS. It was then the Germans' turn to take to the field and the tension mounted. The opponents were once again the 'Internationals'. Germany more than resoundingly staked its claim to being tournament favourite with an 8:1 win. Then came the classic of all classics: England versus Germany. A tough battle for the ball ensued. The rivals



The HF teams become rivals once a year, but only for 90 minutes and only on the football pitch.

on the pitch were giving nothing away. There were even rumours flying around that the earlier hike in the Peak District had only been organised to make the German opponents tired. If someone really did have such sinister intentions, then they would have had to bury any hopes a short time into the game. Germany ultimately proved to be the stronger team, but England resisted with an iron will and irrepressible team spirit. In the end, however, the hosts had to admit defeat in a match that finished 1:2 and the team from Harburg-Freudenberger celebrated. The summary of a German player after the game sounded like the words of a professional: 'England was no easy opponent and we had to be at our best, but in the end we deserved to win and we are naturally delighted.' Despite the odd blister on the players' feet – which are more used to wearing safety shoes than football boots – it still turned out to be a wonderful evening which the tournament players celebrated together. According to unconfirmed reports, many a refreshing pint of draught beer was downed.

Summer picnic

➔ 19 July 2013, Ansonia, USA

FARREL POMINI held an inaugural summer picnic on 19 July at a local amusement and water park. There were a number of activities including volleyball, bocci, horseshoes, rides, water slide and a lake for swimming. Everyone enjoyed lots of hamburgers and hot dogs. It was a great time although it was one of the hottest days of the year with the temperature close to 40 degrees Centigrade. The waterpark had a lot of use!



Retirement party

➔ 5 December 2013, Ansonia, USA

On 5 December, Steve Peterson celebrated his retirement from FARREL POMINI. There was a casual company gathering at the USA Customer Laboratory with hors d'oeuvres and refreshments. Mark Meulbroek, Board Management Member, and Paul Lloyd, new FARREL POMINI business unit director, talked about the highlights of Steve's career and the many contributions he has made to the company over the years. Steve was joined by his wife, Karen, and two of his children, Stephanie and Ron.



International sales training in Freudenberg

➔ June 2013, Freudenberg, Germany

Several teams made up of sales employees and directors from all business units in the HF MIXING GROUP took part in a sales training course with an international feel at the Freudenberger technical centre in June. During the training days, which were held in various groups from 17 till 21 and from 27 till 28 June, the participants addressed different items on the agenda: besides a one-day special technical update session, with talks given by HF MIXING GROUP specialists on various machines and new products, they also received training from Stephan Heinrich, a professional in the area of sales and marketing. After all the theory had been taught, the international participants weren't about to be short-changed on the practical side of things: besides their sporting talent, they were also able to demonstrate their courage, skill and team spirit during an active training session on a high ropes adventure course. The sales teams eventually came out of the treetops again and returned to terra firma in time for the closing barbecue event.



Brushing up on the latest knowledge: the international sales team.

Trainees get into climbing

➔ 30 August 2013, Freudenberg, Germany

Climbing bolsters team spirit, strengthens the muscles, improves coordination and is one thing above all else: a lot of fun. Under the leadership of Ursula Klein and Michael Hoffman, the trainees in Freudenberg were able to see this for themselves on 30 August when they got together as a team to visit the Freudenberg high ropes adventure course, which is located directly above the training facilities. Once all 20 trainees had arrived, things got underway with a few games to give them an opportunity to get to know other team members and training colleagues a little better before taking to the high ropes. After that it was time for them to scale the lofty heights of the course, where some tricky challenges awaited the participants: 'I was especially impressed by how some people worked as a team in order to bring themselves to do things which they previously claimed they would never do,' reports trainee Sara Schneider. Anna Hoffman adds: 'The big highlight of the day for me was plucking up the courage to jump from the 13-metre-high 'Power Fan', which almost everyone did.' When they all gathered for lunch afterwards there was plenty of opportunity to discuss everything and share their experiences. 'Looking back, it was an unforgettable day which made it easier for all of us to approach each other and establish a trusting relationship with our trainers,' says Sara Schneider confidently.





After the training course the sales team headed for the nearby high ropes adventure park.



The trainees from Harburg-Freudenberger want to reach great heights – and not just on the high ropes adventure course.



Full power: the Speeding Scientists with Marla, their s3-13e racing car.



Marla breaks the record – a successful year for the Speeding Scientists Siegen

Research brings people together, as the sponsoring partnership between the HF MIXING GROUP and a team of student developers from the University of Siegen shows.

It all began five years ago: a group of adventurous students from the University of Siegen got together with the aim of developing and building a competitive Formula SAE sports car. Among the sponsors was the HF MIXING GROUP, which not only gave the young team financial assistance, but also made available its production and workshop facilities in Freudenberg, marking the beginning of a successful partnership. In 2013 the mechanical engineering, electrical engineering and industrial engineering students were now tinkering away on Marla, an s3-13e sports car which, over the course of the year, even made it into a race in Hockenheim and finished in an outstanding sixth place in Catalunya, Spain. In September 2012 a group of motivated

students came together to build a new Formula Student racing car. They wanted it to be faster and lighter than the previously designed car. In autumn, work began on designing the various assembly groups such as the chassis, gearbox, electronics and battery system. The car had to outperform the s3-12e in every respect, while remaining efficient and actually capable of being built. After countless days, weekends and nights spent working on various design programs and drinking endless cups of coffee, Marla slowly began to take shape. Shortly before Christmas 2012 the image of a complete car appeared on the computer screen. The task now was to turn the calculated values and designed parts into reality – green light for production!



Tough competition in Formula SAE – the starting line-up for the Hockenheim race in 2013.

From then on, packages and deliveries arrived daily from around the world with parts for the racing car, which meant that work on building the bodywork and frame could begin in the workshop. The students welded, polished and laminated day and night, although they were not able to produce all the parts in their own workshop. Complex elements such as the gearbox housing were manufactured with the support of the HF MIXING GROUP. Once all the parts had been made, work began on assembling them. This is when the rigorous planning and design phase really paid off: the technical parts and bodywork fitted together perfectly to form the s3-13e. Marla was finally presented in a roll-out ceremony at the beginning of May.

At 220 kilos, the car was significantly lighter than its predecessor, more powerful and better engineered in many respects. The testing phase got underway. The road safety centre in Olpe and Siegerland Airport near the HF site in Freudenberg made their facilities available for testing and tuning Marla and preparing the drivers. The first success wasn't long in coming: Marla sprinted 75 metres in under four seconds – a record!

However, some problems still had to be solved before the Hockenheim race: the electrics were playing up. There were communication difficulties between Marla's main control system and the engine – fatal for an electric racing car! The team frantically searched for the error and it was found and rectified just before the start of the race in Hockenheim while some of the team members were presenting the business plan and cost report. Once it had passed the technical acceptance test, Marla was finally allowed on the racetrack – acceleration

its strength! Once again, it recorded an outstanding time of less than four seconds, but the Speeding Scientists were unfortunately soon stripped of this success, because Marla's power was above the prescribed threshold. According to the rules, this figure is 85 kW, but Marla's engine was delivering 99 kW. This mistake was a result of the hectic rush of the previous few days: they had clean forgotten to fit the electric restrictor. The car was subsequently disqualified. A bitter disappointment!

Yet the season was not set to end there. Back in Siegen the students readied Marla for its second appearance in Spain at the Circuit de Catalunya. Errors were rectified and the convoy set off for Spain at the end of August. The hard work of the previous weeks was acknowledged by the jury: there wasn't the slightest objection and Marla was approved for all dynamic disciplines. Even the static disciplines were successfully completed: in the acceleration test Marla recorded an outstanding time of 3.97 seconds – this time without being disqualified! The racing car also mastered the other disciplines with no problems. The team from Siegen found itself in sixth place at the end of the week – a major success for everybody, which made up for the failure in Hockenheim. The HF MIXING GROUP shares the team's delight and wishes them every success for the 2014 season!



The 2013 season ended on a positive note with sixth position in Spain.



On track: Marla in its element.



Technology Day – a resounding success

Youngsters embarked on a technical journey of discovery at the HF stand.

There's plenty happening here. All around the world, the HF MIXING GROUP is not only involved in research, development and the production of high-quality machinery, but is also fully committed to nurturing young talent, supporting social projects and cooperating with universities and research facilities. We would like to take this opportunity to present some of the projects that have kept us busy in 2013.

Lasting impressions – our appearance at the Technology Day in Siegen

Getting young talent of the future interested in the HF MIXING GROUP – in times of demographic change, that

is an important matter for our company. Also serving this purpose was the 'Technology Day' in Siegen, which we attended for the first time with our own stand in September 2013. The idea behind the event is to get children and young people interested in technology and technical careers. We were supported in our efforts by Eric Weier, Markus Immhäuser, Saskia Dentel, Mats Kapteina, Anna Hoffmann, Steffen Schneider, Fabian Quast, Michael Hoffmann and Uschi Klein, who all volunteered to take part in the event and took care of all the organisation. The team was accompanied by Dr Harald Keuter.

The highlight of the HF stand attracted a huge amount of interest: a 1:10 scale model of the internal mixer, complete with rolling mill and batch-off unit. The model had

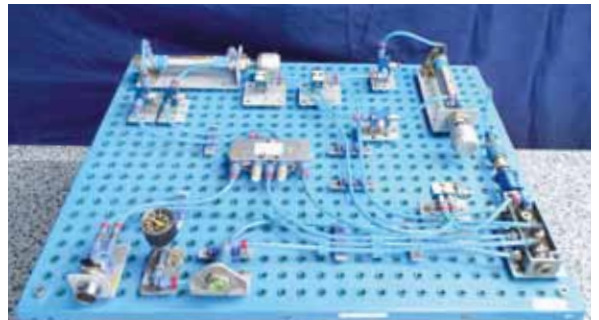


The trainees from HF Freudenberg brought the big world of technology to the small technicians of tomorrow.

originally been built back in 1985 by the training workshop under the stewardship of Kasimir Kulczycki, but the electrotechnical elements were updated by Eric Meier in 2013 as part of his thesis while studying to become a mechatronics engineer. With an air of expertise, he explained to fascinated onlookers how the internal mixer works and outlined the rubber production process.

A second model was used to demonstrate various pneumatic functions, another kind of technology used in HF machinery. Also leaving lasting impressions in the truest sense of the word were the name badges bearing the logo of the HF MIXING GROUP, to which stand visitors were able to add their own names using a letter punch set.

At the end of the event, the team agreed that it had been a successful day!



Get involved and learn. keen interest at the HF MIXING GROUP stand.

Knowledge shared is knowledge doubled

Everyone benefits from knowledge transfer between industry, universities and research institutes.

Successful knowledge transfer partnership with Loughborough University

The Knowledge Transfer Partnerships (KTP) programme was set up especially to facilitate the transfer of knowledge between universities, other training and research facilities and companies in Great Britain. It is an interesting area for the HF MIXING GROUP, because the programme has set itself the aim of improving the competitiveness and productivity of companies by encouraging cooperation with a knowledge pool which also includes universities, training facilities and research and technology centres. The benefits of the KTP programme for our company are obvious: the HF MIXING GROUP is able to acquire theoretical knowledge here, but it also presents opportunities in the area of development and recruitment. The HF MIXING GROUP in Rochdale established a partnership with Loughborough University as part of the programme in March 2013. The aim of the joint project is to develop a mathematical model capable of calculating the wear and abrasion of rotating surfaces in a mixing chamber. To this end, the young engineer Joshua Owen joined Farrel Ltd. on 1 August 2013 as a KTP project worker for 24 months.



Joshua Owen, KTP project worker at Farrel Ltd. in Rochdale, UK.

Besides undertaking initial training on the special subject matter, his duties during his first few months in Rochdale included installing customised software and compiling literature on the theme. Also among his appointments during his initial time with the company were visits to customer premises, which allowed him to get a closer look of the wear on the individual machines, and a visit to Loughborough University where there are special facilities for measuring the surfaces of dust filters.



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