INTERVIEW
With Thomas L. Hensel, Managing Partner

AT FOCUS
Recycling of rare earths from slag – a research project

JOB TEST
A close look at the processes in our plasma smelting oven
Our successful approach to the way we operate will remain unchanged: that means we will continue to offer customer-oriented, premium service coupled with our ambition to make permanent improvements to our processes.

Talking of process optimisation, let’s take the VINO Plasma division as an example. In 2014 we commissioned our plasma smelting furnace. Since then we have managed to align all our processes and can now say that we have effectively expanded our value chain. At our site in Karlstein, 21 people are now handling approx. 150 tonnes of material per month in 3 shifts.

We have also been able to make additional improvements to our processes in Aschaffenburg. The new semi-automatic recycling station for truck catalytic converters allows us to dismantle the large catalytic converters faster and more efficiently. In fact, it was our employees who came up with the idea and used their ingenuity to develop their own plant. We are proud to have such creative and dedicated employees in our team.

We were also able to notch up a win on the international stage: in Russia we successfully completed a technology transfer project. A Renova Group company is now dismantling and recycling using our process in plants designed and supplied by us.

New name – Same format: Whilst we were changing the company name, we also decided to change the name of our customer magazine. DUEMAG has now become HenRy Insight. We will continue to report on our various activities for you in HenRy Insight. Read more about this and other subjects on the following pages. Happy reading!
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Duesmann & Hensel Recycling becomes Hensel Recycling.

06 FIRST CHOICE – EVEN WITH A NEW NAME
As a family company, we made a conscious decision to go with the name “Hensel Recycling”. The corporate identity has high recognition value through proven elements, and clearly illustrates our continuity.

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The managing partner reports on current and future challenges and tells us which projects are most important to him right now.

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Sparks might fly! Operational assistant Veronika Smak takes us through the processes in our plasma smelting furnace at VINO Plasma.

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“My dad collects old cars.” This and other subjects have been part of our corporate presence since the inception of the company. Do you recognize any of the other subjects from earlier campaigns?

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After nine months of planning, we sent a complete plant for processing ceramic catalytic converters on the journey to Ekaterinenburg. On site our skilled team assembled the plant and trained our customer EZ-OCM’s employees.

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In the MinSEM project we are working with research institutes and various companies to find processes to recover rare earths from slag. This reflects the sustained increase in the recycling quota of catalytic converters.

18 EFFICIENT DISMANTLING OF CATALYTIC CONVERTERS FROM TRUCKS
Catalytic converters from trucks are heavy and unwieldy. Thanks to our proprietary semi-automatic design, we can now dismantle them much more quickly and efficiently.

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Safeguarding skilled personnel
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11 March 2016 was the big day: Our employees were told about the new company name at a small company party – the popular “Friday barbecue” held each month. The new logo was revealed and immediately “consumed” by the workforce as a sweet little taste of things to come.

Duesmann & Hensel Recycling is changing to Hensel Recycling. A small change to the name, but those elements that have distinguished the company for more than 15 years – the service and the people – will stay the same. Permanence doesn’t mean standing still. We will continue to drive forward developments, offering new products and innovative technologies, on our way to becoming the first choice in the conservation of precious metals worldwide.

**New name – Same service**

In 2014 Clemens and Thomas Hensel took over Alexandra and Ralf Duesmann’s shares in the company. The logical step then was for the company name to adapt to the new circumstances too. As a family company, we made a conscious decision to go with the name “Hensel Recycling”. It stands for specific values which we identify with and which we live by. But one thing was particularly important to us: a high level of recognition from existing design elements. That’s why the new logo unites these elements in a fresh new design. The sickles have been stylised and are now joined together. They symbolise the recycling process whilst expressing the idea of partnership in various respects – both with our customers and between our employees. Because even though we have a new name, we will still provide our customers with the same premium services and continue to be their first port of call for the recycling of precious metals.

**Moving over to the precious metal industry was not difficult for me as I need to be passionate about my day-to-day activities. With my brother Clemens and our extremely dedicated team we will be able to achieve a great deal.**

Thomas L. Hensel

Our 2015 customer survey confirmed that our customers consider us a competent partner who they trust and who they’re happy to refer. We are absolutely delighted about that!”

Clemens Hensel

**Precious metals are our passion**

Precious metals have played an important role in the industrial value chain for decades now. Demand is increasing, whilst the strata from which the primary deposits have to be mined to reach the valuable raw material have gotten deeper and deeper. The recovery of valuable precious metals from catalytic converters and other materials is, and will remain, our core business, and that has been the case for more than 15 years now.

We will continue to be a reliable full-service partner for our customers and impress our partners with the dynamism and passion we display in making permanent improvements to our processes.

**Compeent and responsible**

What really distinguishes our company from others is the specialist expertise and personal competence of our employees. That’s how we manage to achieve a high level of process reliability. Our ever increasing production depth and technical innovations allow us to realise high recycling quotas for our customers. The fact that we have been able to achieve many milestones since the founding of the company shows that we are on the right path.

And we aspire to continually improve our services and technologies – always with the goal of preserving resources and making a sustainable contribution to the protection of the environment. We are very aware of our corporate responsibility and that’s why we have committed ourselves to various social projects, support sporting activities in the region and looking ahead to ensure we find and retain specialist staff.

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INTERVIEW WITH
THOMAS L. HENSEL
Managing Partner

You can be on board in July 2014. Where have you been able to leave your mark so far?
Since I joined the company, the largest projects have been the refinancing project and the projects to develop a new structure and create greater transparency in our accounting practices. My brother and I have been able to get closer to our people and to the activities within the business again.

What would you like to change in the company in the coming months and years?
The understanding of what it takes to be successful should be improved significantly within the workforce and amongst management. We have grown, so now we all have to make an even more conscious effort to pull together – and that means everyone!

Which project do you feel most strongly about?
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The first claim is something quite fantastic. Everyone knows where they prefer to buy their fish, or look back fondly on their favourite holiday destination. Some drive a preferred brand of car, or support a club through thick and thin. That is the first choice.

In our case we have to have the right people, our product offering we must have to be convincing, our services easy, transparent and reliable. If we work on these elements, we have a real chance of being the first choice.

The first choice is something quite fantastic. Everyone knows where they prefer to buy their fish, or look back fondly on their favourite holiday destination. Some drive a preferred brand of car, or support a club through thick and thin. That is living and breathing the first choice. In our case we have to have the right people, our product offering we must have to be convincing, our services easy, transparent and reliable. People must be able to rely on our advice followed by appropriate action. If we work on these elements, we have a real chance of being the first choice.

Many thanks for the open and informative conversation. Continued success in the future.
Hi, my name is Veronika. Having held a number of different positions within the Hensel Group, I’m now working at MMO Plasma and have been since December 2015. I work as an operational assistant looking after various commercial and organisational issues. Today I’m going to provide you with a glimpse behind the scenes of the plasma smelting furnace and show you how my colleagues work.

Every time we receive a big bag of ground monolith from Aschaffenburg it is accompanied by an assay that our colleagues send with it. This is particularly important as we use this material composition to calculate the so-called aggregates. And whilst the precious metal content is significant, components such as aluminium, silicone and magnesium oxides and several others also have a role to play. We then use our software to work out the complete analytical composition of the base material and an exact calculation of the combination of aggregates is performed for each batch.

The various aggregates are dosed and mixed automatically. Typically, chalk, magnetite and carbon combined in a unique recipe, are added to the contents of a big bag via a hopper and homogenised in the mixer. The monolith mixture is melted down in the plasma smelting furnace at approx. 1,600°C. The temperature of the plasma itself is in excess of 10,000°C. The addition of aggregates causes the so-called collector metal and slag to separate. The collector metal can then be “tapped” using an oxygen lance. This makes the sparks fly and it looks spectacular. It’s a good thing our employees have special protective clothing to protect them.

The molten metal flows across a casting ladle at about 1,600°C on to the casting table where it spreads out. The collector metal cools and is then ground to a powder in the hammer mill. A representative sample of the concentrated metal, whose precious metal concentration is 30 times higher than the original ground material, is extracted for further analysis before the material enters the refining process. In this precious platinum, palladium and rhodium are recovered in its purest form and are then reused in various applications.

Along with the collector metal, slag is also produced and runs off continuously into collector trays. The more precise our calculations were for the aggregates earlier, the better the process control will be. The slag can then be put to practical use again as building materials, for example in roads. This also makes a valuable contribution to protecting the environment.

I have a lot of respect for my colleagues who spend each day standing at the oven dressed in heavy protective gear and making sure that the slag and the collector metal are separated cleanly. In the last few weeks, I have also realised just how much expertise is involved in correctly calculating the amount of aggregates. This experience is gained over several months and has only a limited application to other materials. The work carried out at MMO Plasma makes an important contribution to the further development of our core competency in precious metal recovery and to the expansion of our value chain.

**CONCLUSION**

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**JOB TEST BY VERONIKA**

Trainee on the plasma smelting furnace
CONVERSION TO HENSEL RECYCLING

We are changing our name and nothing else! We have been an industry leader for over 18 years – specialising in the recycling of precious metals. Our new name stands proudly over our never changing principles of high integrity, superior quality and exceptional service.

New Name – Same Service!

www.duerec.com

For further information visit:

from September 2016
CAT-RECYCLING
IN RUSSIAN
We look back at one of our successful large-scale projects

In November 2015 we successfully completed our largest technology and engineering project to date: We designed, constructed and supplied EZ-OCM, a member of the Russian Renova Group of companies, with a complete processing plant for ceramic catalytic converters.

Sound planning is the cornerstone of success
When Clemens Hensel and Oliver Krestin, together with Sergey Grokhovsky and Denis Borovkov of EZ-OCM, formally commissioned the plant in Ekaterinenburg in November, the project team had been working on the plant for eleven long months. “Up to this point, we hadn’t yet designed such a large-scale plant and that made it a great challenge for all the employees involved in the project. But we tackled this project with determination and dedication. We analysed potential risks and developed a detailed schedule which we kept to right up to the very end”, explained Tim Markmann, Engineering Department Manager.

Ready for loading
After nine months of planning, at the end of September it was all stations go. All the parts for a cat-recycling station, a ball mill and a sample preparation laboratory were ready to go. We had also designed a compatible extraction system which extracts the precious metal-bearing dust and makes it available to the precious metal recycling process. In total, eight mega trailers were loaded and sent on the journey to Ekaterinenburg in stages. Every little screw was recorded and assigned its place in one of the trucks so that it could be easily found once on site. After all, everything needed to be constructed quickly and smoothly once it reached the customer’s site. Ultimately, all the trucks arrived at the destination in Russia together as they were only allowed to pass through the border between Poland and Belarus together.

Large-scale operation on site
In October twelve employees flew from Aschaffenburg to Ekaterinenburg to build the plant. With the help of several Russian colleagues, the complete recycling plant was up and standing within three weeks. That then meant that our team had to train the employees from EZ-OCM and instruct them in handling the machinery. EZ-OCM will also be commissioning another smelting furnace in the course of 2016 which means that they will be able to cover the entire value chain. Our team will support our Russian partner in an advisory capacity during the commissioning of this plant as well.
Rare earths are important to industry and very few countries are responsible for recovering them. The high demand has resulted in a significant increase in prices over the long term. This, in turn, has made the recovery of rare earths from spent catalytic converters all the more interesting.

Spotlight on cerium and lanthanum

The MinSEM project – supported by the Federal Ministry of Education and Research – is being spearheaded by the IWKS Fraunhofer project group. One of the things the IWKS does is to scan the slag produced by our plasma furnace using a scanning electron microscope. Although we already analyse the slag in-house using X-ray fluorescence analysis and inductively coupled plasma, this gives us an even more precise image of the composition. Working with the cooperation partners we are looking to find a process to release the detectable rare earths – predominantly cerium and lanthanum – from the slag. The residual mineral fraction can then be used as a secondary product in the construction chemical sector, for example.

RECOVERY OF RARE EARTHS

MinSEM - Our research aims to close material cycles

The project has provided us with a broad perspective of the components of a catalytic converter, and we are committed to increasing the recycling portion for catalytic converters once we have released the platinum group metals from the catalytic converters.

Dr. Thomas Probst, Quality and Environmental Officer

Sustainable and environmentally friendly

Along with technical feasibility, the ecological and economic impact is also taken into account. This would include the question: How much energy is required and what CO₂ emissions are involved in isolating the rare earths? To what extent is cost-efficient recycling possible? In all, seven partners are involved in the collaborative project. A manufacturer of specialty glass is one of the members of the project as rare earths are also used in spectacle lenses. Manufacturers of construction materials are looking for uses for residual mineral fractions and the TU Dresden is developing processes to liberate rare earths from slag.
EFFICIENT DISMANTLING OF CATALYTIC CONVERTERS FROM TRUCKS

Proprietary design of a semi-automatic system

The 400-kilo catalytic converters installed in trucks are somewhat unwieldy. But at the end of their useful life, the same principles apply to these catalytic converters – separate the valuable components, such as steel and precious metals, and feed them to a recycling process.

Varied designs

Usually several catalytic converters used to treat exhaust gases from diesel engines, are located inside the steel casing which measures approx. 50 x 50 x 50 cm. All types of precious metal-bearing carrier materials are used, such as ceramic monolith or metal core, as well as hybrid variants. Our job is to find out whether the catalysts are coated with precious metals and if yes which ones, so that we can return the valuable materials back into the production cycle.

Simple operating principle

Up until now catalytic converters from trucks had to be dismantled by hand. That was very burdensome and also very time consuming. Thanks to our proprietary semi-automatic design, we can now dismantle them much more quickly. The recycling station for truck catalytic converters has been designed and constructed in house. In a first step, fixing hooks are mounted on the steel housing of the catalytic converter if there are no existing mountings that could be used. A lifting device then lifts the heavy catalytic converters onto the workstations on the rotating platform. The housing is cut open and any leaking oil is collected in an oil sump. Any precious-metal-bearing dust is continuously extracted and fed back to the recycling process. In the second step, the platform turns 180 degrees at the touch of a button allowing two catalytic converters to be worked on simultaneously. Here, the precious metal-bearing carrier materials are removed from the steel housing before ending up in the recycling process.

Structured documentation in the Cat-Library

The truck catalytic converters are as diverse as they are in the automotive sector. To make the process as transparent as possible for our customers, we continually record the individual models and their specifications in our Cat-Library. This way we can pass on this knowledge of the precious metal content in the different models to our customers.
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