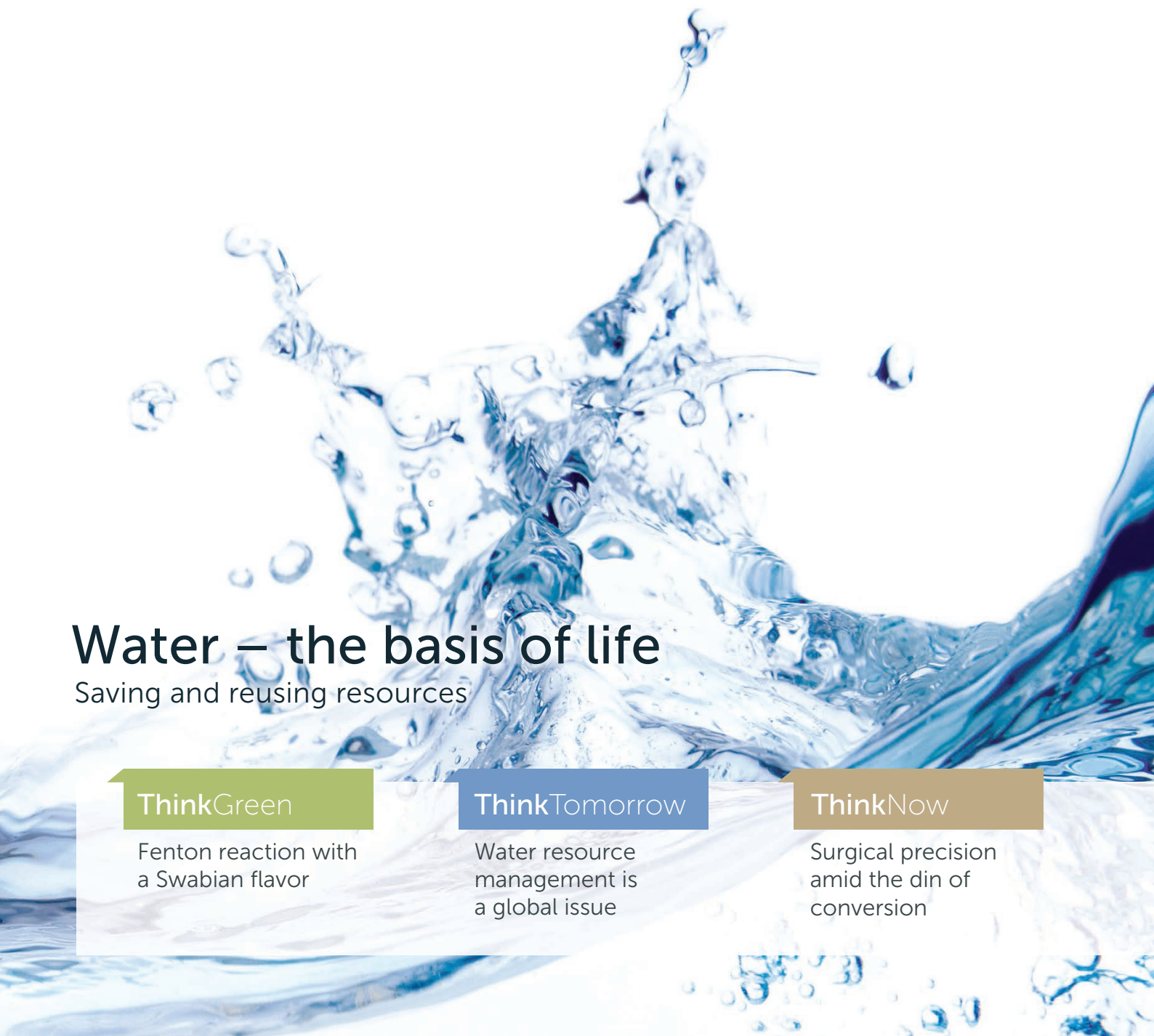
EISENMANN

DAVINCI

The Corporate Magazine N°05 | May 2014



Water – the basis of life

Saving and reusing resources

ThinkGreen

Fenton reaction with a Swabian flavor

ThinkTomorrow

Water resource management is a global issue

ThinkNow

Surgical precision amid the din of conversion

DaVinci N° 05 | May 2014 © Eisenmann AG

Circulation 9,500
Publication frequency biannual
Publisher Eisenmann AG, Tübinger Straße 81, 71032 Böblingen, Germany
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Printed by Offizin Scheufele Druck und Medien GmbH & Co. KG, Tränkestraße 17, 70597 Stuttgart, Germany

MIX Paper from responsible sources FSC® C106007 www.fsc.org

Print CO2 compensated Id-No. 1436619 www.bvdm-online.de

Dear readers,

In the words of the 1968 European Water Charter, "There is **no life without water**. It is a treasure indispensable to all human activity." This applies to industry, agriculture and domestic households alike. And as the charter points out, humanity's freshwater reserves are by no means inexhaustible.

As the global population grows, worldwide water consumption increases and drinking water becomes ever more scarce, awareness is rising among industrialized nations that this resource must be protected. Every year since 1993, World Water Day has been observed on March 22. And the responsible use of water has long been seen as one of the main pillars of sustainable development.

In this issue we will consider **water** from various angles. What technologies do we as a production plant manufacturer develop and provide that can help **minimize consumption**? How can we leverage technology to purify industrial waste water so that it can be returned to the water cycle? In addition, **expert** Dr. Harald Hiessl offers us insight into why technological innovations are so vital to water infrastructure.

Water is the ecological and economic basis of practically every human society. And in some cultures, such as **India**, it also has a spiritual dimension. See page 19 for a brief outline of its cultural significance there.

In other articles, we present a **plant conversion** project and our **college recruitment** officer, who is responsible for attracting and looking after new employees. As a technology company, our survival and success is highly dependent on a regular supply of fresh technical and creative talent.

We hope you find the latest DaVinci both educational and entertaining.

Dr. Matthias von Krauland
Chairman of the Executive Board

+++ Innovation Award +++

Biogas upgrading plant
reaps a well-earned reward

In December 2013, the Environmental Technology business unit had good cause to celebrate: development work on the new biogas upgrading plant was recognized with a highly acclaimed prize. For the fourth time, the German Innovation Awards for Climate and the Environment were presented at the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in Berlin. Eisenmann was the winner in the "eco-friendly technology" category. Senior Vice President of Environmental Technology Dr. Johann Halbartschlager and his colleagues Dr. Ing. Anke Schäffer and Lukas Graf were delighted to receive this prestigious award. The Federal Ministry and the Federation of German Industry (BDI) selected the prizewinners in five categories from nearly 100 applications. The Fraunhofer Institute for Systems and Innovation Research ISI in Karlsruhe evaluated all of the submitted products on the basis of objective, scientific criteria.

Lukas Graf, Dr. Ing. Anke Schäffer and Dr. Johann Halbartschlager (l. to r.) are delighted to receive a German Innovation Award for Climate and the Environment.

+++ Conveyor systems +++

Eisenmann wins
major contract

Eisenmann's Conveyor Systems business unit has won a contract to expand Robert Bosch's logistics center in Karlsruhe, Germany – its largest order to date. The project is worth tens of millions of euros, and is slated for completion by 2018. The new 40-meter tall high-bay warehouse provides 50,000 pallet locations. In addition, Eisenmann will deliver one electrified monorail system and two inverted electrified monorail systems, storage and retrieval systems, picking stations, a pallet labeling solution, and about a mile of pallet conveyor. The four-stage construction project will commence in mid-2014.

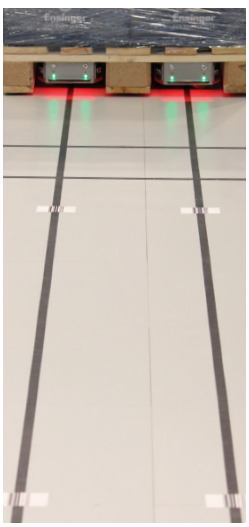
+++ Surface finishing +++

New leadership
for General Finishing

Dr. Gernot Stellberger succeeded Roger Schmidt at the helm of the General Finishing business unit in January of this year. After 11 years with Eisenmann – nine of them as Senior Vice President – Roger Schmidt has decided to accept a new professional challenge elsewhere. His successor is no newcomer to the company: Dr. Stellberger came on board in 2008 and was most recently responsible for group sales and strategy development.

Dr. Gernot Stellberger
New Senior Vice President, General Finishing

+++ Logistics event in Stuttgart +++



Independent fork system hailed as “best product”

From February 25 to 27, Eisenmann presented its solutions at LogiMAT in Stuttgart, Europe’s leading annual intralogistics show. The highlight of Eisenmann’s exhibit was the independent fork system, winner of the prestigious best product prize at LogiMAT 2014 in the “Procurement, Handling, Storage” category. This accolade is presented each year to innovative products that contribute significantly to rationalization, cost savings and productivity improvements in intralogistics. “We are pleased and proud that our independent fork system has received one of the intralogistics sector’s most coveted awards,” comments Ralf Weiland, Senior Vice President of Conveyor Systems at Eisenmann. Equipped with an innovative mobile controller and a high-performance lithium-ion battery system in each tine, the affordable, driverless independent fork system is now ready for industrial applications. It is extremely maneuverable, requires very little space, and streamlines both transportation and warehouse operations. Furthermore, the solution is comparatively quick and easy to commission.

Trade shows

June 2014

03 - 06	ECWATECH, Moscow, Russia
09 - 12	Fuel Ethanol Workshop, Indianapolis, USA

July 2014

09 - 11	ALUMINIUM CHINA, Shanghai, China

August 2014

26 - 28	WASTECON, Dallas, USA

September 2014

03 - 05	CHINA COMPOSITES EXPO, Shanghai, China
29 Sep - 03 Oct	PROFINTECH, Brno, Czech Republic

October 2014

07 - 09	ALUMINIUM, Düsseldorf, Germany
14 - 17	POLEKO, Poznań, Poland

November 2014

05 - 08	ECOMONDO/KeyEnergy, Rimini, Italy
11 - 13	FABTECH, Atlanta, USA

For current events, please go to www.eisenmann.com

Close to zero water consumption – a shining example

Car buyers primarily make their choices based on the power under the hood. But what allures them to a particular model is its design and appearance. The processes needed to create a perfect finish consume huge quantities of energy and resources. That's why providers of end-to-end paint shop systems like Eisenmann offer solutions that are water-efficient and deliver other savings, too.

Cars that look good sell well, which is why manufacturers go to great lengths to maximize the visual appeal of their vehicles. Not only the design, but also the finish is all-important: the paintwork must be rich in tone, gleaming bright, and mirror-smooth. Customers also expect the coating to withstand many years' exposure to ultraviolet light, harsh environmental conditions and extreme weather, not to mention stone chips, scratches and hailstorms.

To fulfil these exacting requirements, today's automotive coatings consist of multiple layers that demand complex and specialized treatments: degreasing, rinsing, phosphating, rinsing, electro-coating, rinsing, drying and top coat application. "As a result, surface finishing is an extremely energy- and water-intensive process. It accounts for up to 50 percent of the energy and close to 90 percent of the water consumed in production," explains Oliver Bolk, an Eisenmann coatings specialist.

A few years ago, water consumption was around 800 liters per vehicle, but creative engineers have since cut that figure to some 300 liters. And today, it's even possible to bring it close to zero. However, this saving is offset by higher energy consumption, which in largely water-rich Europe often plays a bigger role in decision-making. "We're working hard on in-line and closed-loop solutions for the pretreatment and painting processes. With their help, we can continue to drive down water consumption and make more efficient use of energy and other resources," stresses Bolk. »

The flexible E-Shuttle dip coating conveyor minimizes carry-over.

Oliver Bolk
Expert for surface finishing processes

"Surface finishing is an extremely energy- and water-intensive process. It accounts for up to 50 percent of the energy and close to 90 percent of the water consumed in production."

» For example, flexible and intelligent conveyor systems such as Vario Shuttle and E-Shuttle can be deployed in production to move the bodies through the pretreatment and paint lines. Unlike conventional material handling equipment, these innovative systems rotate the bodies, which completely drain them of excess process fluid. In concrete terms, shuttle systems reduce carry-over by about 0.2 liters per square meter. Given that an average vehicle body has a surface area of about 100 square meters, this adds up to quite substantial quantities of fluid. And the conveyor systems not only save expensive chemicals, they also contaminate much less rinsing water in the next process step.

Although no water is consumed while the top coat is being applied, pretreatment still requires a certain amount of rinse water. This is because thorough degreasing, correct phosphating and optimum electrocoating are indispensable for a perfect finish. While it would be technically feasible to completely eliminate the need for water, the process would require extensive modifications and substantial amounts of energy. But Eisenmann's plant engineers are coming closer to zero water consumption by a different route: by optimizing the entire painting process from start to finish. "The water that's used is recirculated. And we constantly clean this valuable resource using ultra- and nanofiltration and

ion exchangers, as well as deploying cascade rinsing systems and evaporators," explains Dr. Peter Börgardts, Head of Sales in Eisenmann's Environmental Technology business unit.

Electrocoating is followed by the actual surface finishing process, comprising primer, base coat and clear coat applications. This painting process requires no water, as wet scrubbing is now seldom used. "Our dry and electrostatic overspray removal systems recirculate the air, significantly reducing primary energy consumption," explains Bolk. For example, thanks to an ingenious filtration method, the E-Cube mechanical overspray removal system uses neither water, nor chemicals, nor any other additives. And existing plants with other solutions in place can easily be converted to the new system. In the E-Scrub electrostatic paint overspray removal system, overspray-laden exhaust air flows through the intake area to the separation module, where the paint particles are removed.

Eisenmann is currently working on a pretreatment and painting facility in Russia with zero water consumption. To comply with the strict consent limits applicable there, the company is implementing paint-shop and environmental technology that is both highly innovative and very elaborate.

Eisenmann optimizes the entire painting process, bringing water consumption close to zero.

Fenton reaction with a Swabian flavor

Clean drinking water is one of the most important natural resources known to man. As Michel Jarraud, Chair of UN-Water stated in January 2014 at the UN-Water Annual International Conference in Zaragoza, Spain, "More than 1.3 billion people worldwide have no access to clean water today." Protecting this precious commodity is now more crucial than ever.

Waste water treatment is particularly important in the chemical industry. Its manufacturing processes are often highly complex and yield residues that must not be allowed to contaminate rivers, lakes or the drinking water supply. This is why legislators worldwide are increasingly reducing the permitted limits for pollutants that enter the water cycle through effluents. And government agencies have introduced rigorous tests and inspections to ensure compliance, as Dr. Peter Börgardts, Head of Sales in Eisenmann's Environmental Technology business unit, explains: "In the past, waste water was analyzed in light of general parameters such as the chemical oxygen demand (COD). But today, the authorities are examining the concentrations of individual substances." This applies both to toxic compounds and to residues from the pharmaceutical industry. Eisenmann's Fentox process is a key weapon in the battle to keep the world's water supplies pure and contaminant-free.

The Fentox process breaks down complex toxic molecules in the treatment of waste water discharged by industrial plants. Subsequently, the degraded chemical compounds are no longer harmful and are readily biodegradable. These benefits make Fentox an ideal solution for addressing mounting public unease about hazardous chemicals entering the water cycle.

The exacting requirements associated with treating industrial waste water can only be fulfilled by sophisticated systems comprising various oxidation, precipitation and filtration stages. And as Dr. Jochen Schumacher, sales engineer for Eisenmann's water treatment portfolio, explains, "As an end-to-end solution provider, we have incorporated all relevant processes

in our offering. The modular structure allows us to deliver made-to-measure solutions to our customers." At the heart of these solutions is Eisenmann's Fentox process. The two-stage process is particularly suitable for treating low-volume waste water streams with high concentrations of contaminants. Manufacturers in Germany, India, China and the USA are already deploying the solution.

The science behind this efficient technology is not really new, however. In fact, more than a century ago, British chemist Henry Fenton discovered that organic substances in an acidic environment may be oxidized by hydrogen peroxide using iron salts as a catalyst. Eisenmann's research engineers are engaged in refining and developing the Fenton reaction to create a readily controllable and reliable procedure for treating waste water. The Fentox process is a fascinating example of the benefits to be achieved by combining the old with the new. The result? An advanced technology with enormous potential.

Eisenmann carefully tailors the solution to each customer's specific requirements and operating parameters to maximize its effectiveness. As Dr. Peter Börgardts explains, "We perform extensive laboratory tests on water samples from each customer's plant. That way, we can develop a custom design for each application." The solution is then tested again on-site by means of a mobile test plant.

Eisenmann's custom solutions help manufacturers not only to comply with the strict permitted limits, but also to protect one of our most valuable resources for generations to come: clean water.

"Water resource management is a global issue"

A conversation with Dr. Harald Hiessl, deputy head of the Fraunhofer Institute for Systems and Innovation Research (ISI), and expert for urban water infrastructure systems.

Dr. Hiessl, is water the key resource of the 21st century?
Absolutely. Water is a finite resource that is required for agriculture, industry and private households across the globe. Even now, sustainable use of this resource is proving to be difficult as water is very unevenly distributed around the world, both in terms of space and time. In the face of the global population explosion, the increase in weather extremes driven by climate change, and urbanization, we must urgently rethink our strategy regarding water infrastructure technology. This applies to both water supply and disposal.

What are the greatest challenges concerning the water infrastructures of the world's megacities?
The networks for water supply and wastewater disposal in booming megacities need to be designed with sustainability in mind. This means they must be able to adapt to changing parameters. It is not possible to simply adapt solutions that are in use in western countries and employ them elsewhere in the world. But even in the shrinking cities of industrialized nations, we need to overhaul the infrastructure to use water more efficiently – for example through the introduction of semi-decentralized water-management concepts. These are more flexible than the centralized solutions currently in use.

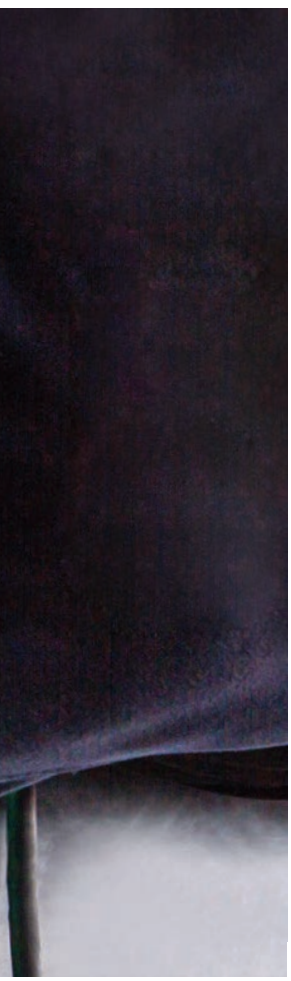
Do we already have the appropriate technology?
Yes. One of the first steps is to separate the rainwater and sewage. In fact, quite a number of towns have already put this radical concept into practice. Many water infrastructures are in need of renovation – and it should become standard practice to turn away from the combined sewers predominantly in use today. Moreover, innovative semi-decentralized concepts with even more sophisticated separation have proven successful in a series of pilot projects. Industrial water management systems, too, provide a good example of resource-saving water use and disposal. This applies to their efficient water usage, sewage separation, and the recovery of energy, raw materials, and drinking and process water.

So does this mean that our concept of water supply and disposal will change drastically in the future?
This is imperative for the future of our planet – innovation in the water infrastructure space is definitely a global issue. Industrialized countries should not attempt to export their centralized water management concepts to developing regions. Instead, they should blaze trails by becoming technological pioneers – because highly innovative solutions in particular can play a big role in developing sustainable infrastructures for countries facing a water shortage.

Dr. Harald Hiessl has been the deputy head of the Fraunhofer Institute for Systems and Innovation Research (ISI) in Karlsruhe, Germany, since 2008. Born in 1954, Hiessl studied hydrology and mathematics at Freiburg University and water resources engineering at the Karlsruhe Institute of Technology where he was awarded his Ph.D. in 1985 by the Department of Civil Engineering, Geology and Environmental Sciences. He joined ISI as a project manager in 1988, and now carries out research on sustainable water management with a focus on urban water infrastructure systems and resource-efficient technologies and services. ISI studies how innovations are developed and how they impact society and industry. On this basis, it makes recommendations for the political, business, and scientific worlds.

Surgical precision amid the din of conversion

The dip-coating facility at Rettig Germany's factory in Meiningen, Thuringia, looked as good as new – with one exception: the old oven. But last December this was upgraded, too, when Eisenmann dismantled it and installed an efficient forced-air dryer in its place. By the end of the Christmas vacation, Rettig's refurbished radiator coating facility was up and running once again.



In the Meiningen factory hall that Thursday before Christmas, there was a palpable sense of excitement tinged with sadness. As the last radiator of the day left the paint shop, the old forced-air dryer that had seen more than three decades of service was switched off for good. But shortly afterwards, the hall was a hive of activity. In came a team of workers in blue overalls, hardhats, ear protectors and safety shoes, driving forklift trucks and cherry pickers. They brought with them angle grinders, reciprocating saws and other heavy-duty tools. Within the next few hours the crew of six completely dismantled the old oven. Amid a terrific din, they carried out their work with surgical precision.

From time to time, production manager Dr. Henry Driesel stopped by to see how things were going. The factory produces tubular radiators in standard and custom colors for the entire Rettig group. About 60 percent of them are exported. In the past few years, the group has grown to become Europe's largest radiator manufacturer. "Now that we have the new Eisenmann oven, we want to eliminate even the tiniest impurities and contaminants, and save a lot of energy besides," reports an upbeat Driesel.

Since 2005, Eisenmann has gradually upgraded the radiator manufacturer's entire paint shop. For this final stage of the project, the last technical and commercial details were not settled until mid October. But from that point, things happened fast. A week later, project manager Philipp Stäbler of Eisenmann Service, and his colleague, started work on the CAD design of the oven, which took 14 days to complete. Meanwhile, the heater went into production. With the exception of the burner, the entire oven was produced by Eisenmann itself. In addition to the tunnel oven and interior fittings, the control cabinet, the control system, electrical equipment, and safety devices were all made by Eisenmann.

On the Saturday afternoon, less than 42 hours after starting to dismantle the old oven, the team led by Stäbler began constructing its replacement. First they erected the steel sub-structure for the tunnel oven. While this was going on, the base plates were already being put in place. On Monday, while two men were fitting the heater with burner and fans, the others continued to build the outer shell of the tunnel. Two days later, the tunnel oven, measuring 18 meters in length, 4 meters in height and 4 meters in width, was fully assembled. The team then turned its attention to the interior fittings, constructing the partition walls and exhaust ducts, laying the pipes and wires, and mounting the exhaust-gas stack. Two electricians then installed the control cabinet housing the electronic components and the control system. »

Philipp Stäbler
Project manager

"Plant modifications are a core competency of Eisenmann Service. We have carried out a number of these assignments for Rettig to date. They included the replacement of the e-coat tank, which we successfully completed last year despite a similarly ambitious time plan."

» Between Christmas and the New Year, Eisenmann performed tests on the wiring, signal transmissions and PLC. Everything was working perfectly – as it should do after successful surgery. On January 2, Rettig employees and project manager Stäbler started up the plant. After heating up the oven and initializing the controller, they put the first test radiators through the system.

The new oven heats its chambers indirectly. That means the flame does not come into direct contact with the air in the oven. Heat is transferred by an air-to-air heat exchanger that stores the energy in its tube bundle significantly longer than the former direct heating system with a fire tube. "Indirect heaters are altogether cleaner and more reliable. Since the drying air is free of soot particles, the coating quality is better, too," points out Philipp Stäbler of Eisenmann Service. Moreover, the new burner consumes less natural gas, and the fan systems use less power. "In addition, all the safety devices we installed are fully redundant," adds Stäbler. In contrast to the old oven, the new one is made from rust-free hot-dip aluminized material both inside and out.

Right on schedule on January 6, the production of radiators was once again in full swing.

Networking with "Studentenfutter"

Kristin Spangenberg develops concepts for Eisenmann's college recruitment activities.

What does college recruitment mean to you?
College recruitment is a very broad topic and offers huge scope for creativity. For me, developing an appropriate, target group-specific concept is an exciting challenge. I think it is important to forge a close relationship with the students, and when I do recruit them, I really enjoy following their career and promotion within the company.

What are your tasks regarding Eisenmann's college recruitment?
I create awareness of Eisenmann as an employer at university fairs and careers events and help raise students' and graduates' interest in our enterprise. In addition to recruitment, I develop concepts to ensure the students make a great start with the company. For example, the in-house "Studentenfutter" program ("Studentenfutter" is a type of trail mix, particularly popular among German students) gives them an insight into the many business units, and helps them make contacts in other departments – right from the get-go. Because embarking on a career is like "Studentenfutter": the right mixture is key. It is impossible to select the right role, without having had the opportunity to learn about various departments.

What makes a successful day's recruiting?
For me, a successful day's recruiting is when we are at an event or a trade fair, and have been able to attract a lot of people to Eisenmann, many of whom then submit applications. That's how we know that we have sparked their enthusiasm – which is what we wanted to achieve. If our interns ask if they can come back for a student placement, or whether they can get in touch with us again when they are writing their thesis, we have done our job.

When you're on the booth at a trade fair, suit or jeans?
The business look, definitely – despite the fact that many companies prefer to dress casually at trade fairs. Most students, graduates and young professionals also go for the business look when they attend these events.

What do you have with you at these events?
Sticky tape. You can use it for all kinds of things, from hiding unsightly cables, to taping up the latest job openings on the booth walls.

How do you personally prepare for a long day at the fair?
I go to bed early the night before and drink a good cup of coffee in the morning before it starts. It is also important to drink lots of water and make sure you are in a good mood throughout the day. Apart from that I try to keep myself in shape – I ride my bike a lot and play tennis.

If you had the choice: travel expo, design fair or the Frankfurt book fair?
Travel expo – I was recently at CMT in Stuttgart. Because I'm not originally from the area, I picked up loads of new ideas for trips there, and discovered some new potential vacation destinations.

How did you find out about Eisenmann as a graduate?
After I completed an internship in Stuttgart, I knew that I wanted to stay in the region. As I searched for an entry-level position, I discovered Eisenmann through StepStone. I enjoyed my current job in Human Resources from the very first moment, and I still relish the challenge every day.

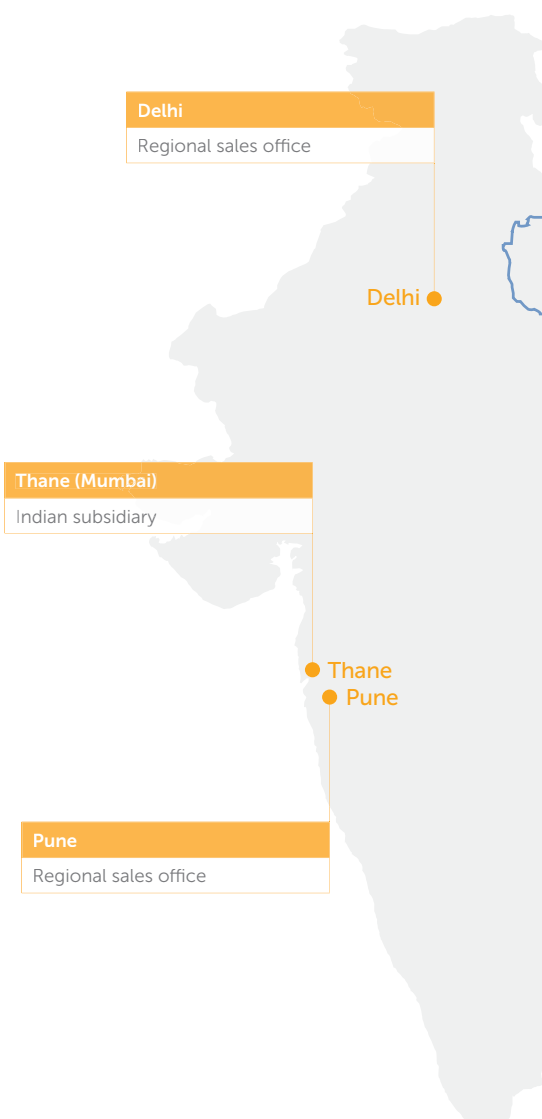
Kristin Spangenberg's internal "Studentenfutter" program shows students and graduates that a career with Eisenmann is a tasty proposition.

India

A booming market with vast potential.

India is a land of superlatives: the world's largest democracy, with a population exceeding 1.2 billion, is setting new standards in industrial development. By 2015, its automotive manufacturing sector will be among the five biggest in the world, predicts a study by the India Brand Equity Foundation (IBEF). Vehicle production in August 2013 soared by an impressive 8.2 percent compared with the same month in 2012. It's a similar picture in the chemical industry, plastics and metal production, and telecommunications, all of which gained ground significantly in 2012 and 2013, according to reports by Germany Trade & Invest (GTAI). India's rising global export trade is not the only growth driver: rapidly increasing domestic demand and a young, confident and well-educated middle class are also playing a major role.

Eisenmann has seized the chance to take an active part in this evolution. The company has been expanding its presence on this attractive, booming market since 2010. A key milestone was the August 2010 acquisition of Haden International Group India, with its 20-year track record of operating in the country. This laid the foundations for today's Eisenmann Surface Finishing Systems India. Based in Thane near Mumbai, it is among India's leading providers of metal and plastic paint lines. Furthermore, Eisenmann India operates in the automotive, process and high-temperature engineering sectors, and also provides environmental technology. The group has also established a development center for hardware and software that is deployed in automotive projects worldwide. Overall, Eisenmann maintains a presence in three locations – Thane, Pune, and Delhi – and offers a custom-tailored range of high-tech solutions backed by local planning and project management services.

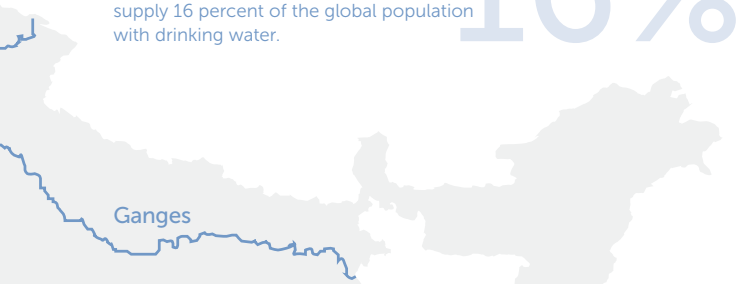


In Hinduism, water is the fundamental force that cleanses body and soul. Washing rituals are usually performed at ghats – steps leading down to the river.

5%

India possesses only 5 percent of the world's fresh water resources, yet has to supply 16 percent of the global population with drinking water.

16%



2,500 km

The mighty Ganges flows for more than 2,500 kilometers from its source in the Himalayas until it meets the Indian Ocean.

Hindus worship the Ganges as a sacred river because they believe that it was originally in the sky and formed the Milky Way before being brought earthwards by the god Brahma to save the world from drought.

Vinay Marawar
President and Managing Director of Eisenmann Surface Finishing Systems India

"India is well on its way to becoming one of the world's leading industrial nations. The automotive industry in particular has seen robust growth in the last decade – thanks in part to the country's international status as a cost-effective production and development location with a skilled workforce. On the Indian market, Eisenmann has an especially high profile in the general finishing sector. Customers value our well-balanced offering of innovative technology at a competitive price, not to mention our outstanding customer service. At present, increasing automation in the paint process and parts handling plays an important role, as do environmentally-friendly solutions designed to reduce process temperatures and water consumption. Our success is reflected in our growing headcount – set to rise from 116 in 2013 to nearly 200 in 2016."