No. 17 – 2019

LIVING METALS

Growth & Responsibility

PLANSEE
The Plansee Group

Dear readers,

in the summer we were delighted to report record sales and revenues for the past fiscal year.

Some six months later, we know that we will not be able to continue the trend this fiscal year, given the slowing global economy.

So what's left from the record summer? In our essay, publicist André Boße writes: "*Complex times like these make it virtually impossible for companies to still project record volumes. External factors are too powerful …*"

While the euphoria of recent years is gone for now, we continue to work on topics we believe will make us stronger and better positioned than the competition:

- Skilled worker training: At the Reutte location, we are significantly boosting the number of apprentices. We are convinced that exceptionally trained skilled workers will become increasingly important for our success.

- Recycling: In the coming years, we plan to grow less dependent on "virgin" raw materials. We are convinced that, by using smart business models, we will be able to recycle sufficient resources to cover our needs in the Group.

- Digitalization: The development of new digital business models and the digitalization of existing business processes are the key for us to manage the digital change in the years ahead.

- Key investments: All over the world, we are investing in capacities, new technologies, and special skills. We are convinced that this is the crucial prerequisite for continuing to serve our customers from diverse high-tech industries as best as possible.

Responsible growth, for us, means that we plan to continue to expand our performance capability and demonstrate that we will remain our customers' preferred partner in the future.

Enjoy reading this issue.

BERNHARD SCHRETTER UND KARLHEINZ WEX
Executive Board Plansee Group

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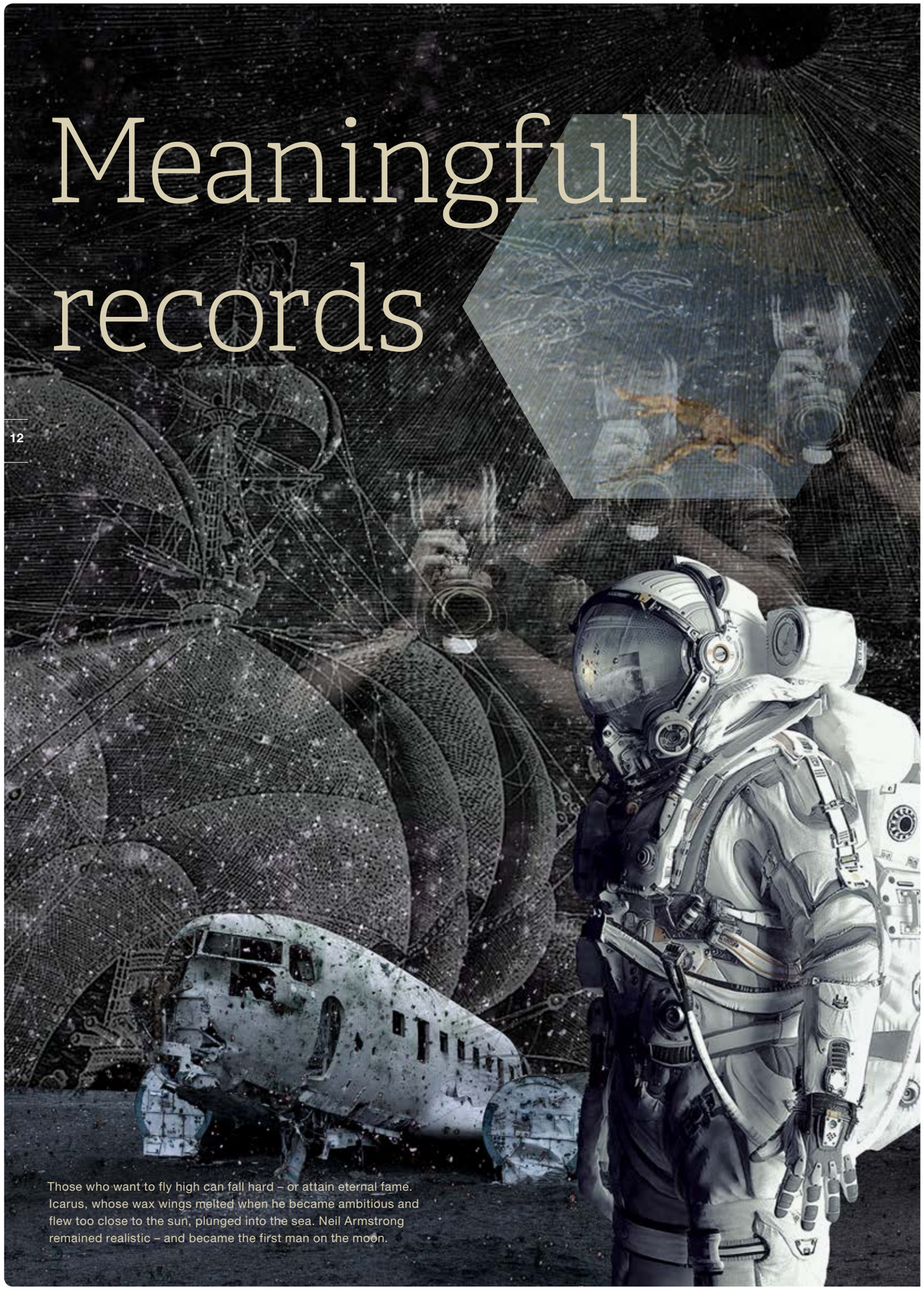
_____ “Off to new peaks” was the motto of the company outing of the Plansee Shanghai employees on the occasion of the Chinese location's five-year anniversary. Instead of sintering and pressing, they had two fun- and action-filled days. Events included the design of an oversized poster with the motto for the year and the corporate logo. In this spirit, the 450-person team of Plansee Shanghai is tackling the next peak in their young track record: in the coming months, they will double the plant's manufacturing space by adding a second building.

——— 31 years ago, Anil Ramdasi established a tungsten wire drawing plant in Mysore, India. Now he is embarking on his well-deserved retirement. His daughter Supriya, who takes over the responsibilities from him, has already managed the plant for several years. In October 2010 the plant became part of the Plansee Group and has since turned into an important building block in the global production network. The plant in Mysore employs 360 staff and is producing a variety of products including Molybdenum and Tungsten fine wires, formed and fabricated parts as well as machined components for various applications.

——— Things are going smoothly for the Ceratizit women's cycling team WNT-Rotor Pro Cycling. The triumphs in the 2019 season included the German National Road Race Championship title by Lisa Brennauer. The 31-year-old Kempten native claimed the title for the second time since 2014. The championship, which totaled 103 kilometers (64 miles), was held on the Sachsenring motorcycle circuit course in Oberlungwitz. The competition was just one of 100 races completed by the Ceratizit-sponsored women's cycling team. The 2019 season featured races all over the world – including, for the first time, New Zealand, Australia, China and Canada. In almost all instances, the team delivered a top performance. For example, Kirsten Wild earned the World Championship title in the omnium and madison competitions during the 2019 Track Cycling World Championships in Pruszkow, Poland; Kathrin Hammes was victorious in the most important German race, the Women's Tour of Thuringia; and most recently, the team won the team classification of the Giro Rosa in Italy, arguably the most prestigious stage race in women's cycling bar none. The 14 cyclists of the WNT-Rotor Pro Cycling team are managed by Sports Director Dirk Baldinger, who is counting on additional victories in the current season.

It is still a vision, but the Plansee Group is working to turn it into reality: customers and engineering offices around the world digitally transmit their technical drawings for finished parts manufactured from molybdenum or tungsten to the Plansee servers. Within a couple of hours, complex parts are created, using 3D printers, as prototypes or in small-scale series production and delivered to the customers. An essential prerequisite is the development of specialized powder mixes that suit the needs of the 3D printers. The GTP division has focused on the development of powder mixes that enable this vision.

Meaningful records



Those who want to fly high can fall hard – or attain eternal fame. Icarus, whose wax wings melted when he became ambitious and flew too close to the sun, plunged into the sea. Neil Armstrong remained realistic – and became the first man on the moon.

Complex times like these make it virtually impossible for companies to still project record volumes. External factors are too powerful, and the spillover effects of continual growth are too great.

IT IS THEREFORE WISE TO FOCUS ON OTHER AREAS OF PEAK PERFORMANCE: SUSTAINABLE RECORDS ARE NO LONGER GEARED TOWARD NUMBERS, BUT INSTEAD FOCUS ON SATISFACTION AND THE COMMON GOOD.

ANDRÉ BOSSE

An Internet search for new records produces countless hits. A race car sets a record on the Nordschleife of the Nürburgring, and the Beelitz Asparagus Festival proudly announces record attendance. In Vienna, people were already forecasting "record summer temperatures" for Austria on a sunny 1st of June – after having learned just a few weeks earlier that cold temperatures in the month of May had produced an unprecedented amount of snow in the Alps. Records draw attention, which is why tabloids in particular seek out such news. At the same time, even the business pages of large newspapers appear to yearn for extreme accounts: industries race from one record to another, companies announce record numbers, and on the stock exchanges the ATX, DAX and Dow Jones chase historic highs. Judging by the number of record announcements, life on Earth should be a constant celebration. But it is not so. So do records not make people happy at all?

Antiquity only knew winners

Before pursuing the question of whether or not records make people happy, we want to know where this thinking in terms of records comes from in the first place, and whether it has always been around. We gave Gunter Gebauer a call, who has the amazing job of being sports philosopher. The 75-year-old is professor emeritus at the Free University of Berlin, and his writings and radio shows deal with Wittgenstein, professional soccer, Laocoön and Niki Lauda alike. He is in the process of writing a book about the history of the Olympic Games, and during his research, learned that the ancient Greeks were not yet familiar with records in their competitions: "All that mattered was the winner, since he managed to beat everyone else," says Gebauer. Nobody in antiquity was interested in how one's performance compared to results achieved at other times or in other locations. "One of the reasons was that, back then, no standardized units of measures existed yet." This may sound strange from today's perspective; after all, chasing records is an integral part of any competition. There is no computer game without high scores, no election coverage without reporting party gains and losses, and even the world of influencers in the digital realm is structured according to the number of followers. These kinds of comparisons were foreign to people who lived during ancient times, and Gebauer understands: "First, you have to come up with the idea that it is not only important who throws the discus the furthest here and now, but also whether someone somewhere threw it just as far before."

Judging by the number of record announcements, life on Earth should be a constant celebration. But it is not so. So do records not make people happy at all?

The satisfaction that comes with a record result is presumably quite a bit less than the disappointment that follows when this record is not achieved.

The dimension of competition expanded with industrialization. Now, the performance of machines was being physically calculated, and to this day, horsepower has remained the unit of measure. Performance is documented in the specification sheet, and with its announcement it becomes comparable – and possibly record-breaking. "The root of the term 'record' comes from the Latin 'recordari,' meaning to write something down to remember it," Gebauer explains. The idea that there is money to be made with records was first conceived by the bookmakers in England, the nation who pioneered the industrial revolution. Once documented, performance characteristics of race horses, greyhounds or boxers allowed quotas to be generated, which then served as a basis for bets. The bookies thus applied the technical principle of performance to sports competitions to cash in. "The system already existed, so transferring it wasn't difficult," says Gunter Gebauer. While the ancient Greeks only knew their gallery of winners, countless lists were now emerging, which compared all sorts of areas and documented records.

No record is for eternity

In this regard, the "Guinness Book of Records" serves as the bible, listing records of just about every achievement since the mid-50s. The latest edition includes the best performance for the highest standing jump with one leg (for anyone interested, it was 1.35 meters), the most tattooed woman (98.75 percent of her body is inked), or the lightest 14-inch laptop, which weighs only about twice as much as a soccer ball. As a reader, one feels well-entertained, but quickly realizes that some of the records are so specific that they appear absurd. Gunter Gebauer explains why: "A record only has value when it is comparative, that is when other competitors vie for a chance to crush it. So a genuine record is never for eternity, it is always only a challenge away from being broken." This ambivalence makes record achievements so attractive to top performers in sports and business: every record is an attempt to escape transience which is doomed to fail.

When Bob Beamon jumped 8.90 meters during the Olympic Games in Mexico in 1968, many thought that this sensational accomplishment would never be outdone. This world record would stay unbroken for 23 years, until Mike Powell in 1991 jumped five centimeters further. What about Beamon, the previous record holder? After his record was broken, he said he was doing fantastic: "It's as if I can finally breathe again." He perceived his world record as a burden only a short time after the incredible jump in Mexico: "You need huge moral resilience to carry such a record because people always expect more." This is a great dilemma of the record holders: it is not sufficient for the public, and frequently for themselves personally, to simply hold the record. No, they strive to improve it. Failure to do so will quickly result in a lack of direction. As if stagnation was death. This goes for championship record holders such as the Bundesliga team FC Bayern München as well as record title holders such as alpine ski racer Marcel Hirscher. At the same time, this also goes for companies that are accustomed to achieving record after record – and suddenly find that the winning streak is coming to an end. Because others are better. Or because factors out of their control changed the rules of the game. Few companies, though, feel as liberated as long jump athlete Bob Beamon after giving up their record. Instead, they feel uneasiness and anxiety, especially because, little by little, they are losing control over their own performance capability in a complex world. Global trade disputes, irrational heads of state and other outside circumstances cause records to fail to materialize, even though the company did everything in its power. What now? Try to become even better with more tenacity still?

eternal Growth

Bob Beamon's long-jump world record of 8.90 meters stood for 23 years …

… until Mike Powell jumped five centimeters further.

This ambivalence makes record achievements so attractive to top performers in sports and business: every record is an attempt to escape transience which is doomed to fail.

Social Responsibility

TODAY

Records with spillover effects

How about the alternative of calling off the hunt for records? Or at least utilizing a new compass? Be honest now. Is the effort it takes to achieve a record even worth it? The satisfaction that comes with a record result is presumably quite a bit less than the disappointment that follows when this record is not achieved. What's more: record economic performance has long shed its innocence, says economist Uwe Schneidewind: "Not only are traditional records in business less projectable, they also create ecological and social side effects." Keeping an eye on these consequences for the environment and society is the task of the Wuppertal Institute, headed by Schneidewind. And he is very straight-forward: "An economic record at the expense of coming generations or global justice rapidly loses value." The analogy with high-performance sports is clear: in a growing number of disciplines, records are only being broken any more when doping is involved. Schneidewind states that the time has come to divorce satisfaction from records: "It is not true that a company is only doing well when it reports record numbers. A host of aspects exist that companies can use for reference instead: How robust is it in terms of risks? How satisfied are the customers, and how much do the employee like their jobs? And last but not least, what does the company contribute to the common good?"

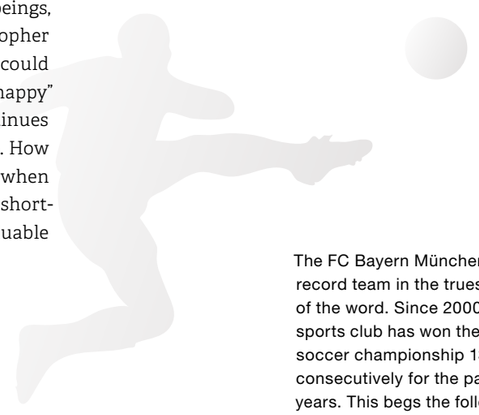
In an effort to make the value of these new accomplishments apparent, Uwe Schneidewind introduces the term "resonance," which he borrowed from sociologist Hartmut Rosa: "Resonance arises when I, as the company, act sustainably and responsibly: customers and employees are satisfied, and the environment and society benefit." In this regard, companies should not consider themselves to be smaller than they are. Sure, individual players can hide behind the statement that being the only one to tackle things differently than others is of little benefit if everyone else continues as before. "In the future, however, the world will change in terms of qualities, not quantities," says the head of the Wuppertal Institute. "A single company that coins a new pattern may suffice to become a trendsetter and provide everyone else with direction."

"An economic record at the expense of coming generations or global justice rapidly loses value."

UWE SCHNEIDEWIND | Economist

How happy does performance have to make a person when the work is neither meaningless nor focused on short-lived records?

Schneidewind refers to this skill as "future literacy": "It combines a different approach of doing business with cultural change and innovative technologies." The beauty is that employees in companies are ideally suited to be "future literacy experts." "As humans, we strive to prove to ourselves that we are capable beings, that we are able to excel", says the sports philosopher Gunter Gebauer. This is also a reason why one could imagine Sisyphus – as Albert Camus wrote – as a "happy" person. He performs. Even if he, day by day, continues to push the same boulder up the same mountain. How happy does performance have to make a person when the work is neither meaningless nor focused on short-lived records? After all, that is when it has a valuable purpose: it helps make the world a better place.



The FC Bayern München is a record team in the truest sense of the word. Since 2000, the sports club has won the German soccer championship 13 times – consecutively for the past seven years. This begs the following question: in light of such a hunt for records, does at some point one's own past become the greatest competitor for the future?

2000/01 2002/03 2004/05 2005/06 2007/08 2009/10 2012/13 2013/14 2014/15 2015/16 2016/17 2017/18 2018/19 2019/20

Current-conducting layer in TV display

15 *G*

Rotating anode for computer tomograph

2.5 *KG*

Components for infrared lamp

10 *G*

Mo

Molybdenum

Crucible for sapphire glass production

45 *KG*

H4 bulb for car headlight

3 *G*

Electrode for glass melting

80 *KG*

Heating element for high-temperature furnaces

750 *KG*

Human organism

10 *MG*

Molybdenum for the high-tech world

In tiny amounts, molybdenum is one of the vital trace elements of the human organism. Molybdenum is equally indispensable, albeit in variably large amounts, in high-tech products. A few examples are listed here.

Tungsten

W

Bit for hammer-drill

65 *G*

Housing for luxury watch

35 *G*

Pins for door lock

12 *G*

Heating wires for car window

5 *G*

Vibration alarm unit in smart phones

0.4 *G*

Teeth for a saw blade of a circular saw

400 *G*

Lamp for movie projector

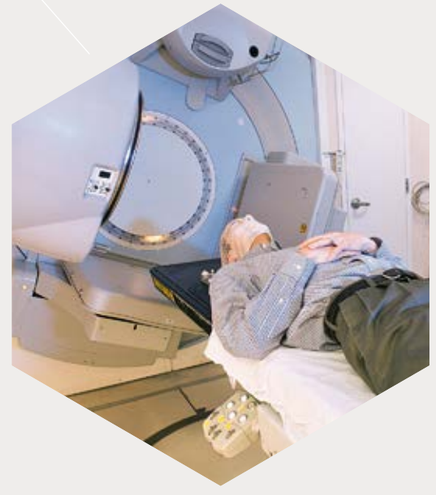
750 *G*

Cocoa crusher

30 *KG*

Helmet for radiation equipment

485 *KG*



Tungsten for the high-tech world

Tungsten is one of the heaviest materials. In conjunction with cobalt, tungsten becomes an extremely wear-resistant hard metal, which is used for all kinds of tools. Just see for yourself.

It is a lustrous bluish-gray metal and, in the past, was prized by painters and glassblowers for its bold-colored pigments. Today, cobalt is an important element in high-tech applications.

Ever since its discovery in 1735, interest in cobalt and its use in high-tech applications has steadily grown. Today, the material is an essential component for electromobility and is needed to develop the next generation of electronic devices. For the past 90 years, cobalt has also been an important ingredient in the production of wear-resistant hard metal.

Overall demand for cobalt is forecast to double between 2016 and 2025 to 230,000 tons. It is expected that 60 percent of the cobalt will be needed for cathode materials in rechargeable batteries alone.

Even though cobalt compounds have been used for centuries, the Swedish chemist Georg Brandt was the first person to discover the metal unknown until then and describe its properties, giving it the name it has today.

Cobalt is not found in nature as a free element, but only in bound form in the Earth's crust. The vast majority of cobalt, which is primarily produced in Africa, is a by-product of nickel, copper and silver mining. Given the high demand for cobalt, however, it has been anything but a by-product for quite some time. The recycling aspect is also increasingly gaining in importance. While initial recycling technologies are already available for batteries, considerable material recovery is not likely to happen until ten years from now, at the end of the product life cycle.

Two thirds of the cobalt is used in the form of chemicals. Mixed oxides of cobalt, for example, are indispensable for lithium-ion batteries to power electronic devices and electric vehicles. Together with nickel batteries and rechargeable batteries, these applications account for almost half of the world's consumption.

Pure cobalt is a hard, brittle metal, which when combined with other metals forms very corrosion- and heat-resistant alloys. These qualities have led to the use of cobalt alloys in rocket engines, spacecraft, nuclear reactors and gas turbines. Hard metal and diamond tools as well as magnets represent the main metallic applications, outranked only by superalloys. Cobalt-containing materials are also utilized on an increasing scale in electroplating, for industrial catalysts and powerful magnets.

As demand for cobalt has risen, worldwide interest has soared. Investors are increasingly financing the development and mining of cobalt deposits. At present, in excess of 60 percent of cobalt is produced in the Democratic Republic of the Congo, and the share is likely to grow further. While cobalt is primarily mined industrially there, artisanal mining – that is, purely manual ore extraction – is on the rise. Cobalt is now also being chemically further processed to a large degree in China.

Industrial enterprises utilize the material for new technologies and devices in a variety of sectors, including the development of energy storage systems for industry and private households as well as for intelligent drone systems.

The Plansee Group is striving to achieve a high level of self-sufficiency when it comes to cobalt as a raw material by ensuring its supply primarily through the collection and recycling of hard metals.

USED

RECYCLED

Too valuable to throw away

What holds true for glass, plastic, paper and metals such as aluminum and gold is also important for carbide tools: they are too valuable to throw away. With limited effort, tools made of hard metal can have not just two, but even three, four and five lives.

"In fact, hard metal from any product can be reused almost indefinitely, and only minor amounts are genuinely lost in the case of wear products," says Heiko Wildner. Thanks to him, Stadler Metalle GmbH, specializing in the recycling of hard metals, was integrated into the Ceratizit Group at a record pace. It comes as no surprise that the Luxembourg hard metal manufacturer is speeding things up since the share of recycled tungsten in production is expected to grow significantly in the coming years. With the acquisition of Stadler, Ceratizit not only took Europe's largest company specializing in hard metal recycling under its wing – the company also purchased the necessary expertise to comprehensively collect, clean and recycle these raw materials. This acquisition ideally complements the existing collaboration with Global Tungsten & Powders in the USA.

Hard metal – a unique composite material

In carbide, *tungsten – in the form of tungsten carbide – and cobalt metals create a uniquely strong, durable and wear-resistant material which synergizes their qualities.* This is achieved by embedding tungsten carbide particles in a cobalt matrix. The tungsten content ranges between 65 and more than 90 percent, with cobalt accounting for up to 25 percent.

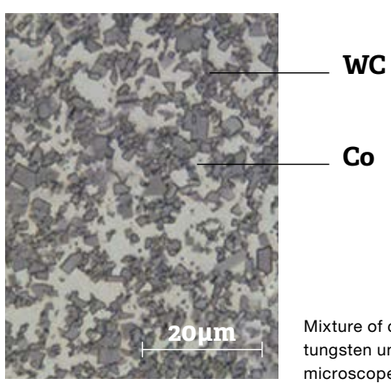
At the same time, the strong tungsten carbide and cobalt duo has one disadvantage from a Western point of view: over 80 percent of fresh tungsten is mined in China, and over 60 percent of new cobalt in Congo. Additionally, 60 percent of cobalt is further processed in China. Ceratizit has consequently set the ambitious goal of becoming less dependent on regions and suppliers and ensuring the raw material supply through recycling. "Urban mining" on the doorstep – meaning: collecting raw materials where they occur and used to be disposed of and thrown away.

Less invasion in nature, lower energy consumption

For nature and the environment, recovering tungsten and cobalt from secondary raw material is a huge benefit. Up to 0.4 percent tungsten or cobalt can be extracted from ores. Roughly speaking, this means that some 250 kilograms of rock have to be mined to yield one kilogram of tungsten or cobalt.

When secondary raw materials are recycled, as much as 95 to 99.5 percent tungsten and cobalt can be recovered from one kilogram of scrap.

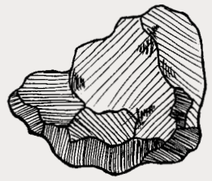
Naturally, this depends on the proportion of tungsten and cobalt present in the scrap. Recycling consumes significantly less energy. The energy savings amount to as much as 75 percent when the material does not come from a mine, but is obtained through recycling.



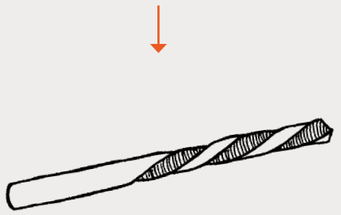
Mixture of cobalt and tungsten under the microscope.

QUANTITY COMPARISON OF ORE AND METAL

Approximately 250 kilos of ore-containing rock have to be mined to yield one kilo of tungsten or cobalt.



250 kg Tungsten ore



1 kg Hard metal

Conflict-free sourcing of raw materials

The goal of the supply policy is to minimize the dependencies on individual regions and suppliers, and to reuse raw materials from conflict-free and sustainable sources. Only companies who are certified conflict-free tungsten producers are accepted as suppliers. The Tungsten Industry Conflict Minerals Council (TICMC) developed rules and regulations to ensure compliance.

Two approaches – one goal

Two processes are employed in the recycling of tungsten. In the zinc process, the hard metal is treated thermally with zinc after use, resulting in reclaim powder that contains over 99 percent of the tungsten carbide in its original form as well as metallic cobalt and other additives. This powder blend can be used directly in hard metal production. Suitable starting materials include tungsten carbide-based tools and wear products containing a cobalt binder.

The chemical recycling process is suitable for all types of hard metals as well as for batches with a low hard metal content and for grinding sludge arising in the machining of carbide products.

In this process, the metallic components are dissolved and converted to oxides, from which pure tungsten metal and carbide powder is then obtained. Cobalt is incurred separately and is also processed into fresh cobalt.

With the exception of the carbon used in the chemical process, all additives can be recovered in both processes.

Every gram matters: comprehensive collection of scrap

"We estimate that, worldwide, at present only every other carbide tool and one out of three wear parts made of hard metal ends up being recycled," says Heiko Wildner. Ceratizit plans to change that now and is counting on its customers as active and dedicated collection partners. "Many small and larger companies have not yet realized the value of hard metal tools or wear parts after use, and as a result, these are disposed of along with all the other (metal) end-of-life products," Heiko Wildner continues. With a large-scale campaign launched at the EMO trade show in Hannover, Ceratizit intends to collect and recycle every possible gram of hard metal after use. To make life as easy as possible on its collection partners, Ceratizit offers several collection systems:

- setting up boxes for hard metal scrap in the production facility and organizing pick-up;
- sending hard metal scrap using return slips;
- picking up larger quantities of hard metal scrap with its own truck fleet.

This service is not only free of charge for the customers and requires no major effort, they are also compensated for all scrap based on the daily price for tungsten and cobalt.

Old = new

This equation sums up tungsten products recycled from the chemical process. In terms of quality, they are exactly identical to those produced from ore concentrates from mines. With the zinc reclaim process, the recycled material meets all the requirements with regard to the desired tool properties. In general, secondary raw materials extracted with the zinc process are blended with those obtained from the chemical process to ensure uniform quality.

THE PLAYERS

Collection and sorting: Stadler Metalle in Türkheim/Germany. The result: hard metal scrap sorted according to type.

Reclaiming – chemical process: Global Tungsten & Powders in Towanda/USA. The result: fresh tungsten metal powder.

Reclaiming – zinc process: Ceratizit and GTP companies in Reutte/Austria and Jyväskülä/Finland. The result: tungsten carbide powder with clearly defined properties.

Processing: the Ceratizit Group and additional customers worldwide. The result: components made of carbide in the form of tools for machining and wear parts for industrial manufacturing processes.

The collectors and sorters

Tungsten or nickel?

35 years ago, Gabriele Stadler and her husband Hubert Stadler went into business for themselves, founding a small recycling firm. They started out with a used truck purchased on credit, their living room as the office, and lots of enthusiasm.

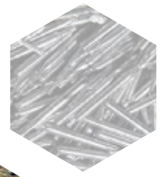
Anyone who speaks with Gabriele Stadler today will feel that this enthusiasm from their founding days is still there. The one truck has since grown into an entire fleet, with the trucks traveling the roads of many Central European locations to collect scrap metal. And the home office has turned into a small industrial park, featuring an administrative building, storage and sorting facilities, and now 47 employees.

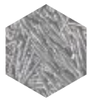
But first things first. For almost 20 years, Gabriele Stadler and her husband were in charge of everything in their company. They quickly purchased a second truck to be able to transport the growing volumes of scrap. It was not uncommon for them to start the day at 4 am. They usually planned their routes and contacted the customers by phone while on the road. In the evenings, they would jointly sort the scrap. The weekends were dedicated to taking care of everything office-related.

Stadler specialized in the collection and recycling of hard metal scrap and sludge early in the business. This doesn't exactly come as a surprise. After all, a number of German solid carbide manufacturers operate in the region between Memmingen and Ulm, including what is now Ceratizit Balzheim, following the merger of the subsidiaries Klenk and Günther Wirth. Every day, thousands of drills and milling cutters have been, and still are, produced here, creating a lot of hard metal sludge.

The Stadler company

Coated or uncoated?





MILESTONES OF THE COMPANY DEVELOPMENT

In 1997 the Stadlers purchased their first commercial property in Türkheim in the Allgäu region, the first buildings were completed in 1998, and as early as 1999 the company received its certifications according to DIN EN ISO 9001 and as a specialized waste management company.

They hired their first permanent employee in 2004. Marco Grunau took over some of the time-consuming trips in the truck and has remained loyal to Stadler to this day. This also finally freed up more time to dedicate to the sales aspect of the business and acquire new customers.

Their efforts would prove to be successful, allowing them to be well on their way to becoming Central Europe's largest hard metal scrap dealer, as things were happing quickly. They hired additional staff, purchased additional properties, and built new facilities. One of the milestones was the establishment of a dedicated laboratory – instantly allowing them to examine and classify the collected scrap on-site.

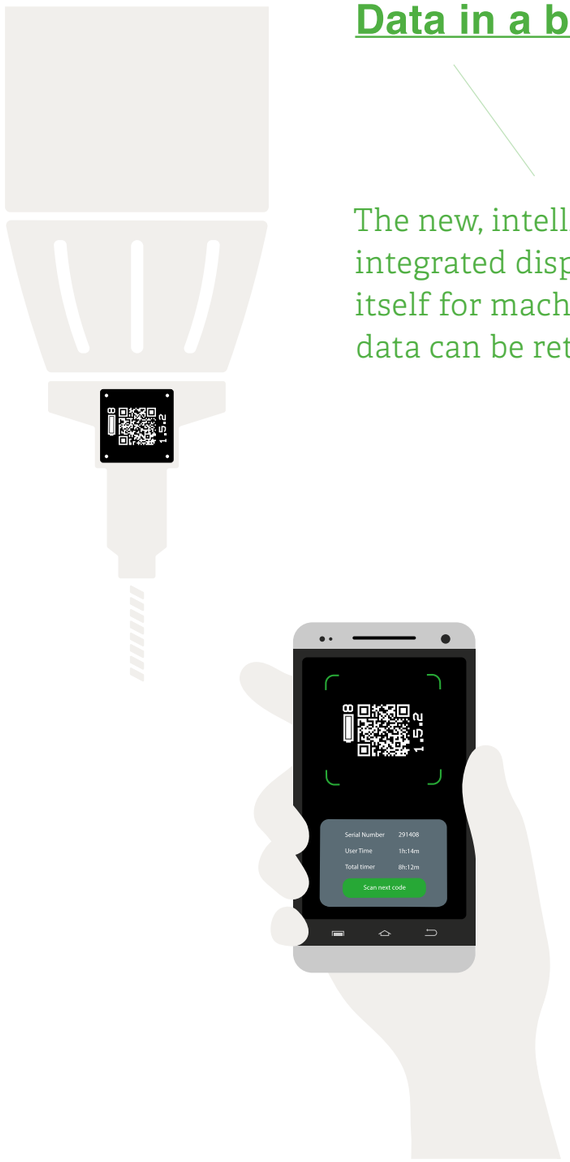
Cleanly sorted products: the employees' experience in sorting tungsten scrap is a key factor in Stadler's success.

Logistics under control: Stadler collects the scrap and sorts it according to type before recycling.

The role of the laboratory and its long-time manager René Bucher in the company is evident from the weekly training that all employees attend, depending on topic: the drivers, who have to pre-sort and classify the scrap on-site at the customer's premises, but also the employees, of course, who carefully separate the scrap in the warehouses and at the sorting tables. Just now, for example, a large pile of blackish-gray pins was delivered. At the customer's facility, tungsten and nickel pins were inadvertently lumped together. Collectively, the pile is a huge heap of garbage; once separated, it is a lucrative business. "You have to do what you have to do," Warehouse Manager Michael Quasinowski says laughing and sets to the tedious and time-consuming task of sorting the pins, which at first glance look almost identical, into two piles with tweezers.

"Companies who purchase from us appreciate our cleanly sorted products," Gabriele Stadler confirms. She adds that quality during sorting was the key to success and was becoming increasingly important, and that transparent processes and purchasing scrap materials at competitive prices were equally as important. In the incoming goods department, the scrap materials are meticulously weighed, photographed, labeled and saved in the inventory management system. It is only then that the scrap is sorted further, which in the case of tungsten carbide scrap is carried out in a large room where the employees are seated at two large sorting tables. Indexable inserts are sorted at one table, carbide drills and other tungsten carbide products at the other. This is primarily still a manual process, which is very difficult to automate. The employees check every single indexable insert. Is it coated or uncoated? Depending on content, the material can be processed using the zinc process or undergoes the purely chemical recycling process.

Stadler has been working with various companies of the Plansee Group for a number of years. In 2004, the first scrap shipments were sent to the Tikka Group in Finland, which today is Tikomet in Jyväskylä, as well as to Osram Sylvania, which today is GTP in Towanda. Additionally, Stadler repeatedly picked up grinding sludge at the Reutte location. The collaboration has reached a new dimension after Ceratizit acquired a stake in Stadler. Going forward, Stadler will be an important building block in the strategy of Ceratizit, GTP and Plansee for covering the need for tungsten by recycling scrap (see article on page 24). The conditions for continued expansion are favorable: Stadler just built a huge facility in 2018 to ensure that scrap materials are stored protected from the elements and with the environment in mind.



When man interacts with the machine, the process is based on a binary code. The tool supplies data, which is forwarded to the smart phone in binary form, and displayed on a graphical user interface. Hard to imagine? It's actually quite simple: we translated the text you are reading on this page into a binary form to be machine-compatible. The machine-readable version is displayed in green on the left side.

Data in a blink of an eye

The new, intelligent maintenance system with integrated display from Ceratizit is simplicity itself for machine operators: all the operating data can be retrieved directly on the tool.

In manufacturing, machine downtime can quickly turn into a nightmare: productivity drops, unit costs increase, and repairs command valuable time. Previously, the operator's experience was a crucial factor in correctly assessing a tool's condition: how long has the tool been in use, and how many more parts can it still machine?

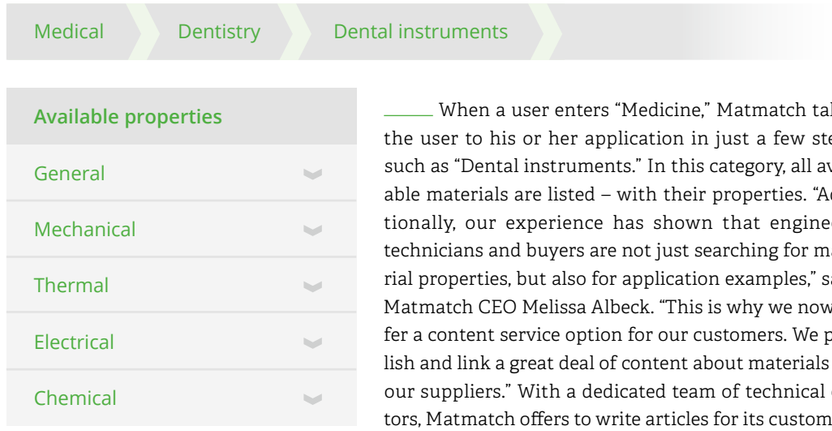
KOMlife made by Ceratizit now answers these questions “at the touch of a button.” KOMlife allows operating data to be collected autonomously and viewed from an integrated display, which is activated with a magnetic pen. The maintenance display can be customized with the variable maintenance intervals, such as for replacing cutting edges. If the maintenance interval is exceeded, a flashing red LED indicates that maintenance is due. To digitally collect the operating data, the recorded data can be viewed with the KOMlife app via a QR code.

Michael Renz, who is in charge of actuating tools at Ceratizit, comments: “Regular and timely maintenance planning can increase the service life of the tools, and the economic efficiency of the machine as a whole.” Use of the predictive maintenance system KOMlife additionally helps assure the quality of the finished workpiece.

The maintenance display can be integrated even with small tool diameters of as little as 50 millimeters.

Materials – Content is King

The materials platform Matmatch covers thousands of materials as well as their properties. What's more: with just a few clicks, users can also find “their” application, and the materials suitable and available for it.



When a user enters “Medicine,” Matmatch takes the user to his or her application in just a few steps, such as “Dental instruments.” In this category, all available materials are listed – with their properties. “Additionally, our experience has shown that engineers, technicians and buyers are not just searching for material properties, but also for application examples,” says Matmatch CEO Melissa Albeck. “This is why we now offer a content service option for our customers. We publish and link a great deal of content about materials for our suppliers.” With a dedicated team of technical editors, Matmatch offers to write articles for its customers as part of a service package. This allows materials manufacturers to highlight what makes their materials stand out, and why they are particularly well-suited for certain applications. Another advantage: content marketing provides advertisement for the customer and increases traffic to the Matmatch platform.

Matmatch lists thousands of materials as well as their properties. The platform is free-of-charge for users. Material vendors pay for appearing in the results list of relevant searches.

Simple, user-friendly and completely digital

myHR is the new software that is being incrementally rolled out in the entire Plansee Group and provides a contemporary approach to handling personnel processes.

These are just some of the scenarios that myHR will cover:

- Employees will be able to view their data and many HR processes in myHR and update personal information such as telephone number, banking information and marital status.
- By being able to access it via the mobile app, regardless of time and location, the tool can be used more flexibly. Managers will be able to start or approve processes while away on a business trip.
- Employees and managers will be able to view and update forms for the employee review or an employee's individual development plan directly in myHR.
- Managers will be able to gain an overview of the employees working in their department, including qualifications, development plans and succession planning. myHR supplies the necessary data in a well-organized manner.

These and a host of other functions will be enabled in the coming months. “Previously, every one of our 50 locations in the Group had its own procedures for the majority of HR processes,” says Plansee Group's Executive Board member Bernhard Schretter. “With myHR, we now have a powerful tool and a uniform solution throughout the Group. As a result of standardized information about employees, such as job descriptions, skills and career planning, we will be able to optimally fill positions with the people best-suited for them, much better than we could in the past, and ensure that we develop our employees according to their potential and their personal expectations. Compared to the current processes, it will be much easier to offer customized training, conduct the appropriate career planning, and expand our talent pool.”

Employees and managers will be particularly pleased to learn that myHR works just like any other app – the tool is essentially self-explanatory, requiring no extensive training. If any questions should arise, a help line is available to answer them. The help line will be enabled for every location at which myHR has been introduced. myHR is already up and running in Italy and being used by all employees. Josef Lämmle, Managing Director of Ceratizit Como: “While myHR required a lot of work and testing during the preparatory phase, the effort was worth it. Once implemented, the tool is simple and user-friendly to operate.”

CLEAN ROOM

Molybdenum components subject to cleanliness standards

Plansee built a new state-of-the-art cleanroom in Reutte where components for the semiconductor industry are being produced.

Before she enters her assembly work station, Lisa A. has completed a five to ten minute cleaning and dressing ritual in the people airlock of the newly constructed cleanroom in Reutte, Austria. The process involves washing her hands, putting on a hairnet, passing through cleanroom locks, putting on a hooded protective suit, cleanroom boots, a face mask and gloves, and ends with the mandatory air shower. She may then enter the cleanroom, which Plansee planned, built and commissioned in a record time of only nine months.

In the cleanroom, components for the semiconductor industry are assembled, which are needed to produce the latest computer chips. An interesting comparison illustrates the full scope: the requirements with regard to purity are so high that the surface of Germany's Lake Constance, measuring 536 square kilometers (207 square miles), could not be “contaminated” with any more than three particles the size of a wine cork.

Lisa A. is one of the numerous specialists at Plansee who make the high-tech assembly processes in the cleanroom possible.

Lisa A. begins her work, assembling the components from hundreds of individual parts. The work stations in the cleanroom are paperless. Each work step is displayed on large monitors – similarly to putting together a LEGO set. Every work step is confirmed on the PC before the next step is displayed. Before the components enter the cleanroom, they undergo a thorough cleaning process. In a high-vacuum furnace, a kind of "drying chamber," they are heated until they are completely dry and free of hydrocarbons. In the "darkroom," UV and white light is used to check, prior to assembly, whether all components are indeed free of impurities such as fingerprints or particles.

Lisa A. is one of the numerous specialists at Plansee who make the high-tech assembly processes in the cleanroom possible. Whether they are supply technicians, assemblers, quality assurance staff or maintenance technicians – in addition to their specialty fields, they all share the responsibility of ensuring that the cleanliness and purity requirements are met.

The components are needed to produce the latest chip generation. These computer chips are exposed to ultraviolet light. This is the only technology that allows the next-generation chips with feature sizes of just a few nanometers to be produced economically. The process requires implementing even smaller features on the printed circuit boards, making them even more powerful in the smallest space possible.

Without these semiconductors, autonomous driving, Industry 4.0 applications, the new fifth-generation mobile communication networks, still more powerful CT scanners and many advantages from Big Data will remain a distant dream. The new chips are crucial for the pace and progress of digitalization.

Ulrich Lausecker, Executive Vice President at Plansee emphasizes: "This is not your everyday kind of project. It commands all our skills and expertise and extends across several of Plansee's locations."

What's involved is already evident from the fact that this project covers all of Plansee's machining and processing technologies: the molybdenum has to be laser-cut, bent, pressed, welded, turned and milled – all at tight tolerances, under extreme time constraints, and in exceptionally clean conditions.

Salt

pues

Protection against

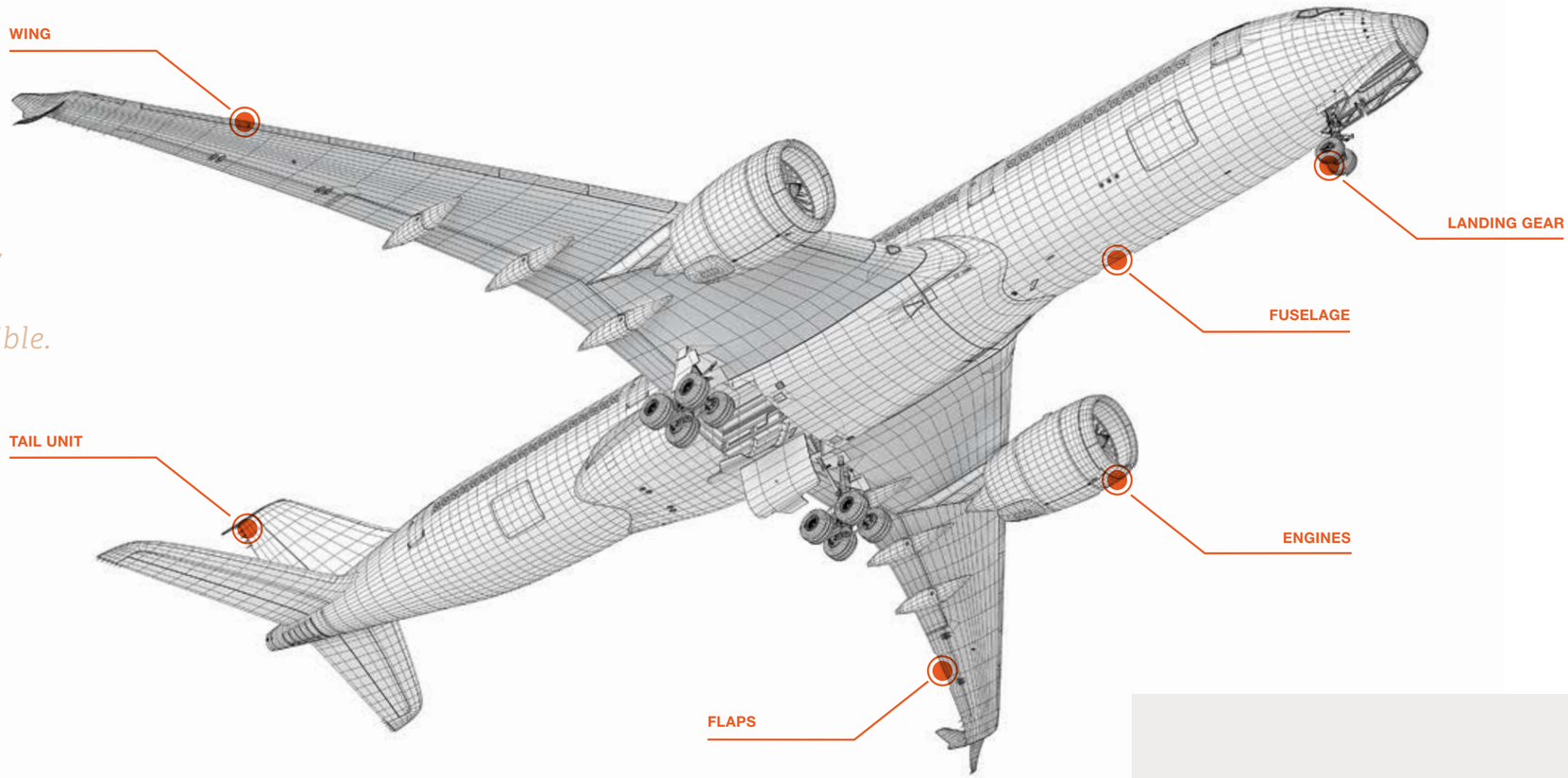
They are wafer-thin and exceptionally effective: materials from Plansee are used to coat components and tools in aircraft construction. The coatings protect important components and increase the service life and precision of tools.

"Mobility, and flying in particular, will remain a key topic for Plansee in the future," says Peter Polcik, Head of Development at Plansee Composite Materials in Lechbruck, Germany. Experts forecast that air traffic will grow tremendously in the coming years. The number of passengers is expected to double by the year 2036 from currently approximately 4.1 billion persons per year. While, at present, 19,000 aircraft are concurrently in the air worldwide during peak times, the number will be as high as 46,000 in 2036. At the same time, aircraft makers are working on further reducing fuel consumption. Today, a state-of-the-art aircraft uses 2.9 liters of jet fuel per 100 passengers per kilometer. This number is expected to decline to 2.2 liters by 2030 – a reduction of up to 25 percent.

The coatings made by Plansee serve a range of purposes in aircraft construction.

The supplier industry is expected to manufacture with precision and cost-consciousness in mind. In view of refractory materials such as titanium alloys or carbon fiber-reinforced materials used in aircraft construction, specially developed coatings are needed to make tools more wear-resistant and precise. These tools are used to work components for the fuselage or structural components.

During flight operations, it is particularly important to protect the engines from environmental conditions as best as possible.



Long-haul aircraft in particular travel all over the world. They take off from and land in the desert as much as they do at airports in direct vicinity of the ocean. Protective coatings in the outer area of the turbine blades protect the engines against sand particles, salt air, and even the consequences of a bird strike.

And in light of rising jet fuel prices and growing ecological awareness, an increasing number of airlines stipulate ambitious fuel reduction goals in the specification sheet for aircraft makers. Heat protection coatings for the engines enable higher operating temperatures, thereby lowering jet fuel consumption.

To ensure that Plansee continues to offer beneficial solutions for all these requirements, the company works closely with its key customers. “Together, we develop coating solutions from new and unconventional materials,” comments Peter Polcik. While the customer coats tools and turbine component using the PVD process, Plansee manufactures the required coating material, which is supplied in the form of so-called sputtering targets. “Developing and manufacturing sputtering targets is our core competency”, Peter Polcik adds. Different techniques are used in the process – including powder metallurgical manufacturing, in particular hot pressing or spark plasma sintering (see box page 44).

Plansee develops coatings for tools in order to make them even more precise and wear-resistant.

“Together, we develop coating solutions from new and unconventional materials.”

OVERVIEW

Coating solutions can improve the tools and components used in aircraft construction in a number of ways.

Fuselage

Manufacturing components made of aluminum and carbon fiber-reinforced materials: coatings for high-precision and wear-resistant tools.

Structural components

Manufacturing difficult-to-machine components made of high-strength titanium materials: coatings for wear-resistant, heat-resistant and robust tools.

Engines

Protection against erosion and corrosion: protective coatings for turbine blades against sand or salt particles and against hot gas corrosion.

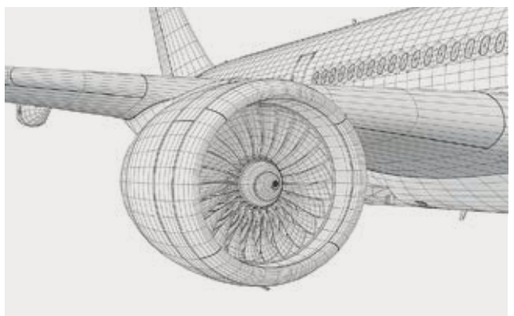
Increased efficiency: Heat protection coatings enable higher operating temperatures, thereby lowering jet fuel consumption.

AVAILABLE MANUFACTURING PROCESSES

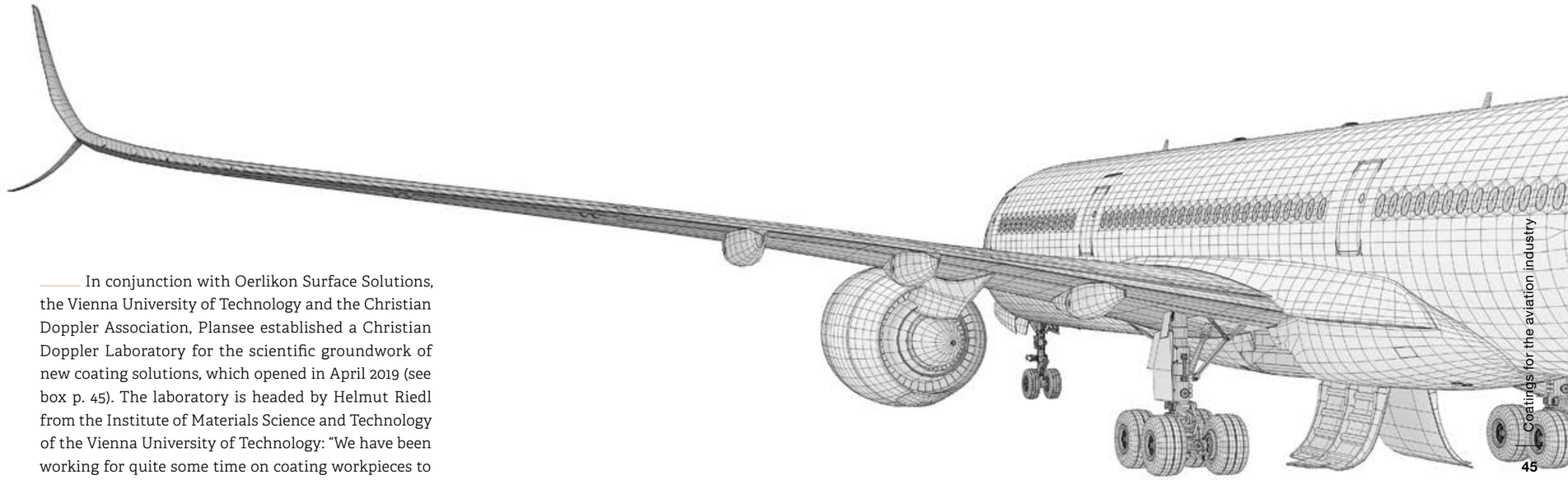
Powder metallurgical manufacturing: Mechanical compaction of metal powders in molds or presses and subsequent sintering of the “green compact” at high temperatures.

Hot pressing: The powders, which are added into heat-resistant tools, are compacted in a vacuum machine, which consists of a combination of a sintering furnace with an axial press, at temperatures of up to 2500°C to yield strong materials.

Spark plasma sintering: The powder is compacted in a pressing tool under high pressure. This pressure is maintained throughout the sintering process. The applied direct current is conducted directly through the tool and the powder, thereby heating the powder from the inside.



Protective coatings make the turbine blades more robust against sand or salt particles and hot gases.



In conjunction with Oerlikon Surface Solutions, the Vienna University of Technology and the Christian Doppler Association, Plansee established a Christian Doppler Laboratory for the scientific groundwork of new coating solutions, which opened in April 2019 (see box p. 45). The laboratory is headed by Helmut Riedl from the Institute of Materials Science and Technology of the Vienna University of Technology: “We have been working for quite some time on coating workpieces to improve their material properties. Previously, the work was mainly focused on mechanical properties, such as hardness or elasticity. Now, we want to explore a much broader range of material properties that can be improved with customized coatings.”

One of the key technologies is physical vapor deposition (PVD): a wide variety of base materials are evaporated in a coating machine and atomized on the atomic scale. These atoms then deposit on the workpiece to be coated. By using parameters such as pressure and temperature, or by adding other gases, it is possible to influence how this coating is to be composed.

Thin films make a whole host of combinations of properties possible, depending on the base materials and the surface. Given the large diversity of possible material types, the most difficult challenge is often to design suitable interfaces between the material and the base material at the atomic level to ensure that the coating bonds with the base material as desired.

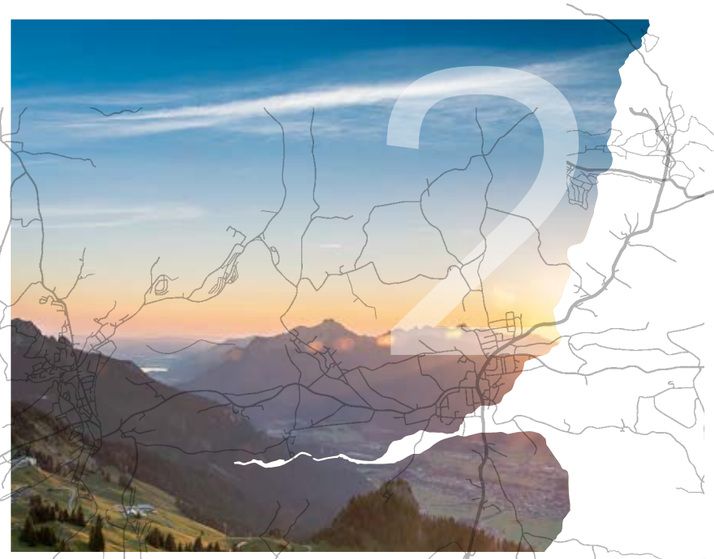
“The choice of coating materials has become immense”, Helmut Rield states. “Special ceramics are frequently used, but we also work with metal coatings. We produce a wide range of borides, carbides, oxides, and even combinations of these materials.” It is not just the ingredients of the coating that matter, though, but also its microstructure. “Sometimes it is possible to select a coating that, chemically, is very similar to the base material, but contains additional functional elements on the surface,” Riedl explains.

ABOUT CHRISTIAN DOPPLER LABORATORIES

Christian Doppler laboratories conduct high-level application-oriented basic research through a cooperation of excellent scientists with innovative companies. In terms of the funding program for this kind of cooperation, the Christian Doppler Research Association is internationally recognized as a best practice example.

Christian Doppler Laboratories are jointly funded by the public sector and the companies involved. The primary public funding partner is Austria's Federal Ministry for Digital and Economic Affairs (BMDW).

PIONEERING SPIRIT



CHALLENGES AND ANSWERS

AND INGENUITY

Peter Aldrian

Pioneering spirit: With positions in Germany, China, France and Japan, Peter Aldrian has repeatedly given fresh impetus to the Plansee Group.

POSITION AT PLANSEE

Managing Director of Plansee Japan

LOCATIONS

Germany, China, France and Japan

You have worked for the Plansee Group all over the world for many years – how does it feel to be a permanent expatriate?

Great! Since the exchange of information and communication works so well, I never felt far away from the headquarters, regardless of where I was. What motivates me is my curiosity and the determination to track down shortcomings and encourage employees to actively participate. At the same time, I myself continue to gain new experience.

You have worked in a number of countries. Was it the similarities or the differences that mostly stood out in your work?

Despite the different tasks, there was one constant: time and again, I was able to provide new impetus, write a new chapter in the history of the particular Plansee company. My assignment in Germany was to relocate Efradur, the paper knife manufacturer we had just acquired, from Frankfurt to Bad Urach. The goal was to re-motivate the team and instill the Plansee Tizit culture. While working from Hong Kong, my mission consisted of developing the Chinese market for Plansee and Ceratizit products and tools. Pioneering work was also needed during my time in France: Plansee had just acquired Cime Bocuze, and the challenge was to create a broader position of the company in the market, which was heavily focused on the aerospace industry, to make it more immune to fluctuations. And finally, ten years ago, I came to Japan where three individual Plansee companies were merged into what is now Plansee Japan. Here, we first had to do some integration work before we were able to return the company to a path toward growth.

What do you learn abroad that you don't learn in Reutte?

You definitely get to know the markets better. The field organization often has a major filter effect, so the headquarters tends to feel much less pressure from the market. The learning curve is also extremely steep – you can't possibly gain experience this fast at the head office! In my view, it would be beneficial for Plansee to send more employees out into the world.

What does it take to bring the Plansee spirit to another country and keep it alive there?

This is indeed a major challenge. Other countries have a different vision in terms of doing business, and at times the cultural and language differences are immense. It takes a lot of compromise to reconcile all these aspects, and ultimately the local employees have to accept and embody it.

Kathrin Knittl

When is ingenuity needed? Reason 1: When one's own product is no better than that of the competition.

POSITION AT PLANSEE

Developer at Plansee in Austria

LOCATION

Austria

Can you explain your invention in one sentence?

We were focusing on optimizing slinger rings made of molybdenum. Our customers need these slinger rings to produce alloys for rare earth magnets.

What did the invention improve?

By optimizing the microstructure, we were able to significantly increase the service life of the slinger rings.

How does it feel to have created an invention?

Naturally, it is a wonderful success story for the team and for each member when you can help create new products. It was especially great to see that the customers were really excited about the improved product. And put in more business management terms: with the invention, we have devised a unique selling proposition – which helps win our customers' loyalty, strengthens our position in the market, and safeguards our business.

Where and when did you have the crucial idea?

Regrettably, our products were no better than those from our competition. This bothered us. One day, we just rolled up our sleeves and meticulously examined slinger rings already in use for clues about what we could do better. After extensive analyses, we found shortcomings and, with this, approaches for ideas of how to solve the issue. The idea that ultimately helped us achieve the breakthrough came up during a discussion on the team.

How long was the journey from the initial idea to the finished product?

The examinations of the returned items started in the fall of 2015. We devised the idea in early 2016, and the first tests followed in the course of the year. The invention disclosure was filed in January 2017, and the utility model application was filed with the patent office in June 2017.

Sabine Wörle

When is ingenuity needed? Reason 2: When the customer voices an (almost) unaccomplishable request.

POSITION AT PLANSEE

Developer at Plansee in Germany

LOCATIONS

Austria and Germany

Can you explain your invention in one sentence?

We developed a coating material made of graphite that is doped with metal particles and produced using hot pressing technology. The material is used for more efficient friction-lowering coatings of vehicle components.

What did the invention improve?

We simplify our customer's work. The customer receives a ready-to-use coating material. This comes with two advantages: The fine and uniform doping of the metal powders results in better coatings. And the customer is able to work with a single coating material, and no longer needs one made of graphite and one made of metal, as in the past.

How does it feel to have created an invention?

It started with our customer's request for a ready-to-use product. It was our job to utilize our knowledge and our technologies to find a new avenue for producing this coating material, manufacture prototypes, and test them. It makes us proud that we achieved our desired goal and, at the same time, came up with an invention. It demonstrates that we delivered great team performance.

Where and when did you have the crucial idea?

We came up with the idea as a team. But we did not know whether this idea could be implemented, and what means were needed to do so. It required a lot of experiments, which ultimately led us to the solution we hoped for.

How long was the journey from the initial idea to the finished product?

My job was to review whether the idea could be implemented. This required a lot of attention to detail: selecting suitable raw materials, determining the mixing techniques for the powder batches, and establishing the sintering parameters for producing the blanks. These also had to have good strength properties to allow them to be machined on a turn/mill machine. At present, the customer is extensively testing the prototypes. The initial results are very promising …

Mathias Hochstrasser

Pioneering spirit: He made his first steps in Switzerland and optimized production processes. In China he built a new factory. Now he is facing new challenges in the contemplative Allgäu region.

POSITION AT PLANSEE

Managing Director at Plansee in Lechbruck/Germany

LOCATIONS

Switzerland, China, Germany

What positions have you held so far at Plansee?

I started out as Production Planner in our Swiss plant. In 2011, I relocated to China to set up the new plant there, together with 50 other experts from the Group. I managed the plant in Shanghai since 2013.

What did you learn during the eight years in China?

The flexibility of the Chinese colleagues is impressive – they are extremely open to change. At the same time, I learned to appreciate Plansee's incredibly stable network: whenever we ran into problems during the construction and start-up phase or with new customer projects, an expert was located within the Group in no time and supported us with advice and, more importantly, assistance. Quite often even on-site, over several weeks or months.

What do our customers in China appreciate about Plansee?

The network I just mentioned and our engineering capabilities, but also our financial stability and our fast decisions that they can rely on.

On March 1, you became the Managing Director of Plansee Composite Materials in Lechbruck, an established location. What is the challenge here?

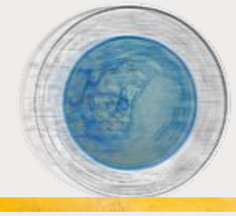
Plansee is very well positioned in Lechbruck – with great employees, competitive products, good capacity utilization, and outstanding machinery. I look forward to continuing to develop this successful plant. We need state-of-the-art manufacturing technologies and processes here, a high level of automation, qualified employees, and carefully crafted succession planning in order to cover the need for suitable employees in the coming years.

Focusing on safety

It only takes a split second of inattentiveness for a finger or a hand to get caught in machinery: cuts and crush injuries are among the most frequent work accidents at Plansee and Ceratizit. These accidents are preventable, which is why the companies at the Reutte location have launched a campaign for greater workplace safety. The tenor: avoiding work accidents is not difficult. An orderly workstation, proper use of protective gear and attentive working play a significant role in ensuring that employees complete their workday without an accident. The companies are doing more than just appealing to the employees' sense of safety. As in other locations in the Group, employees in Reutte are rewarded with hearty snacks for an accident-free work place over defined periods of time.

A thing or a person?

Is it a thing? Is it a person? It is humanoid "super intelligence." A complex new species. With this highly detailed silver-niobium coin, we are approaching a future which has already begun with great anticipation. Intelligent machines have long become an integral part of our everyday life, growing ever smarter, more independent.



Artificial intelligence is already assisting us in many of life's situations and applications. It serves as a tool, a toy, and a medium to us. It is always attentive, works diligently and efficiently. Completes monotonous tasks without complaining. And it does not lose patience when it takes us a moment to understand.

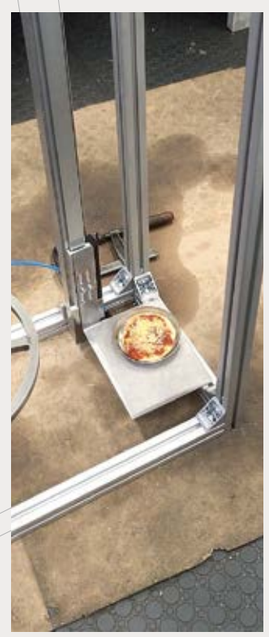
These intelligent helpers will also ease our workload a great deal in the Plansee Group – in sales, in production, in logistics and especially in administration. But until then – and thereafter even more so – we need employees who teach these systems what it is we want, employees who understand what the systems do, and employees who take corrective action when the helpers take on a life of their own or do things they should not do.

The obverse of the coin shows the head of a robot and a processor, from which conductors extend into the silver ring. The reverse shows applications of artificial intelligence: E-health, smart machines, processor development, digitalization, data analysis, and artificial neural networks.

The coin was created with human intelligence – employees from the Austrian Mint and Plansee, who worked untiringly until the selected areas of the niobium center appeared in the beautifully rich blue luster.

Pizza à la Plansee

Working together for a good cause, while learning a lot and having fun: Plansee and Ceratizit apprentices sold pizza and small apple tarts at the Christmas market in Reutte, Austria, and donated the net profit totaling 3000 euros to regional children's and youth welfare organizations. Everything was hand-made-including the pizza oven, which the apprentices and their trainers spent three months on to build. The lathe machinists created key components, and the mechanical engineering technicians carried out the welding. The electronics technicians and process technicians worked on automating the process flows in the pizza oven and installed the electrical system, including the control cabinet. The result: the pizza is slowly transported through the 300°C (570°F) oven on a conveyor belt, and comes out fully baked at the other end.



Calendar message

For decades, Plansee's popular annual calendar has given customers and business partners an opportunity to enjoy the beauty and culture of Tyrol. Every year, employees share images of the Tyrolian countryside captured during their travels and adventures. The almost 2000 calendars are packaged and shipped by staff from Tiroler Lebenshilfe. The Lebenshilfe employees – people with disabilities – look forward to this job every year. Their dedication and hard work in their shop in Reutte is instrumental in sending the calendars on their way to far-way countries such as China, India or South America.

WORLDWIDE INVESTMENTS

GERMANY

CERATIZIT

NEW CONSTRUCTION

New construction of administrative building and logistics center

Expansion of production capacity for solid carbide tools

MOLYMET

New production line for molybdenum metal powder

KOMET

Automation and introduction of new manufacturing technologies for the production of carbide drills and other tools

FROM 140 TO 240 APPRENTICES

AUSTRIA

PLANSEE

Construction of a new apprentice workshop for the practical training of up to 240 apprentices

Construction of a cleanroom for the assembly of components for semiconductor production

Automation of the manufacturing operation of computer tomography components

AUTOMATION

CERATIZIT

New building for the final machining of indexable inserts for machining and in-house Tool & Die

NEW CONSTRUCTION

BELGIUM

MOLYMET

New production equipment for molybdenum pure oxide

NEW PRODUCTION EQUIPMENT

SWITZERLAND

PLANSEE

Expansion of manufacturing space

Pooling of powder metallurgical manufacturing

DOUBLING OF MANUFACTURING SPACE

CHINA

PLANSEE

Doubling of the manufacturing space for coating materials, heavy metals, and the machining of semi-finished products and components

CB CT

Relocation of powder production from Xiamen and expansion of the manufacturing capacity for tungsten carbide powder

Expansion of production capacity for carbide tools

EXPANSION

TO POSITION US BETTER AND MAKE US MORE COMPETITIVE AROUND THE GLOBE

JAPAN

PLANSEE

Expansion of manufacturing space

Expansion of machining operation

EXPANSION

INDIA

PLANSEE

Expansion of manufacturing capacity

Expansion of machining operation

TUNGSTEN HEATS UP FOOD

Admittedly, the recipe is not for everyone. You may find it too sweet or too sticky. Try it if you like! And while you're enjoying the cake, don't forget to be amazed; after all, Plansee components are also used in microwaves. Or better put: our subsidiary GTP supplies the tungsten powder used to produce the microwave cathodes. The cathodes conduct the necessary operating voltage into the device to generate microwaves. When these high-energy waves pass through the food, they cause the water in the food to oscillate. The oscillations heat the water, and consequently also the food. Please note: The ingredients that are mixed in our recipe are not just heated. They are also "baked" in the microwave, doubling their volume!

INGREDIENTS FOR TWO CUPS

3 tbsp	flour
3 tbsp	sugar
3 tbsp	cocoa
¼ pkg	baking powder
1	egg
3 tbsp	sunflower oil
3 tbsp	milk
2 tbsp	Nutella (chocolate-hazelnut spread)
1 tbsp	chocolate sprinkles
2 tbsp	cinnamon whipped cream

Whipped cream and fruit as decoration.

PREPARATION

Get a large cup (mug). Add flour, sugar, cocoa and baking powder to the mug and mix. Then add egg, oil, milk and Nutella. Optionally, omit Nutella. Blend everything well and bake in the microwave for approximately 1 ½ minutes at 75% power. Stir after 20 to 30 seconds. If you prefer the center to be soft, you can also cut the cake's cooking time in the microwave to approximately 50 seconds. Serve the cake in the mug.

IMPRINT

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TRANSLATION
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CONCEPT & DESIGN
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livingmetals 2019: 7002488

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