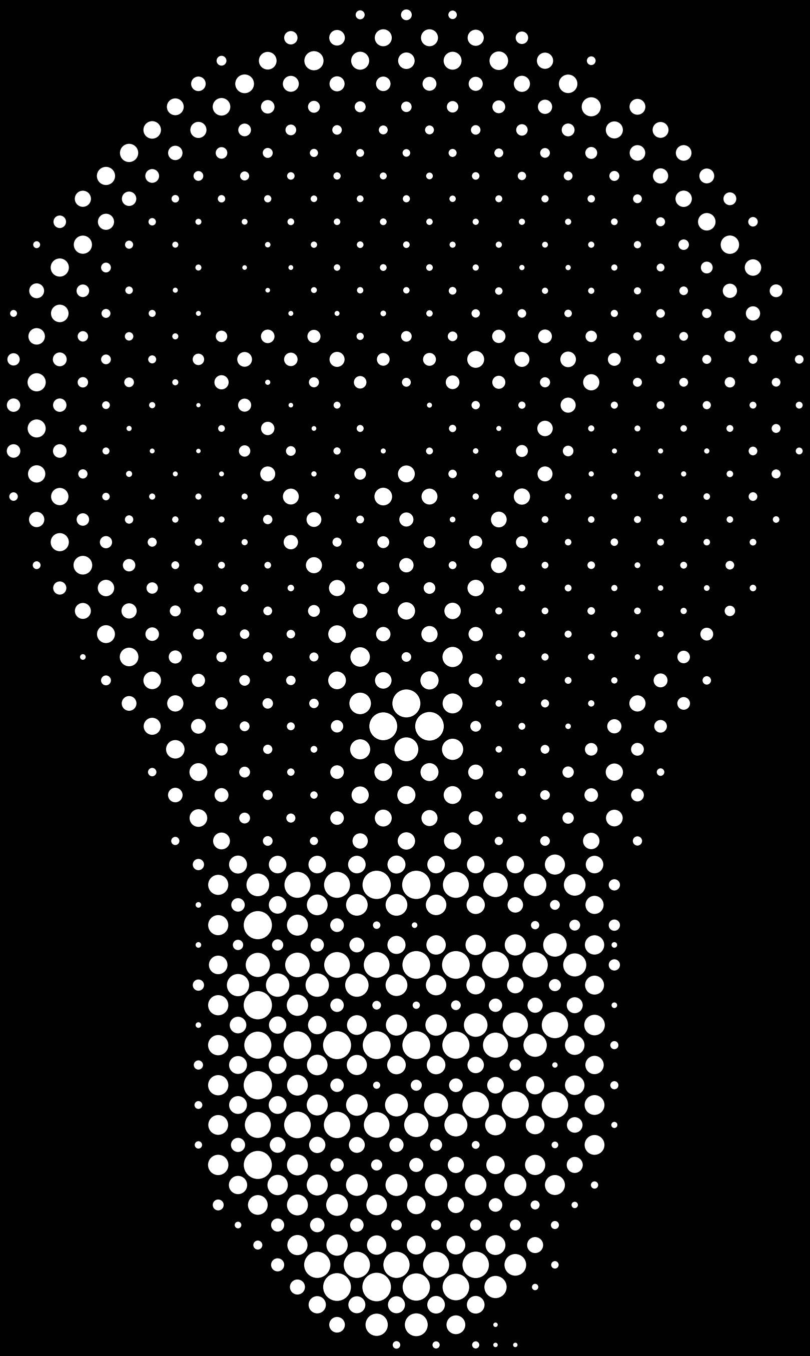
Our metals drive machines, bring light into our houses, transmit words and pictures across long distances, and do thousands of other useful and important things.

Paul Schwarzkopf
Founder

PLANSEE

The Plansee Group



Tungsten is the key material found in incandescent bulbs, where it is used in the form of coiled tungsten filaments. It has provided light in our homes since the early 20th century.

100 years
of powder magic and
the art of metallurgy

47° 28‘ 10“ N, 10° 48‘ 20“ O

Lake Plansee serves as a source of energy and the namesake of the Plansee Group. Located at an altitude of 976 meters in the Ausserfern region in the Austrian Alps, the surface area of this glacial meltwater lake measures approximately 2.87 square kilometers. The depth sounder indicates a maximum depth of 77 meters. The designation ‘Plansee’ was first documented in a demarcation description of the Archdiocese of Freising in 1073.

Foreword

Dear readers,
For 100 years, the Plansee Group has manufactured robust products made from molybdenum and tungsten. Our mission is to enable new high-tech applications for our customers with these materials. Ever since, we have pushed the envelope of what is technologically feasible.

Our materials make this technology-driven world simpler, safer, and more livable. 100 years ago, we did so for the first time with the tungsten wire for incandescent lamps, bringing light to all households. The filament was followed by the rotating anode for X-ray machines. In the 1930s, we started to continually increase the useful life of machine tools with cutting tools made of hard metal. In the succeeding decades, we have developed products for the lighting and glass industry, aviation, mechanical engineering, power transmission and distribution, the automotive industry, as well as consumer electronics. Today, we support the semiconductor industry with components for the manufacture of the most powerful microchips.

In which high-tech applications will our molybdenum and tungsten materials be used going forward? We do not know for certain. But we are prepared. With our experience, strong values, and employees determined to develop new fields of application together with our customers.

Ever since Plansee was established in 1921, the Breitenwang/Reutte location has been the powerhouse of the Plansee Group. On the following pages, you will find a mosaic of answers to the question as to what has since made us, at this location, successful, continually innovative, and consistently responsibly-minded.

But go ahead and read – and above all see – for yourself!

Table of contents

Generating knowledge: research and development

R&D is Plansee's be-all and end-all, as is the urge to share metallurgical expertise within the craft, instead of hoarding it.

Plansee, Reutte, and Breitenwang

Is it love? Absolutely. The global player and the two Alpine towns have grown together and are bound to each other.

Application worlds galore

Amazing how versatile two elements can be: close to 75,000 products are in use, ranging from consumer electronics through medical technology and mechanical engineering to aviation.

Raw materials and recycling

Thanks to smart shareholdings and acquisitions, Plansee is not affected by global power games when it comes to raw materials and is systematically ramping up its recycling rate.

Plansee and digitalization

3D printers generate metal components, as machines and tools learn to feel and think. Exciting times!

The world of Plansee on a map

We follow in the footsteps of our founder Paul Schwarzkopf: who called many places home.

Our metals drive machines, bring light into our houses, transmit words and pictures across long distances, and do thousands of other useful and important things.

Paul Schwarzkopf
Founder

42
Mo
MOLYBDENUM
95.94

74
W
TUNGSTEN
183.84

In Plansee's element

The German-Swedish pharmacist Carl Wilhelm Scheele (1742-1786), a gifted self-educated chemist, discovered not only the elements oxygen, nitrogen, barium, chlorine, phosphorus, fluorine and manganese, but also molybdenum and tungsten – the two high-performance materials in which the Plansee Group specializes.

Carl Wilhelm Scheele
* December 9, 1742 in Stralsund
† May 21, 1786 in Köping

Molybdenum and tungsten

The history of two strong metals.

Using nitric acid, Carl Wilhelm Scheele for the first time produces molybdenum trioxide, refuting the widely held view that molybdenum was a variant of graphite.

1778

Scheele extracts tungsten trioxide from calcium tungstate, delivering proof that there is a new element in the world of chemistry.

1781

First discovery of calcium tungstate in Austria, in the Schellgaden gold deposit in Salzburg's Lungau region.

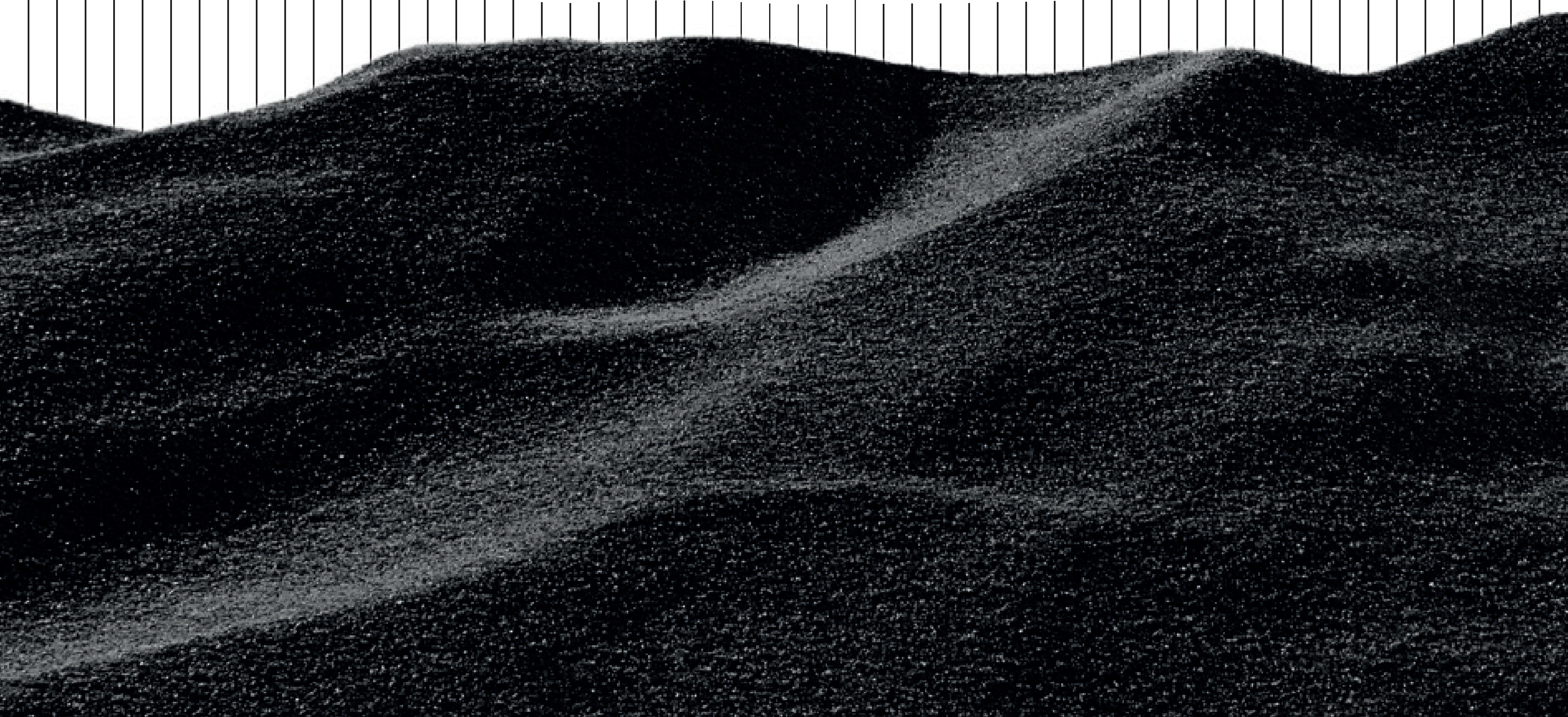
ca. 1815

In the quest for refractory metals, incandescent lamp manufacturers begin to experiment with tungsten.

1881

The French company Schneider & Co. uses molybdenum for the first time in steel alloys.

ca. 1900



Molybdenum wires are used as filament supports and guides in the lighting industry.

Filaments produced experimentally from tungsten are thin enough for industrial use for the first time.

1908

Mass production of filaments and coils made of tungsten starts.

1910

The first tools made of hard metal become established.

1929

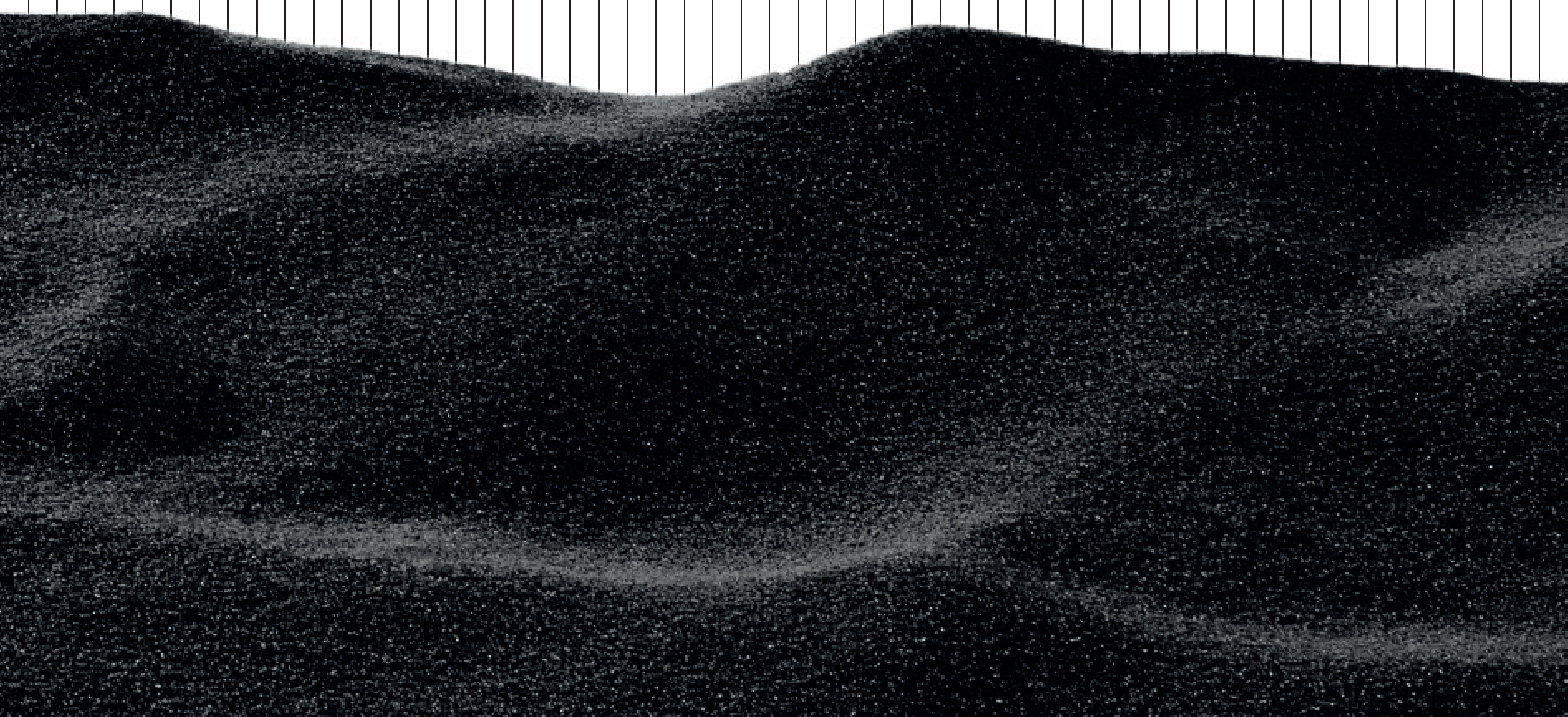
Molybdenum-alloyed high-speed steels are manufactured for the first time.

1930

Molybdenum sulfide is used as a lubricant.

Molybdenum and molybdenum alloys are widely used in the lighting and glass industry, as well as in furnace engineering and electronics.

1945



Molybdenum and tungsten

As an entrepreneur and metallurgist, Paul Schwarzkopf brought with him to the Ausserfern region not only tremendous determination, but also extensive knowledge about the challenging processing of molybdenum and tungsten. From the very start, Plansee focused on the technology of producing the two metals on an industrial scale and in exceptional quality, which was still nascent in 1921. With a clear focus on molybdenum and tungsten as the primary materials, and a pronounced pioneering and innovative spirit, the Tyrolian-based global company time and again has succeeded in making new applications available for these two strong metals.

42 Mo MOLYBDENUM 95.94	74 W TUNGSTEN 183.84

Two high-performance materials

Corrosion-resistant

Heat-resistant

High melting point

The origins

Tungsten: composed of the two Swedish words tung (heavy) and sten (stone). Originally denoted calcium tungstate, which in honor of Carl Wilhelm Scheele is commonly referred to as scheelite today. In German: Wolfram.

Molybdenum: from the Greek word mólybdos (lead).

Properties

Molybdenum as well as **tungsten** expand very little under heat and are excellent electrical and heat conductors. The two materials can be used under vacuum and in noble gas, nitrogen and hydrogen atmospheres up to extremely high temperatures and are resistant to many metal melts, glass melts and oxide ceramic melts. Molybdenum and tungsten even withstand hydrofluoric acid.

Melting point

The melting point of **tungsten** is 3420°C, the highest of all metals.

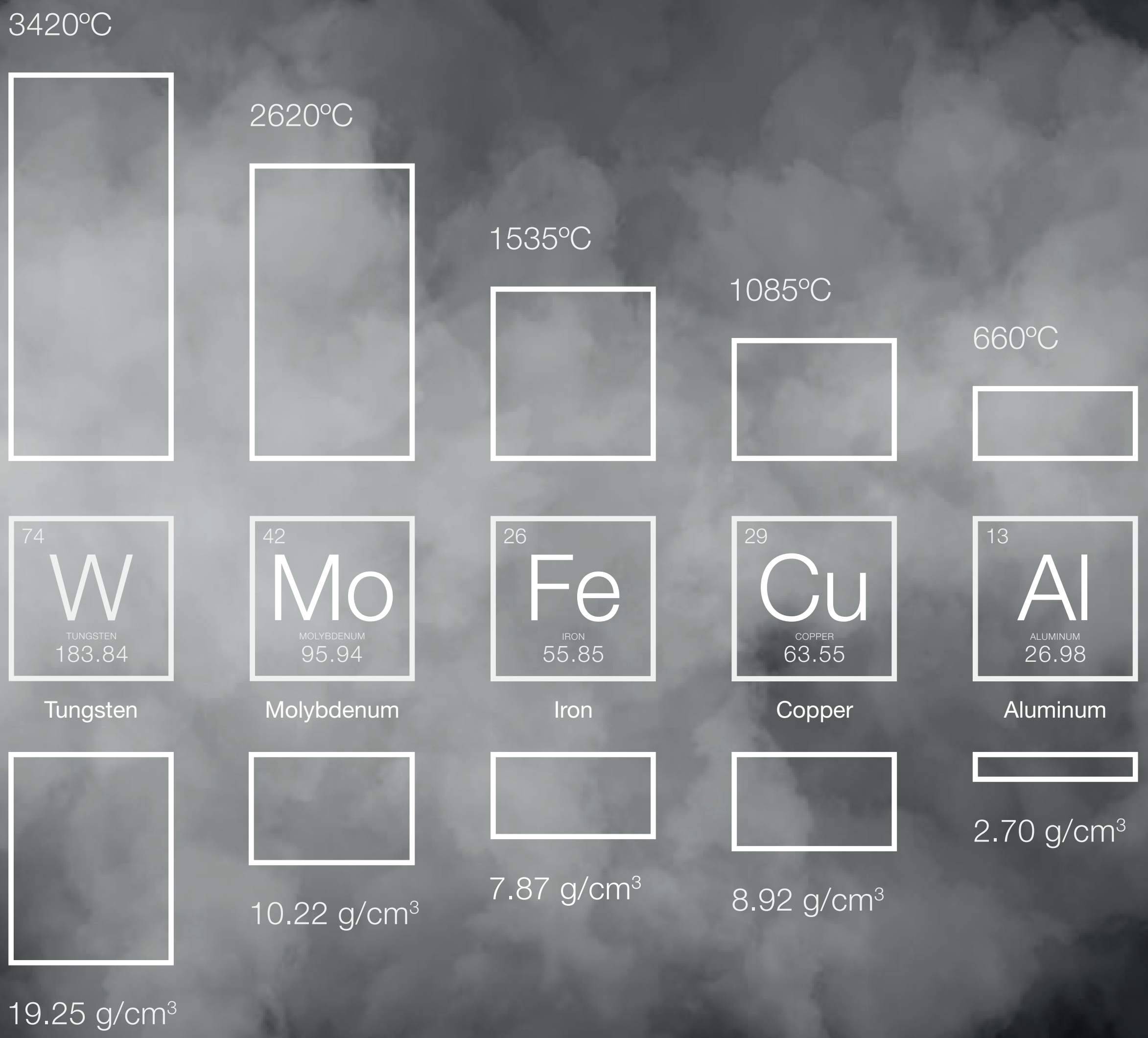
With a melting point of 2620°C, **molybdenum** ranks at the top of the period 5 elements.

Density

With a weight of 19.25 grams per cubic centimeter, **tungsten** reaches a similarly high density as that of gold.

With 10.22 grams per cubic centimeter, **molybdenum** is only half as heavy.

Melting point and density



Molybdenum

has a gray appearance in its pure metal powder state and is slightly lighter in color than tungsten powder. The two metals also differ in other respects. Molybdenum is considerably easier to form, initially requiring high temperatures, which with increasing deformation can be gradually lowered to room temperature.

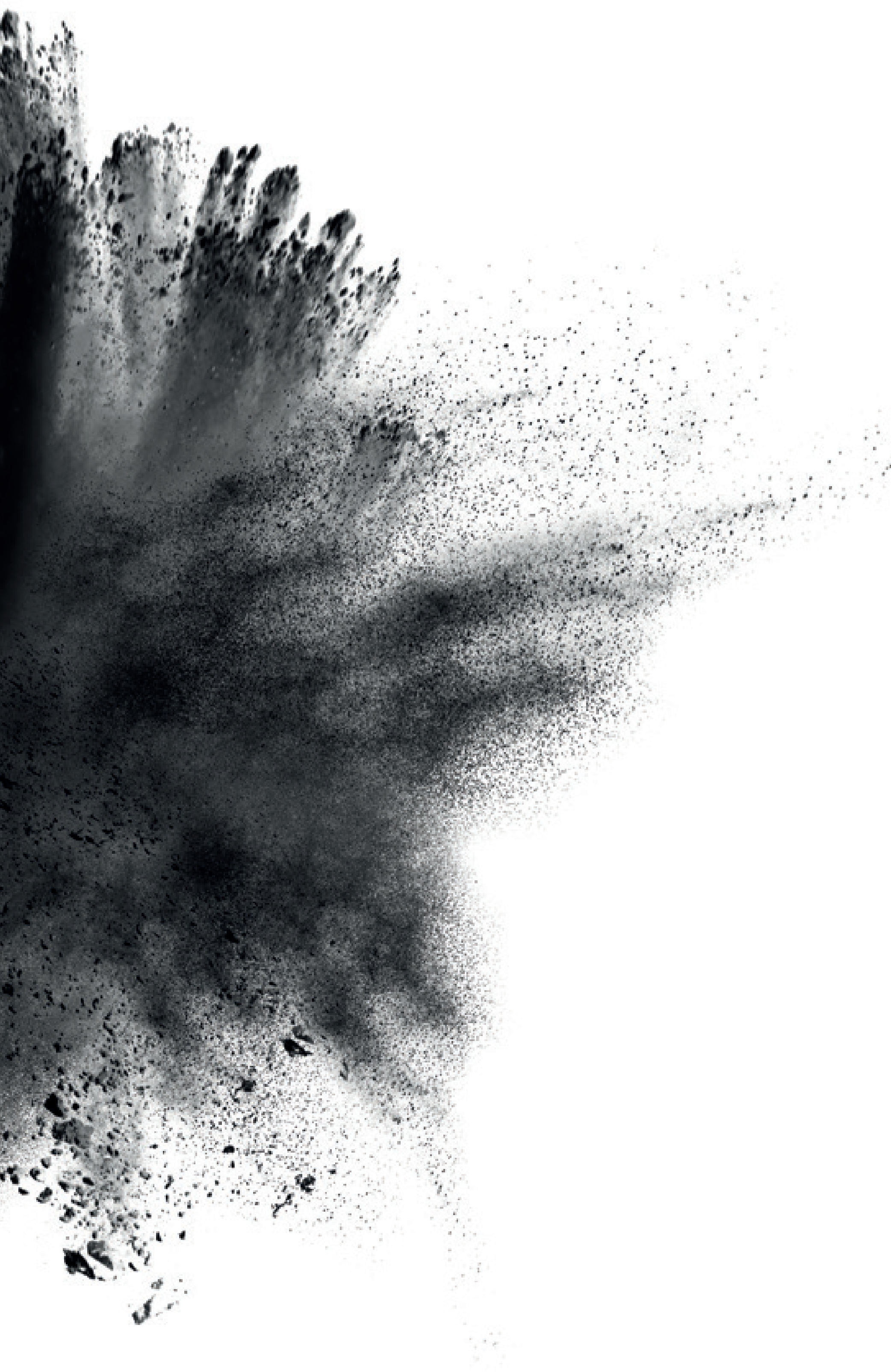
Serving as an important trace element, molybdenum is essential for many organisms. In nature, it predominantly occurs as molybdenite (MoS_2), which in the past was also referred to as molybdenum glance.

The extraction of molybdenum is closely tied to copper mining: it is recovered as a by-product during copper extraction, especially in the USA as well as in Chile, Peru and Canada, where the largest deposits can be found.

At approximately 300,000 tons, the amount of molybdenum processed worldwide on an annual basis is three times that of tungsten. The lion's share of approximately two thirds goes to the steel industry, which utilizes molybdenum as an alloying element. Consuming over ten percent, the chemicals industry ranks second, and only approximately five percent is used in the form of pure metal for the production of molybdenum and molybdenum-based materials.

In the past, molybdenum was predominantly used in its pure form, or as part of alloys, in traditional high-temperature applications, such as the lighting and furnace engineering industries. Today, especially coating technology, the electronics industry, medical technology, as well as the metal and polymer processing industry are dependent on molybdenum-based materials.

Sputtering targets made of molybdenum materials, for example, are used for the deposition of thin films in the production of flat screens. The field of computer tomography is also based on the use of molybdenum: the rotating anode of the X-ray tube of the tomograph is made of a molybdenum alloy. As metal base body, it is the functional heart of the machine ■



Tungsten

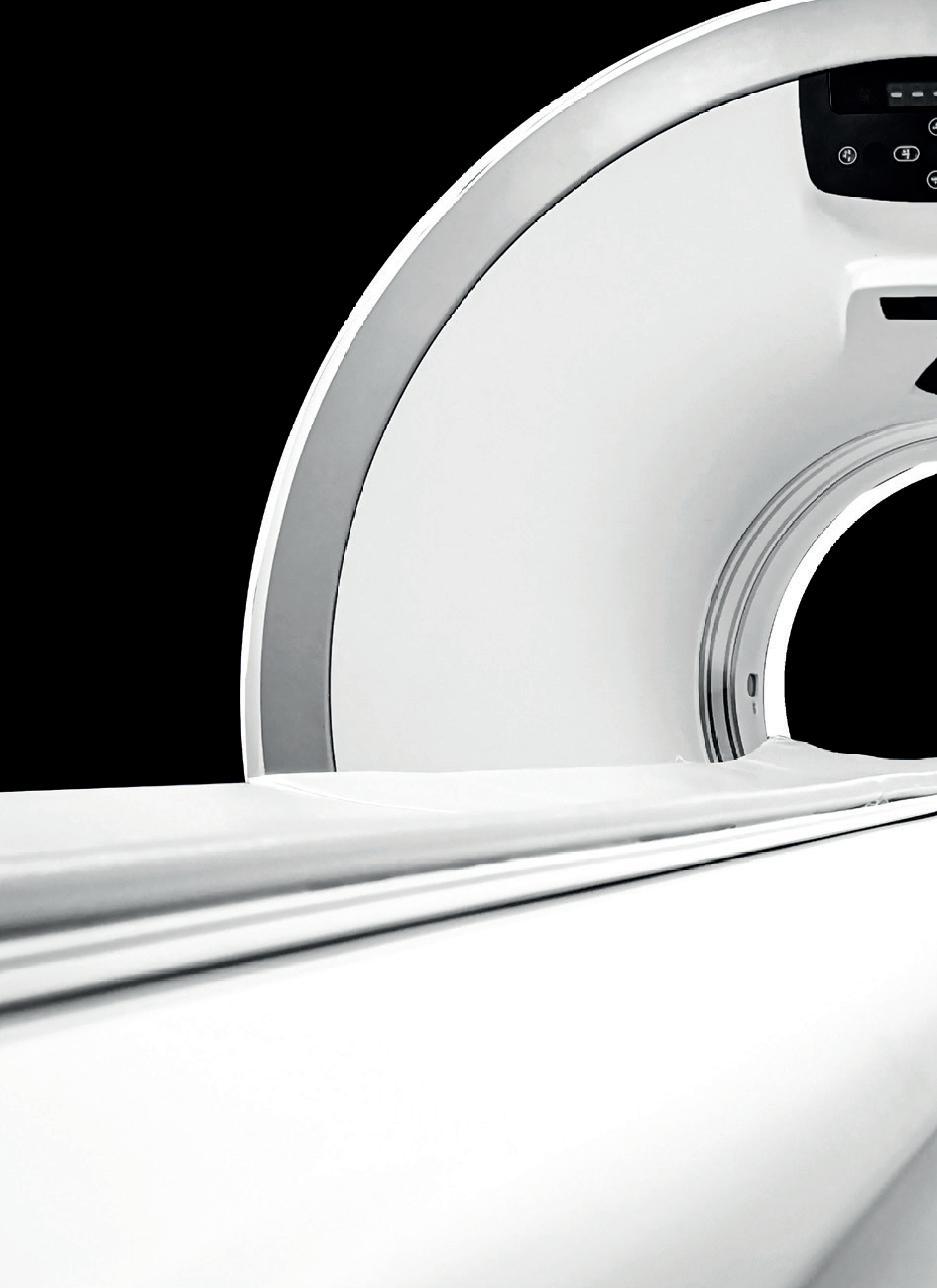
has a dark-gray appearance in its pure metal powder state. Speaking of purity: tungsten may be difficult to form, but this becomes easier with increasing chemical purity.

Tungsten accounts for 0.006 percent of the Earth's crust – primarily in the form of wolframite ($(Fe,Mn)WO_4$) and scheelite ($CaWO_4$); however, they are distributed relatively unevenly. By far the largest reserves can be found in China. Additionally, Russia, Canada and Bolivia have deposits of this rare treasure, which is also present in significant amounts in Austria, along the Felbertauern highway near Mittersill.

In light of the high density of tungsten – it is 19.25 grams per cubic centimeter, which equates to a weight of 19.25 tons per cubic meter – the total volume of approximately 100,000 tons processed annually at the worldwide level is modest.
Hard metal production, which utilizes tungsten carbide, accounts for some 65 percent of this volume. The remainder is split among steel and superalloy manufacturers as well as producers of tungsten-based materials, each taking up a share of approximately 15 percent, and the chemical industry, which processes around five percent of the tungsten volume.

The sheer numbers alone provide a sense of the significance of the raw material for hard metal production, in which cobalt also plays a major role. The extremely hard tungsten carbide is a must-have both in wear applications and in machining. The lighting industry also remains dependent on tungsten, although its need for the metal has already considerably diminished. So-called short arc lamps are indispensable for all photolithography processes, and this is not likely to change. Thick tungsten rods are an integral part of this light source.

Lastly, medical technology is also reliant on tungsten, specifically in the form of heavy metals made of a composite consisting of tungsten with nickel as well as iron or copper, in which the weight fraction of tungsten is more than 90 percent ■



The Ausserfern region of 1921 was remote and anything but developed economically. The decision to build a metal factory here, of all places, was driven by more than just the availability of hydroelectric power as a resource. It was also motivated by love for the country and the people.


METALLWERK · PLANSEE ·
G.m.b.H.

After a few explanatory words by Dr. Schwarzkopf, the tour of the newly constructed factory began where today, for the first time, creaking wheels were rotating and where, with the help of energizing electric current, powdered metals were turned into thin tungsten-molybdenum wires – serving as the core of electric incandescent lamps.

Report in the Ausserfern Newspaper in 1922 on the opening of the Plansee metal factory

Schwarzkopf's plan

Headed for Tyrol

Triumphs and tragedies, expropriation, espionage, political intrigue, and globalization starting as early as in the 1920s: as if straight out of a movie, thus began the story of the Plansee Group on June 21, 1921 when Paul Schwarzkopf traveled to the Ausserfern region for the first time. He arrived from Berlin, where demand for the incandescent lamps for which Schwarzkopf supplied the coiled filament made from tungsten was just as enormous as energy costs. The notion of expanding production in Berlin being inconceivable, Schwarzkopf immediately pounced on a newspaper advertisement about inexpensive electricity from the hydroelectric power plant at Lake Plansee built in 1903. He immediately made the journey to Reutte.

Having been born in Old Austria, he was taken with Tyrol: he completed his military officer training in Wattens, and survived World War I at the front in South Tyrol, which "inspired such love in me for this country that I only had one wish once the war was over – to relocate my residence and livelihood to Tyrol."

The parties came to an agreement in no time at all, and the inception of Metallwerk Plansee Gesellschaft m.b.H. was made official on June 24, 1921: "I was taken with Lake Plansee, Lake Uri, the magnificent mountains framing the wide basin at the bend of the Lech River, and its population, to the extent I interacted with them during the few days of my stay. It was not good sense that drew me to Reutte, but a feeling; not the brain, but the heart." To be able to do so, Schwarzkopf also tolerated serious drawbacks, such as 1920s Ausserfern's poor transportation and telephone infrastructure, as well as the lack of skilled labor.

As accommodating as Reutte was with respect to hydropower, the municipality turned out to be extremely rigid when it came to selling a commercial property to the newly launched business, whose metal factory local politicians at the time would rather have seen constructed elsewhere.

Without further ado, Schwarzkopf acquired a property in the neighboring community of Breitenwang that, even though it was not ideal, was immediately available. There, the Metallwerk Plansee was constructed according to the drawings of architect Alfons Kerle. The powder metallurgical production of tungsten and molybdenum rods, which at first were still further processed at Schwarzkopf's main enterprise in Berlin, started in 1922 ■

The alchemist

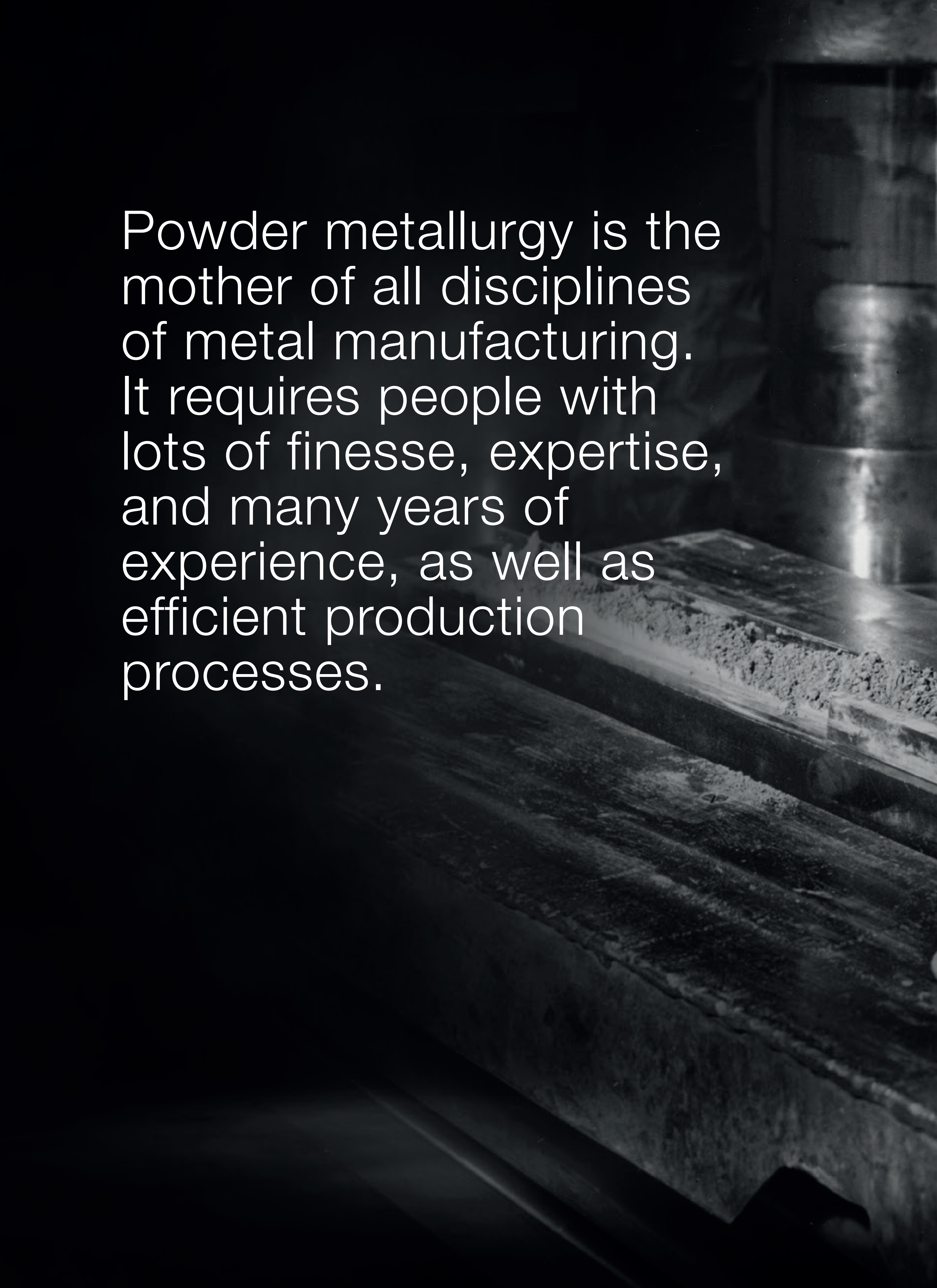
Paul Schwarzkopf

When Paul Schwarzkopf, born in Prague on April 13, 1886, settled in Tyrol, the doctor of technical science could already point to a number of achievements: in Italy and Berlin, the young powder metallurgist had worked with molybdenum and tungsten, developed a proprietary process for filament production following an inspiration during a walk, and co-founded a tungsten laboratory under his own name as well as a wire factory in the Netherlands and another in Berlin. The latter would be Germany's first production site for industrially drawn tungsten wire.

In 1925, four years after the founding of Plansee, he traveled to the USA for the first time and visited the automobile manufacturer Henry Ford, returning to Tyrol with a major contract for tungsten contact plates. In New York, he established the American Electro Metal Corporation, which in turn founded the manufacturing plant Elmet in Lewiston, Maine. The companies turned out to be his saving grace when the National Socialists seized power. In a far-sighted decision, the Jewish entrepreneur and scientist emigrated via Zurich to the USA in 1937. Plansee ended up under National Socialist control, and 135 of his relatives perished in the Nazi extermination camps. Having achieved tremendous economic success in the USA, an anonymous source reported Schwarzkopf himself as an alleged Nazi spy, resulting in his detention on Ellis Island on New York's doorstep. He was found to be innocent and respectfully released only after protracted legal proceedings.

During the post-war era, it took another lengthy five-year legal battle, which was anything but a glorious chapter for the Republic of Austria involved in the legal action, before Paul Schwarzkopf was able to resume ownership of Metallwerk Plansee after having returned to his beloved Reutte in 1947 – where he was given a festive welcome reception by the Plansee concert band. Not until 1952 was he able to take over the reins of the metal factory, which until then he headed as appointed public manager. During the years until his passing on December 27, 1970, the metallurgist and researcher received many awards and honors, increasing the prestige he enjoyed based on his scientific and technical achievements, as a result of the Plansee Seminars he initiated, as well as on account of his numerous publications in the scientific community ■

Paul Schwarzkopf sits at the helm of Plansee as much as he does at this stately convertible, which in this picture from the 1920s is ready for departure from Plansee's administrative building, with unidentified passengers on the rear bench.



Powder metallurgy is the mother of all disciplines of metal manufacturing. It requires people with lots of finesse, expertise, and many years of experience, as well as efficient production processes.

Powder magic and the art of metallurgy

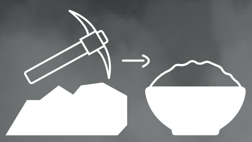
Today's metallurgists trace back to the alchemists of antiquity. These early natural scientists explored chemical and pharmaceutical matters as early as 8000 years before the Common Era – including the production and processing of metals. The conversion of precisely dosed metal powder blends into sinter metals is a particularly fascinating form of metallurgical transformation: modern alchemy.

Today, we can count atoms at boundaries between individual grains in the material microstructure. We can use complex simulation methods and calculate what happens between the atoms when our metals are alloyed, pressed, rolled, annealed or processed otherwise. All the things we are able to do today technologically, essentially confirm the perspective that commonly already existed 100 years ago.

The majority of metal products are manufactured by melting. The powder metallurgist bypasses this melting process and instead applies pressure: he carries out the transformation by compacting metal powder before exposing it to heat during sintering. Owing to his craftsmanship, materials that have melting points far above 2000°C can be produced – in small as well as large quantities.

From dream to reality

It all begins with the product requirements, which dictate the powder blend. After the powder mixture is prepared, the metal powder mix is compacted. After sintering, the workpieces still have to undergo proper and precise deformation, such as forging, rolling or drawing. Only when all the cogs of this transformation process mesh precisely with each other will the results be achieved that customers have come to expect from Plansee: maximum purity and high performance products.



From ore to powder

In the first stage, mined molybdenum- and tungsten-containing ores undergo physical enrichment processes to increase their content, and then their purity is increased by chemical methods to the level required by the further processing steps. The starting materials for the powder metallurgical production of molybdenum- and tungsten-based metals are the high-purity oxides molybdenum trioxide (MoO_3) and tungsten trioxide (WO_3). These, in turn, are the result of the conversion from ammonium dimolybdate (ADM) and ammonium paratungstate (APT), achieved by a calcination process.

Chile's Molymet, in which the Plansee Groups holds a strategic share, is the world's largest producer of molybdenum trioxide. Global Tungsten & Powders (GTP), part of the Plansee Group, is considered one of the most prominent manufacturers of tungsten powders in the western world. GTP processes ore concentrates and recycles various scraps to tungsten metal powder and other ready-to-press powders.

The reduction

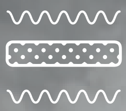
A variety of manufacturing processes lend themselves to producing refractory metal powders. In the case of molybdenum and tungsten, reducing the oxides obtained in the first step by way of hydrogen is the method of choice. In the process, the oxides are reduced, together with hydrogen, in pusher-type furnaces to form very fine-grained molybdenum and tungsten powders.

Alloying: the art of blending

The term alloy derives from the Latin word 'ligare' for 'to bind' or 'to combine'. In the metallurgists' language, the term alloy denotes a material created from two or more elements. At least one of the alloying elements must be a metal. The oldest alloys in human history since the Stone Age are bronze, brass, and a number of noble metal alloys.

The fine art of the school of powder metallurgy lies in mixing selected metal powders so that exceptionally homogeneous metal products are obtained, which precisely feature the properties they should have for their intended purpose. The powder specialists at Plansee process pure molybdenum or tungsten powder or prepare mixtures containing precisely dosed alloying additives.

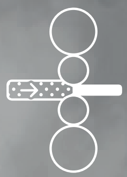
The blend determines more than just the melting point and the recrystallization temperature, density, electrical and thermal conductivity, thermal expansion, and electron work function. It also crucially impacts deformation and strength behavior, corrosion resistance, etching behavior, and the suitability for welding.



Compaction and sintering

Compaction turns the pure or blended powder into a granular workpiece, which is referred to as a 'green body' or 'pressed parts' by metallurgists. Simple blanks for semi-finished products are generally produced in isostatic presses, which are distinguished by their consistently high and uniform pressing power. Alternatively, the die pressing technique is employed.

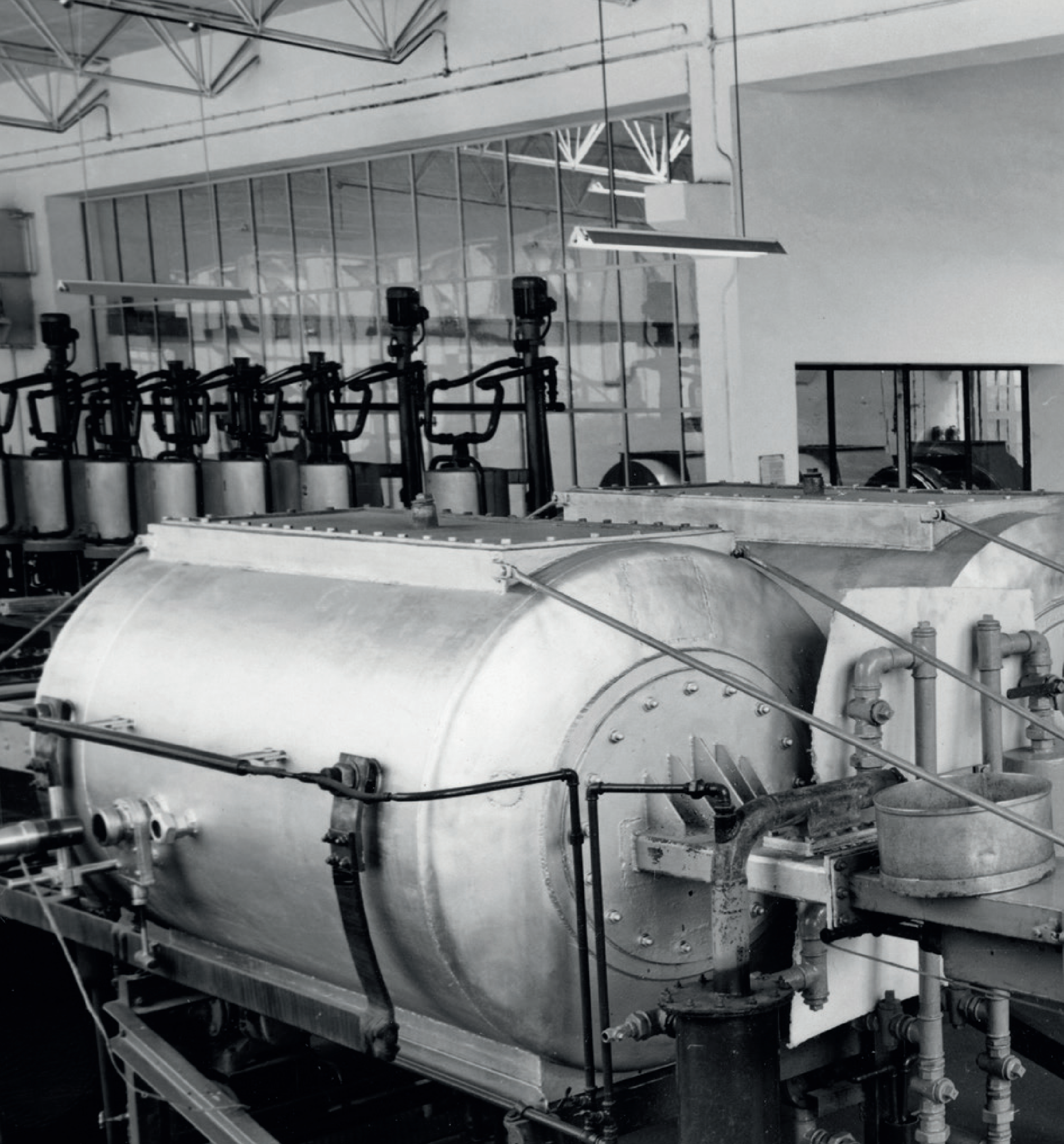
During the sintering process, the pressed part, at temperatures below the melting point, then transforms into what is known as the sintered part: a solid workpiece.



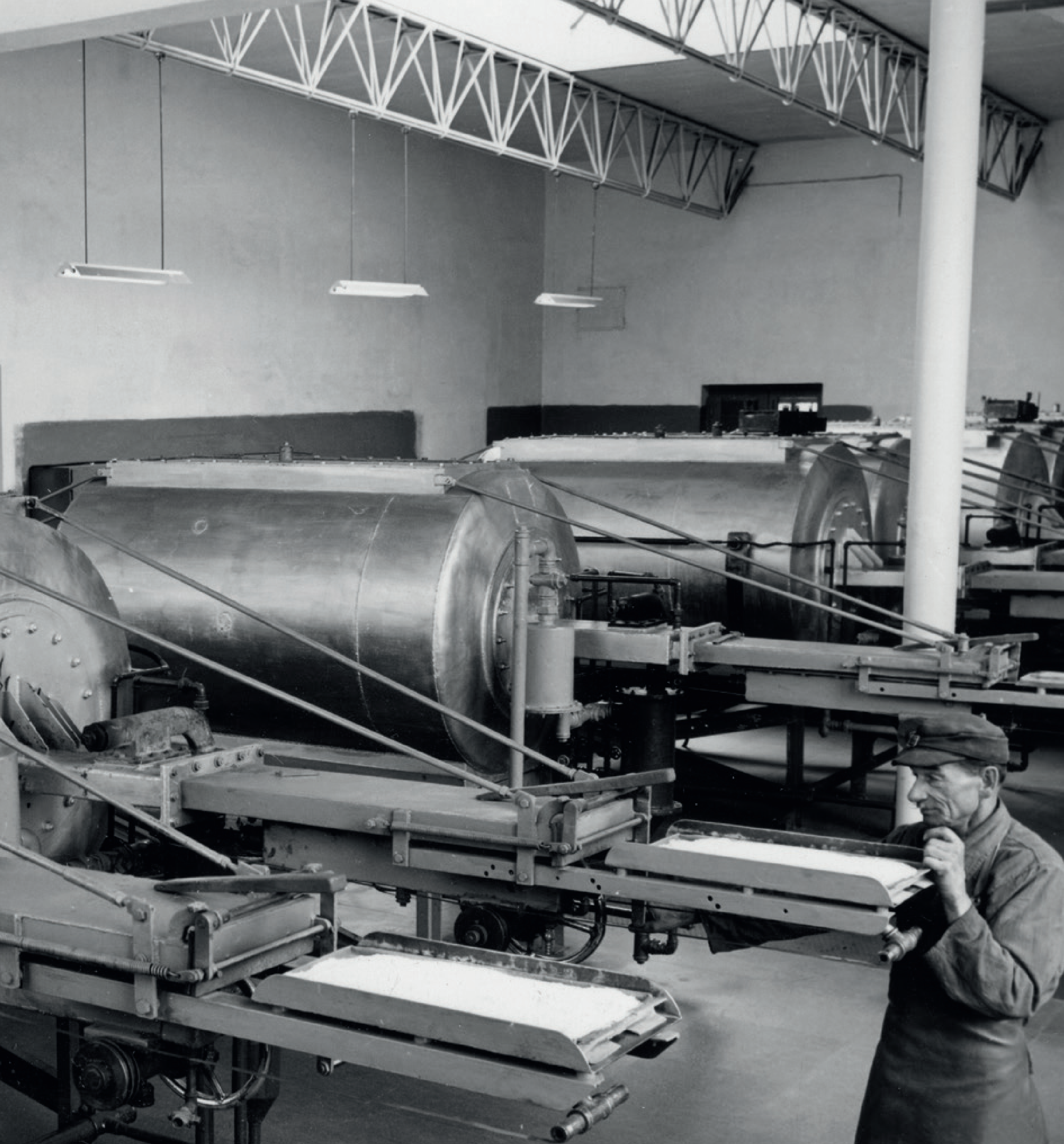
Deformation

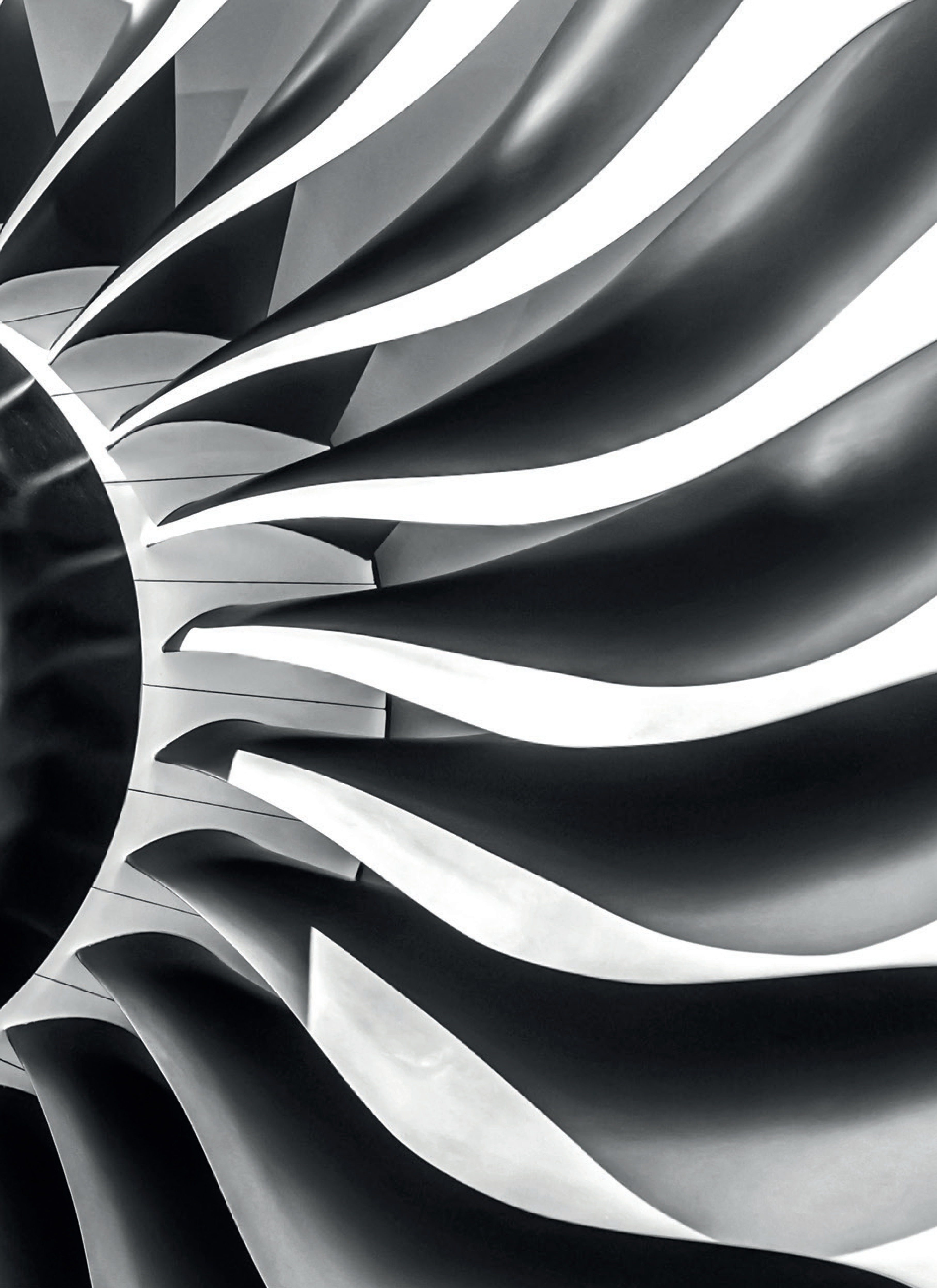
Mechanical deformation, in combination with heat treatment, ensures further transformation: the sintered part loses its brittleness, reaches 100 percent density, and gains its characteristic mechanical and physical properties.

Molybdenum and tungsten, both refractory metals, can be deformed in different ways, including rolling, swaging, forging, drawing and extrusion, as well as using machining operations, such as turning, milling, drilling, and grinding.



A probing look at the high-purity metal powder, which is produced in the pusher-type furnace from molybdenum or tungsten oxide through reduction. In the next process step, the fine-grained powder is compacted into green bodies and sintered at high temperatures.





Plansee has never been listed on any exchange and from the time of its inception in 1921 until this day has remained privately owned by the founding family. The company ranks at the top of the global market and stands by its values more than ever.


RIEBSAUSFLUG
LWERK-PLANSEE «
TTE/TIROL

Strong values

The DNA of Plansee

The history of Plansee, to a large degree, is also the history of the Schwarzkopf family and their loyalty to the company, which manifests itself in their unwavering propensity to invest: for generations, an impressive portion of profits has flown to the Reutte location in particular, which the company has decisively helped to develop through its training and cultural initiatives. The Plansee Group continually invests in shareholdings, operational facilities and equipment, but does so equally in training, continuing education and personnel development for the employees. The appreciation for the employees in the Plansee Group is reflected in no small part in above-average renumeration.

Loyalty goes hand in hand with continuity, as the Plansee Group continues to abide by its mission of delivering peak performance in powder metallurgy. Ever since its founding years, the company has developed novel methods and products, as well as optimal organizational structures, in an effort to be ready for the next step at all times.

Paul Schwarzkopf's son Walter has fostered an open corporate culture focused on personal ownership and initiative, which allows the employees as well as the individual divisions and companies to prosper. To this day, this culture has allowed the Plansee Group to adapt quickly and effectively to technological and economic changes, without losing clear focus on its mission ■

Since 1975

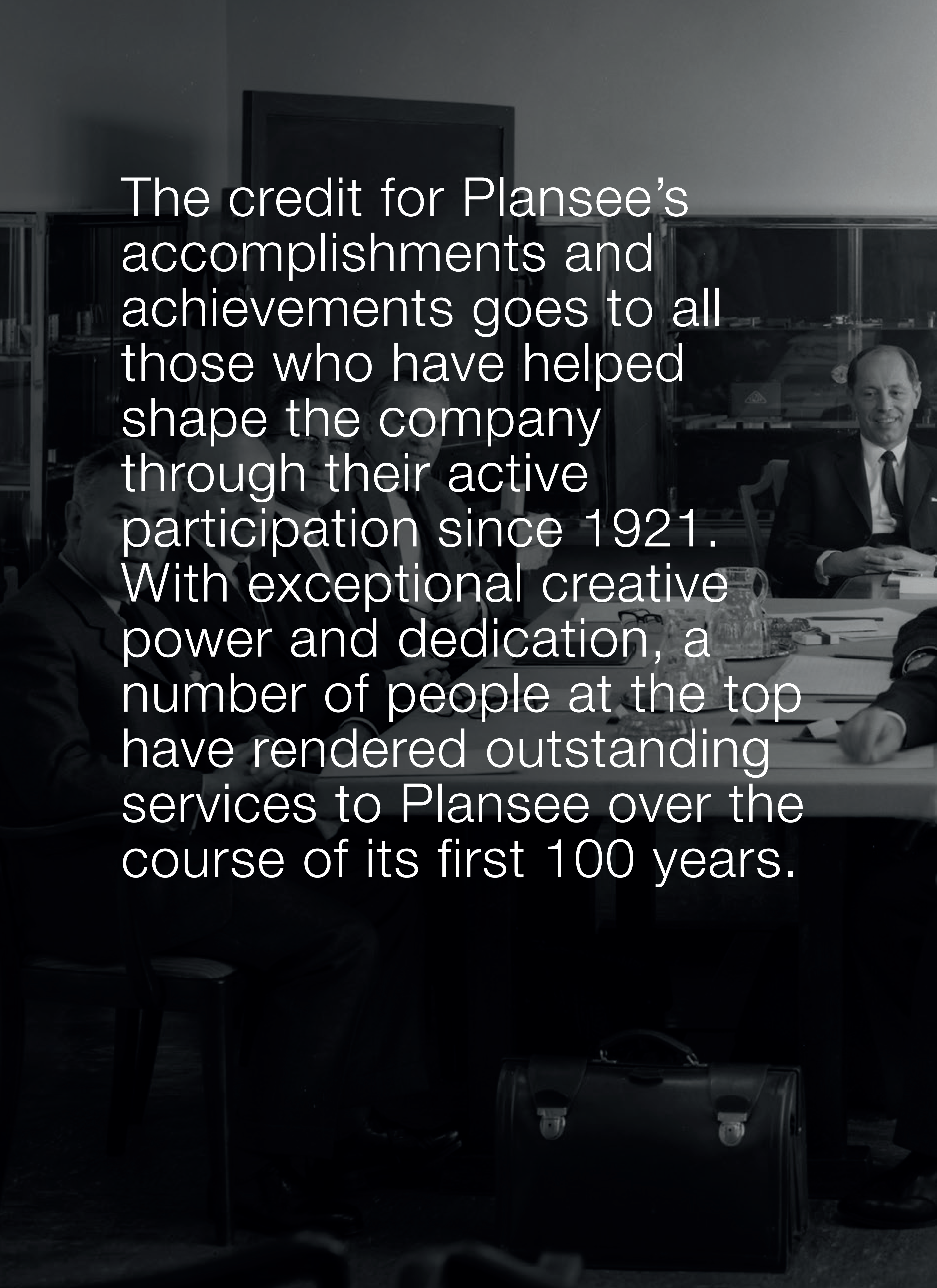
The Plansee guiding principles

as defined by Walter Schwarzkopf

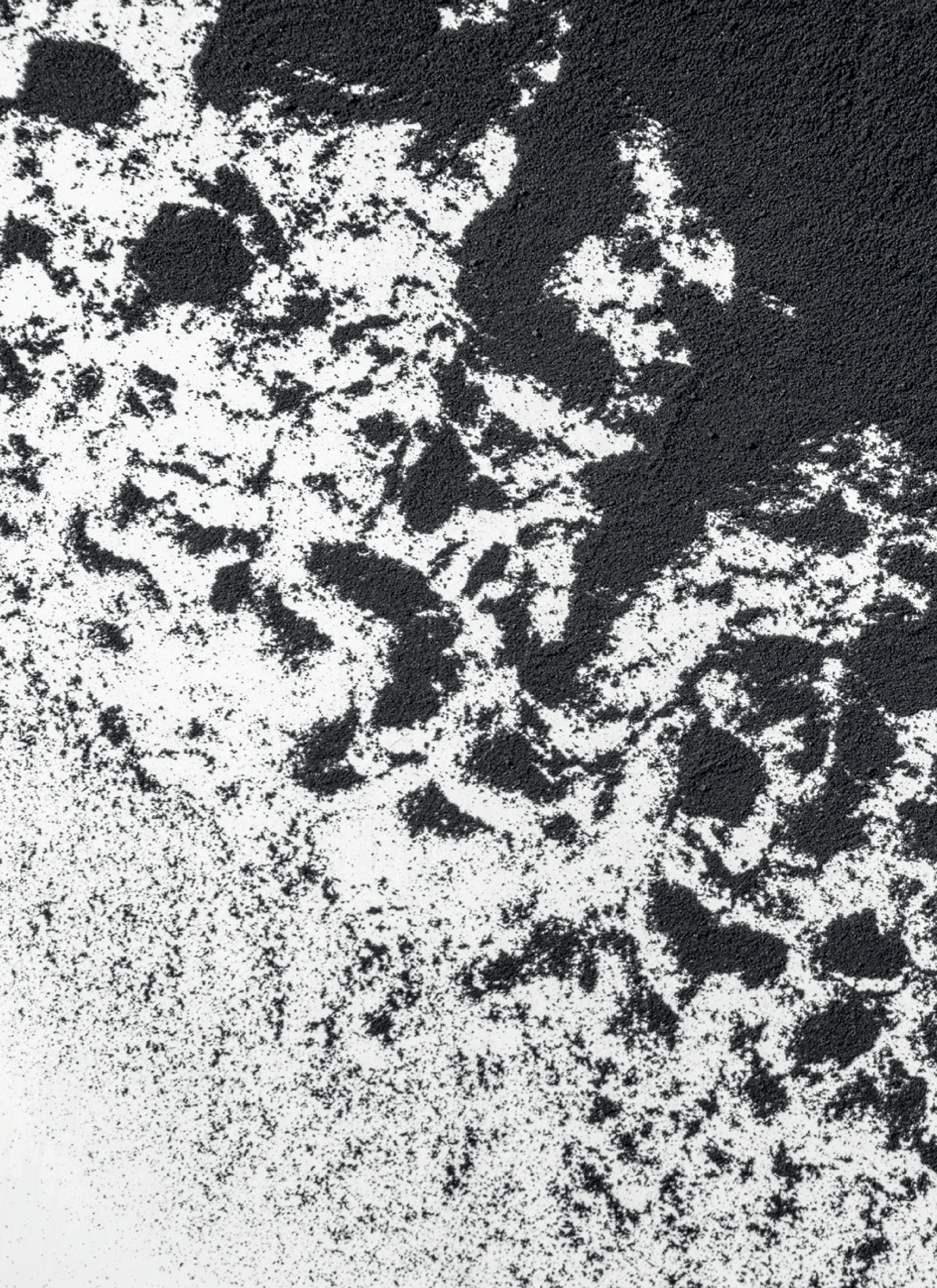
Respect for the dignity of fellow human beings through mutual understanding and trust, as well as through sincerity, equitable treatment and kindness.

The right of every individual to constructive personal input at the workplace as well as to co-determination, based on shared responsibility, in the company's performance.

Our passion to work together extends beyond the immediate sphere of the company and encompasses the employees' families, while preserving their privacy, communities, country, as well as the social and business partners.



The credit for Plansee's accomplishments and achievements goes to all those who have helped shape the company through their active participation since 1921. With exceptional creative power and dedication, a number of people at the top have rendered outstanding services to Plansee over the course of its first 100 years.



What is being referred to as my life’s work is simply what I have done all my life – often with great pleasure, often out of a sense of duty, and always with all my heart.

Hilde Schwarzkopf (1932–2015)
Owner and long-standing member of the Supervisory Board

I was lucky to be given a major task right where I grew up. If this happens in your life, you cannot be grateful enough. From seasonal worker through undergraduate and postgraduate, I worked my way up to Chairman of the Supervisory Board.

Rudolf Machenschalk
Chairman of the Executive Board from 1978 to 1996

The pioneers

Leadership

Twice in the history of Plansee is the company's management handed over to the family's next generation. In 1958, Paul Schwarzkopf is able to persuade his son Walter and daughter-in-law Hilde to return to Tyrol prematurely from the USA, from where Walter brings with him entirely new management approaches. He establishes a cooperative leadership style, initiates the Plansee guiding principles, and installs a comprehensive training program for the staff. Due in no small part to his knowledge of human nature and his visionary approach, he surrounds himself with a high-caliber Executive Board with great ambitions. The Board members move Plansee forward in all areas, from technology and research, to marketing and finance: Rudolf Machenschalk, Hubert Bildstein, Franz Hosp, and Albert Pietsch.

Paul Schwarzkopf heads Plansee.

1921 *to* 1967

Walter Schwarzkopf is Chairman of the Executive Board.

1967 *to* 1978

Hilde Schwarzkopf bears responsibility on the Supervisory Board.

1978 *to* 2009

Rudolf Machenschalk manages the company.

1978 *to* 1996

After Walter Schwarzkopf's sudden death, Rudolf Machenschalk assumes the position of Chairman of the Board. As a member of the Supervisory Board, Hilde Schwarzkopf is instrumental in ensuring the private company's continuity. She is a figure with whom people can identify and who promotes integration, both internally and externally. Her son Michael Schwarzkopf ultimately turns the company into a worldwide operation and develops the Plansee Group into a global player. Together with Bernhard Schretter and Karlheinz Wex, he forms a three-member Executive Board starting in 2002. In 2017, Michael Schwarzkopf steps down from his position as Chairman of the Executive Board and assumes the role of Chairman of the Supervisory Board. Three years later, Bernhard Schretter embarks on his well-deserved retirement. The Plansee Group has since been managed by Karlheinz Wex and Wolfgang Köck ■

Michael Schwarzkopf holds the position of Chairman of the Executive Board.

1996 *to* 2017

Bernhard Schretter and Karlheinz Wex manage the Plansee Group.

2017 *to* 2020

Together with Karlheinz Wex, Wolfgang Köck forms the two-member Executive Board of the Plansee Group.

since 2020

Grandparents, parents, children. For generations, Ausserfern natives, non-locals, and increasingly also residents from the Allgäu region in neighboring Germany have worked in Reutte for the Plansee Group. The average tenure within the company is 15 years.

Those who appreciate the culture and values of the Plansee Group tend to stay for their entire working life – as evidenced every year during the traditional service award ceremony held in late fall. At this event, the Board members and management recognize the long tenure of hundreds of employees.

100 years

A journey through time

1921

Paul Schwarzkopf and his business partner Richard Kurtz founded Metallwerk Plansee Gesellschaft m.b.H and purchased commercial premises in Breitenwang.

1922

The metal factory commenced production with 15 employees.

1926

A molybdenum wire drawing facility was established in Reutte.

The plant fire department was founded.

1929

Plansee developed tungsten carbide hard metals for steel working and sold them under the Titanit brand name.

The first in-house research facility (Höhenlaboratorium) was built.

American Electro Metal Corporation was founded, and a plant was constructed in Lewiston, Maine, USA.

1932

Plansee brought sintered composite materials to market under the Elmet brand name.

1937/38

Paul Schwarzkopf emigrated to the USA and Metallwerk Plansee was arianized/expropriated.

1938/39

An apprentice workshop was set up and a company vocational school was founded, which was given public-law status in 1956.

1940

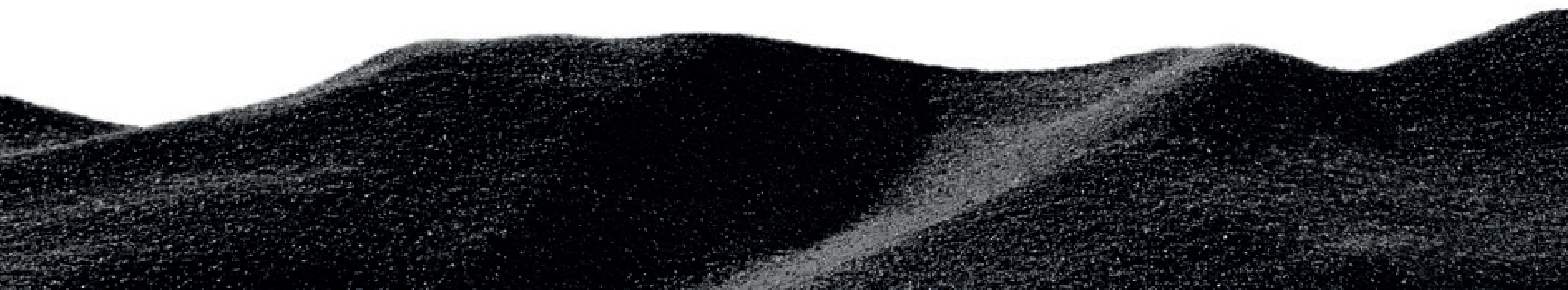
The facility switched to the production of armament.

1947

The Plansee concert band (Werksmusik) was founded.

1947/48

Paul Schwarzkopf returned from the USA and was appointed public manager of Metallwerk Plansee.



1948

The first employee residential quarters were constructed.

The production of hard metals resumed under the Tizit brand name.

In exchange for technology transfer, Paul Schwarzkopf temporarily received a stake in Luxembourg hard metal manufacturer Cérametal.

1952

The restitution negotiations in progress since 1947 were concluded. Paul Schwarzkopf became the sole proprietor of Metallwerk Plansee again.

Plansee's first Seminar 'De re metallica' was held in Reutte.

The Reutte secondary school (Realgymnasium) was founded, which called the plant premises its home for many years.

1955

The plant kindergarten was opened.

1956

Paul Schwarzkopf created the foundation named after him, supporting adolescents in their education and training.

1960

Sinterstahl GmbH was founded in Füssen, Germany.

1961

The first employee magazine was published.

1969

A property on the north banks of the Archbach river acquired from the municipality of Reutte was developed, and the Archbach halls were built.

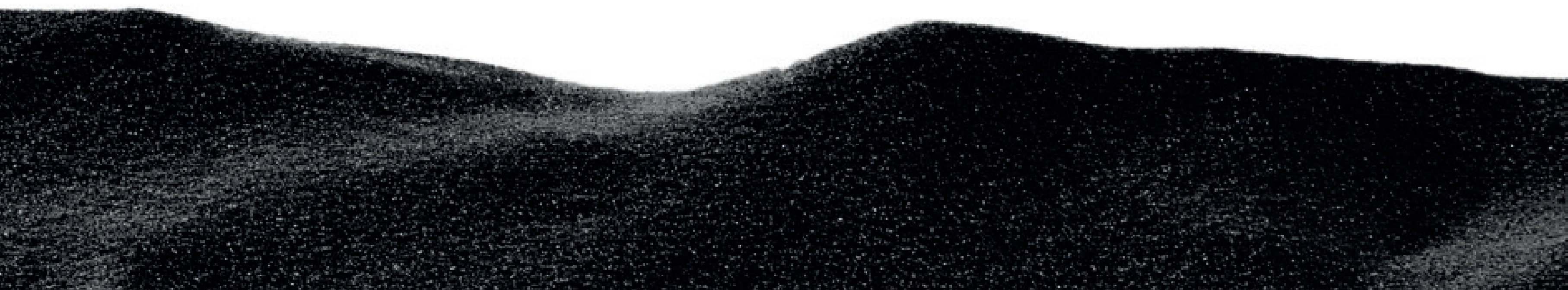
1974

Metallwerk Plansee GmbH in Lechbruck, Germany, was founded for the manufacture of composite materials.

1975

The new Plansee Education Center combined an apprentice workshop, a company vocational school, and seminar rooms under one roof.

The first Plansee Concert was organized.



1981

The Walter Schwarzkopf House, a new building accommodating offices, employee facilities and the reception area, was opened.

1987

Plansee spun off the hard metal activities.
The new company Plansee Tizit GmbH in Reutte was founded.

Plansee acquired Elektro-Metall AG in Seon, Switzerland.

1989

The production plant of Vacs Precision in Esashi, Japan, was opened.

1994

A cooperation agreement was concluded with India Hard Metals for the production of hard metals in Kolkata.

1996

Plansee acquired the majority stake in Bulgarian tool manufacturer Instrument AG in Gabrovo.

A major fire broke out in the hard metal plant at the Reutte location.

1999

The majority stake in French composite material producer Cime Bocuze in Saint-Pierre-en-Faucigny was acquired.

2000

The Italian hard metal manufacturer Nuova Aldap in Alserio was acquired.

2002

Plansee Tizit and Luxembourg's Céramétal merged, becoming Ceratizit.

2003

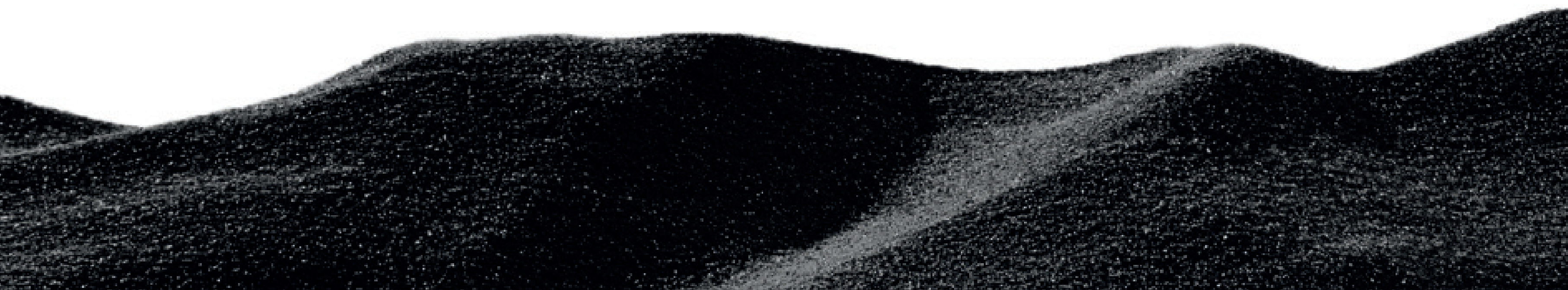
Plansee built a manufacturing site in Japan for bonding sputtering targets.

2005

A recycling center for hard metals was established at the Reutte site.

A joint venture agreement with Mitsubishi Materials Corporation was concluded to pool sintered steel component-related activities.

The first issue of the employee magazine 'comma' was published by Ceratizit.



2008

The Plansee Group acquired tungsten powder manufacturer Global Tungsten & Powders (GTP).

2010

The fine wire producer Wolfra-Tech in India was acquired.

Ceratizit founded a joint venture with Taiwanese hard metal producer CB Carbide.

2011

The first shares in Chile's Molymet were acquired, a specialist for molybdenum and rhenium processing and treatment.

The Plansee Group sold the division PMG Sinterformteile.

Plansee Group Service GmbH was founded.

Plansee acquired Korean company TCB.

2012–2016

Ceratizit acquired solid carbide tool manufacturers Günther Wirth, Promax, Cobra Carbide, and Klenk.

2013

Plansee High Performance Materials opened a new plant in Shanghai.

2015

GTP acquired Finnish hard metal recycler Tikomet.

2016

The Plansee Group pin was awarded for the first time, recognizing employees' international mobility.

2017

Ceratizit acquired German precision tool manufacturer Komet.

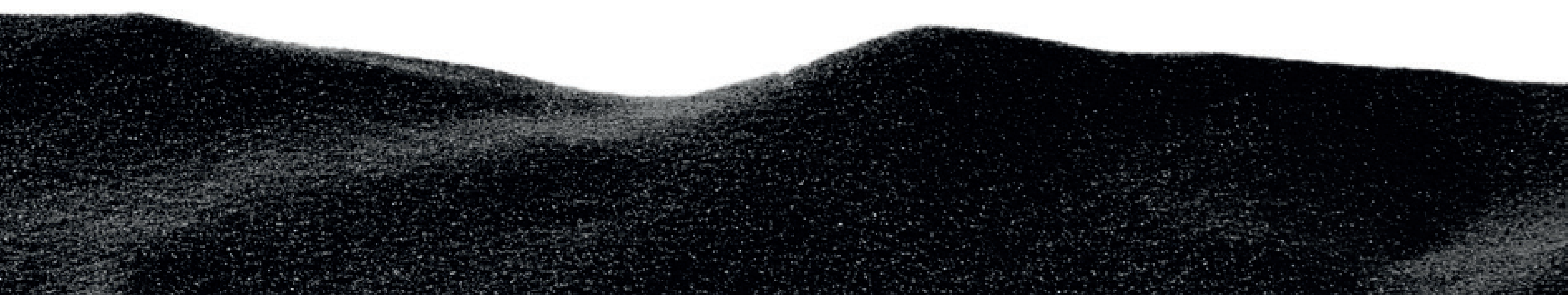
2019

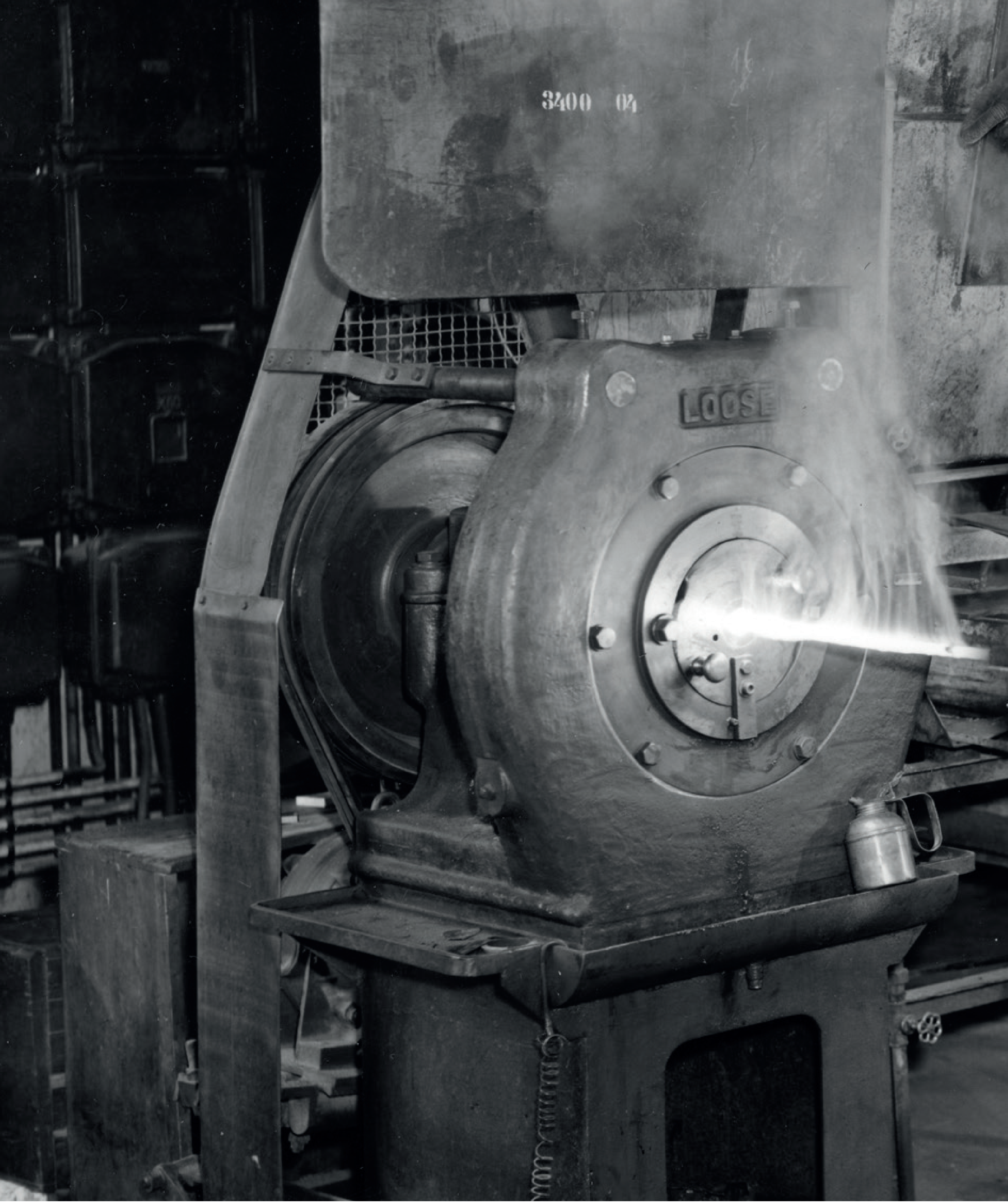
Ceratizit became a shareholder of German recycling company Stadler Metalle.

2021

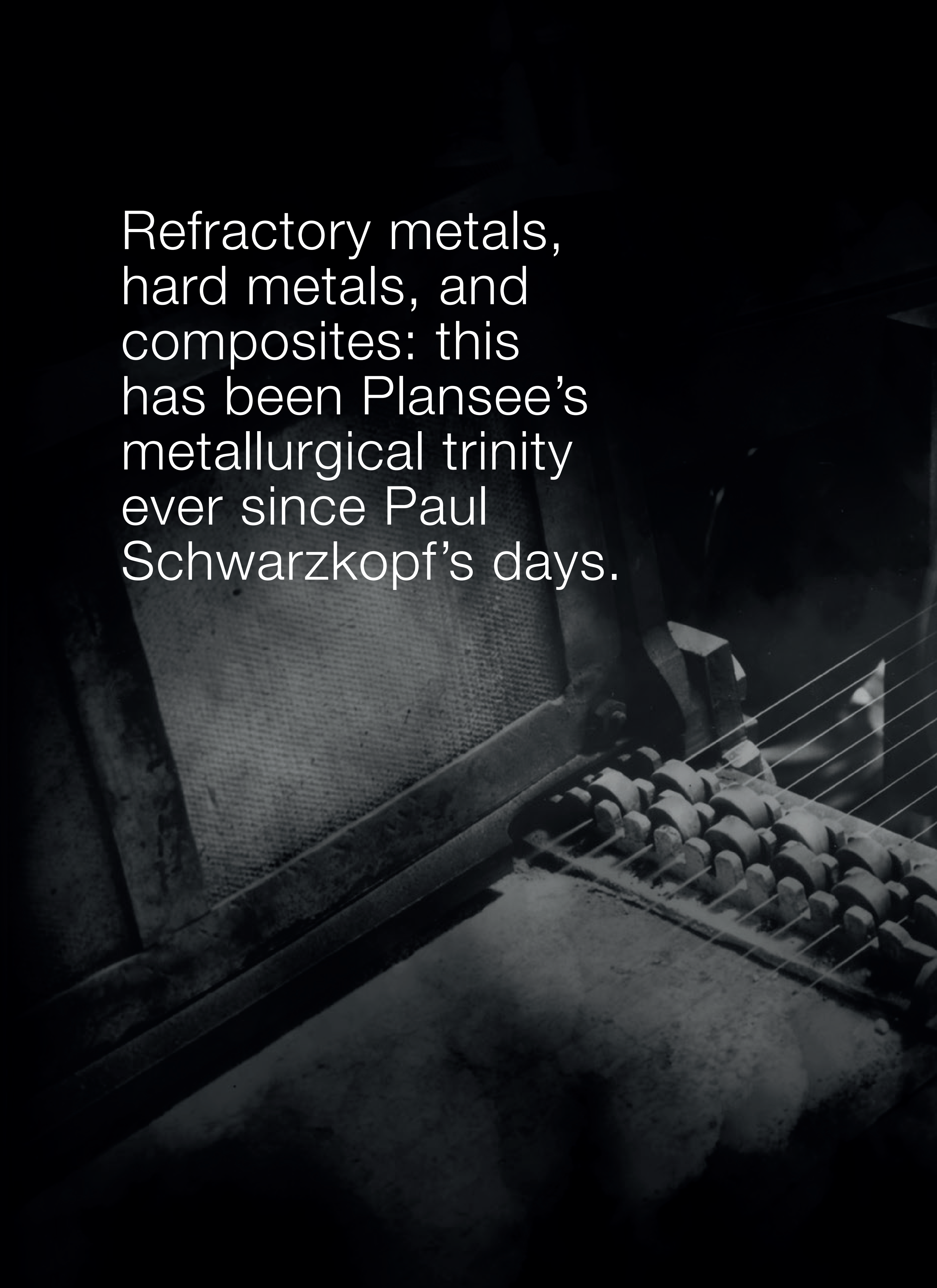
The Plansee Group acquired the majority interest in Ceratizit.

During the first 20 years of the new millennium, the Plansee Group invested more than 800 million euros in the Reutte location.

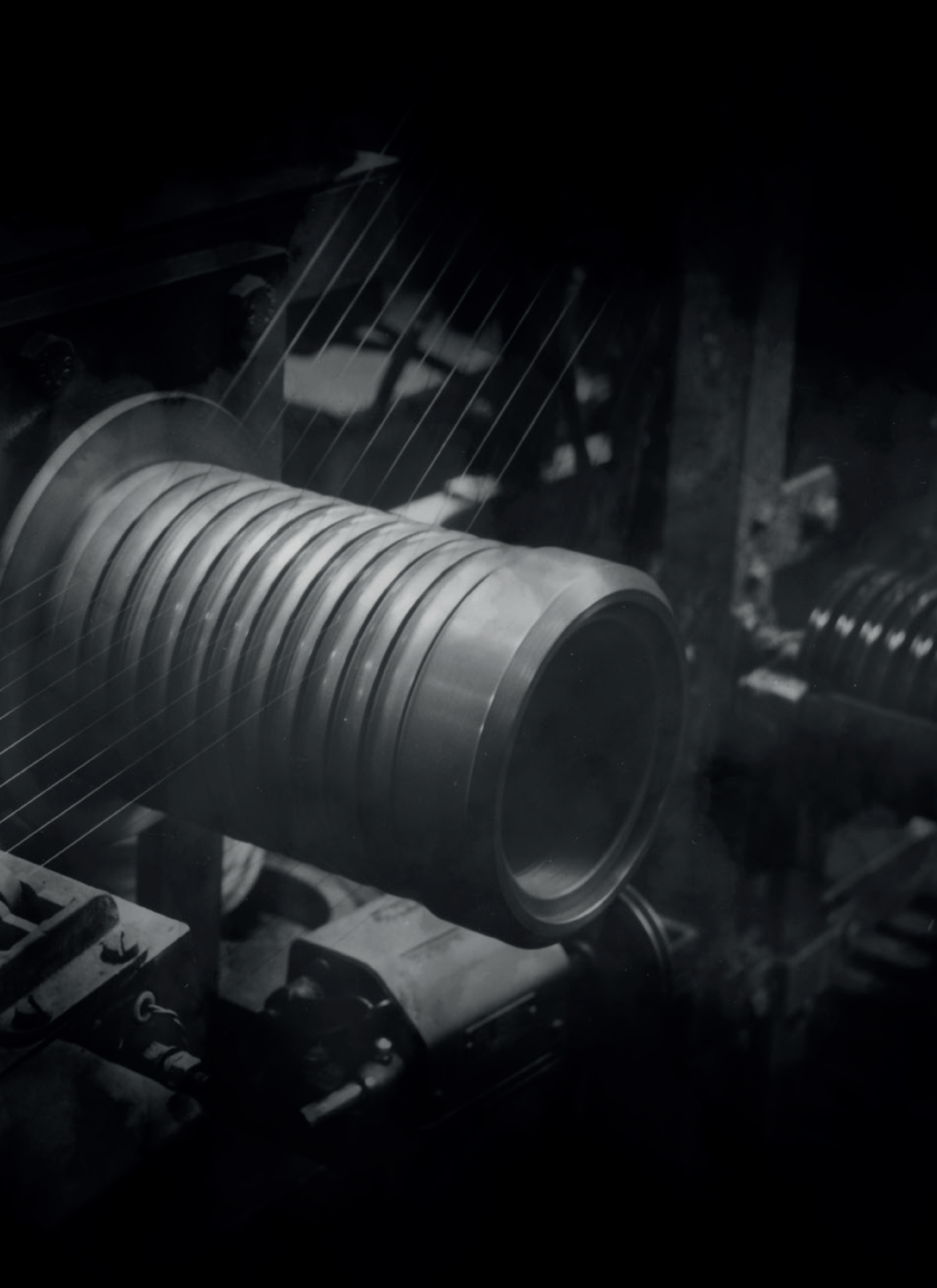




Hands-on work at the machine: this skilled Plansee employee forges molybdenum or tungsten rods at the radial swaging machine. The rods are later used to produce wires, glass melting electrodes, or cathodes for cinema lamps.



Refractory metals, hard metals, and composites: this has been Plansee's metallurgical trinity ever since Paul Schwarzkopf's days.



The focus on molybdenum and tungsten materials and early globalization are some of the cornerstones of Plansee's success, along with a healthy portion of entrepreneurial talent and luck.

Michael Schwarzkopf
Chairman of the Executive Board from 1996 to 2017

Intractable

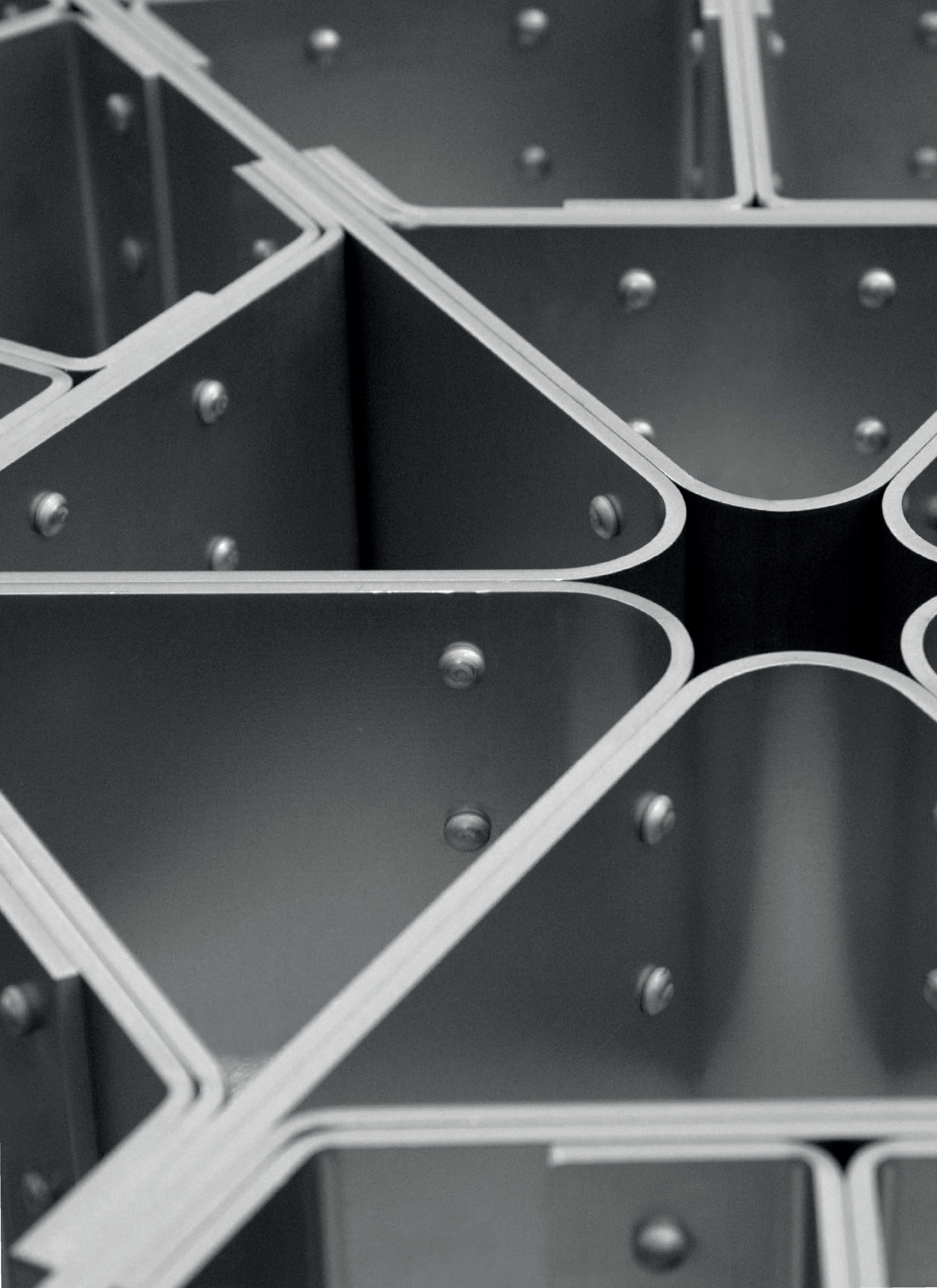
Refractory metals such as molybdenum and tungsten are high-performance materials with high melting points. The fact that they are notoriously difficult to process has earned them their designation, which stems from the Latin word 'refractarius' (= intractable, obstinate). The first refractory metal product needed in a large quantities was the coiled tungsten wire used in incandescent lamps, which was a game changer for Plansee's growth.

At the same time, as early as the 1920s, Plansee supplied the nascent electronics industry with molybdenum and tungsten components for electron tubes. These remained indispensable in the telecommunications sector until the 1980s.

Medical technology is also dependent on refractory metals in many respects. Serving as a reliable development partner to the industry, Plansee has earned an excellent reputation over many decades, such as for rotating anodes for X-ray machines.

In the 1970s, components made of molybdenum and tungsten were increasingly used for heat management purposes in the power electronics field and in semiconductor production, and between 1971 and 1979 Plansee tripled its sales volume of refractory metal components. Semiconductor base plates made by Plansee can be found in converters and power diodes of wind turbines, trains, and large manufacturing equipment. Heat-resistant Plansee components are a fundamental part of high temperature furnaces in the aviation industry, and the growth of single-crystal sapphires serves as the base material for the production of LEDs.

Starting in Japan, the flat screen industry developed beginning in 1980, which is supplied by Plansee with coating materials made of molybdenum and tungsten to apply electrically conducting functional layers to the displays. Several technology generations later, this technology was also used for smart phones. Today, molybdenum components from Plansee can be found in the giant extreme ultraviolet (EUV) lithography machines currently used to manufacture the most powerful microchips ▬



Resilient

In 1929, Plansee achieved a breakthrough in the development of hard metals with a high mixed-carbide content of, for example, titanium, vanadium or tantalum. In Breitenwang, high-volume hard metal production based on several Plansee patents began. Lathe machinists in the steel industry were delighted, as tools made of the new hard materials were subject to considerably less wear.

Sold under the Tizit brand name starting in 1948, the hard metal from the Ausserfern region piqued the interest of industries outside the steel sector and also became popular in wood working and stone machining, in hydraulic engineering and tunnel construction, in the oil industry, for the machining of gas turbines and jet engines, as well as in the automobile and aviation industries.

In 1972, Plansee Tizit enhanced the wear resistance of its hard metals with its development of Goldmaster, a multi-layer coating one hundredth of a millimeter thin, which was followed by the aluminum oxide-based Starmaster coating in 1982. Since they considerably increased the useful life and cutting speed of machining tools, the two coatings attracted a great deal of attention.

In 1987, Plansee turned the hard metal operation into a division of its own, which soon stepped out from under the long shadow of the refractory metal line. In 2002, Plansee Tizit merged with the Luxembourg company Céramétal to form the new company Ceratizit and evolved into a global tool manufacturer for the machining industry and wear applications in the manufacturing industry ■


speedM

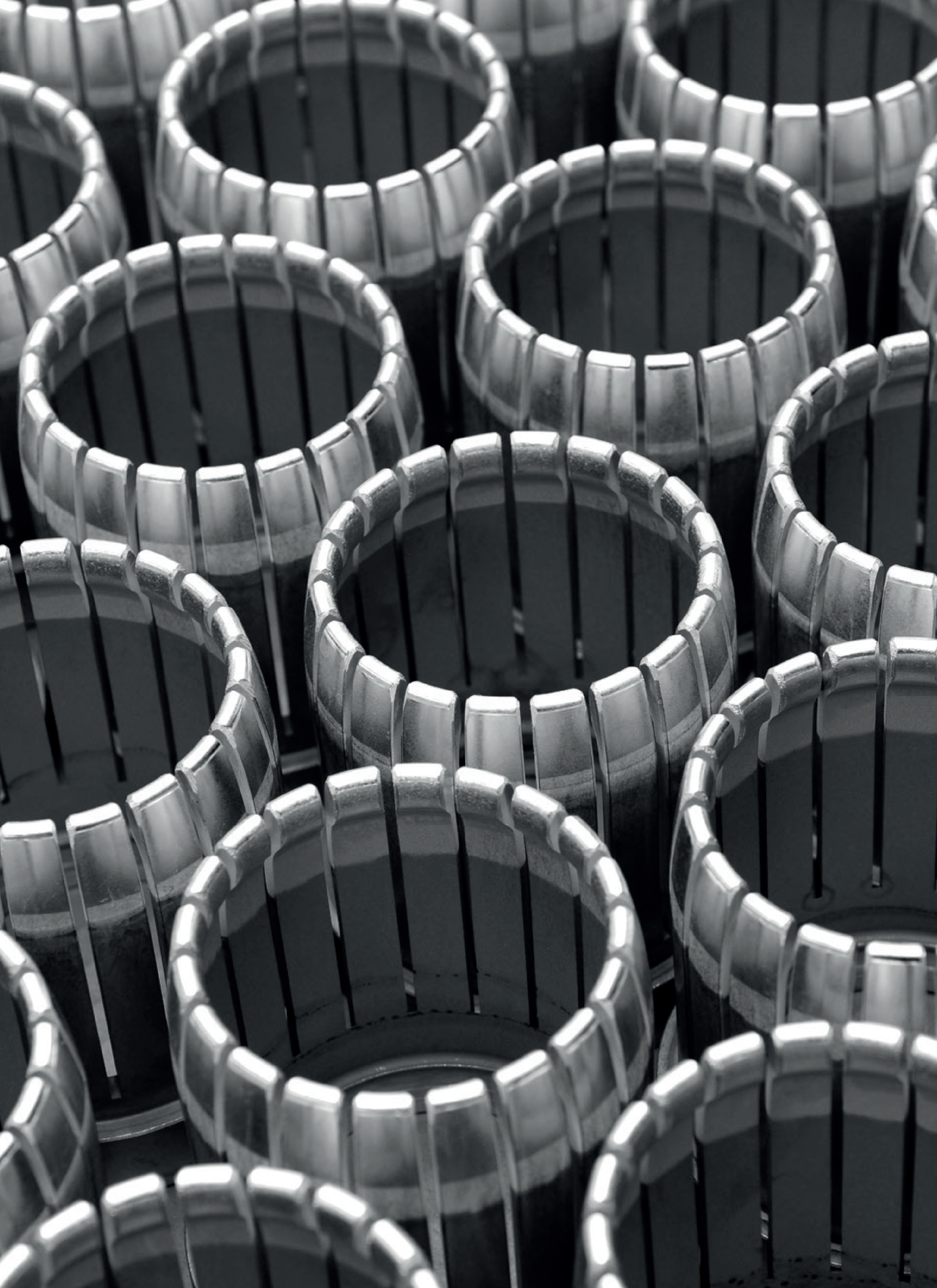
Harmonious

The composite materials, launched in 1932 under the name Elmet, were another genuine development just like hard metals by Plansee's laboratory. Elmet combines refractory and arc erosion-resistant metals, such as tungsten with metals that are thermally and electrically highly conductive like copper and silver. From a metallurgical point of view, it is brilliant that the resilient, yet conductive compounds are obtained by infiltrating the porous molybdenum or tungsten with molten copper or silver. The outcome: composite materials with a fine, uniform microstructure and high purity.

Industry's long quest for a product to be used in electrical engineering and metal working applications was finally over when Plansee introduced its heat-resistant, yet highly conducting materials made from tungsten-copper and tungsten-silver. Wires used in spark erosion were added to the product line of Elmet contact materials.

Later, Plansee established a copper-chromium compounds for the electrodes of electrical switching contacts. The continued development of the contact materials was expedited with the acquisition of Elektro Metall AG in Seon, Switzerland, in 1987. Today, ready-to-install high-voltage contacts made of tungsten-copper are manufactured in Seon, and ready-to-install medium-voltage contacts made of copper-chromium are produced in Shanghai.

In 1974, Plansee relocated the production of tungsten composites from Reutte to Lechbruck, a town located 35 kilometers away in the German Allgäu region. Today, the continuously enhanced products from Plansee's plant in southern Germany are sold under the brands Densimet and Inermet. These composites are characterized by particularly high density. Together with their ability to absorb high-energy radiation and excellent mechanical properties, these materials are ideally suited for a host of applications in the aerospace and automotive industries, medical technology and the construction industry ▬



Team work at the roll stand: here, Werner Angerlechner (right), who embarked on his well-deserved retirement more than 20 years ago, and his young colleague tackle a millimeter-thin molybdenum sheet – cautiously, since the precious product is still hot.

Successful transformation: the moment of truth comes after the pressed part has spent many hours in the sintering furnace and turned from a fragile, brittle product into a sintered part. The hard metal parts are removed from the sintering furnace and inspected.


50

Metallwerk Plansee has been engaged in non-academic powder metallurgical research and development ever since 1921 – and a regular meeting place of the international scientific community since 1952.

New heights

The Plansee laboratories

The future really always starts in the laboratory: the discovery of new materials, production methods and application fields is made by those who invest heavily and consistently in research and development. In 1929, Plansee invested in a research facility of its own, in a hillside location. It became one of Paul Schwarzkopf's top priorities and was named 'high elevation laboratory'.

In 1958, Plansee funded a new research center, equipped with laboratories for physical chemistry and electrochemistry, electronics, magnetics, material testing, and microstructure analysis. Added to this were a department for metallography and photography, a separate chemistry laboratory for raw material and product analysis, an in-plant technical library, and close ties to universities.

In the 1970s, Plansee became a development partner for X-ray tubes with companies such as Siemens and General Electric.

Computer-assisted simulation processes have been used and continually enhanced since 2000 for the optimization of manufacturing processes and for designing components for customer-specific applications. Most recently, these were complemented with machine learning methods, giving the company the proverbial leading edge in technological and operational matters as well as with regard to new digital business models.

The company has invested in the ongoing development of welding technologies for products used in medical technology since 2005.

Additive manufacturing allows components with tight tolerances and challenging geometries to be produced directly from the metal powder ■

Fruits of knowledge

International flair in the Ausserfern region

Knowledge is one of the few commodities in the world that multiplies when shared. In this spirit, it was not only Plansee's continued progress that was dear to Paul Schwarzkopf's heart, but also the future per se. As a result, one year after Schwarzkopf returned from his exile in the USA, he extended an invitation in 1948 for the first international Powder Metallurgy Conference at the Karl-Franzens University in Graz. The event, which also provided a platform to exchange knowledge and experiences, was well-received – and inspired both the attendees and its initiator, who used it as a basis for the Plansee Seminar format.

In 1952, Plansee extended an invitation to the first Plansee Seminar, entitled 'De re metallica' alluding to the book bearing the same title by Georgius Agricola, a Renaissance scholar (1494-1555). A total of 200 scientists, technical experts and managers from world-renowned universities and companies from 15 nations traveled to Reutte to share the latest accomplishments in material science and powder metallurgy of refractory metals, as well as in the field of hard materials and hard metals.

The gathering was a first in two respects: not only did it mark the launch of the Plansee Seminars, it was also the first meeting of European and US metallurgists in Austria in the post-war era organized on private initiative.

The Plansee Seminar has been held 19 times thus far, initially at three-year intervals, and every four years since 1977. As one of the largest gatherings of its kind in the world, it offers an opportunity for researchers, developers and users to hold scientific discussions and provide an outlook of future applications of refractory metals, hard metals, and hard materials. The 20th Plansee Seminar would have been held during the 2021 anniversary year but had to be postponed due to the COVID-19 pandemic ▬


Plansee-Seminar
Der grosse Max

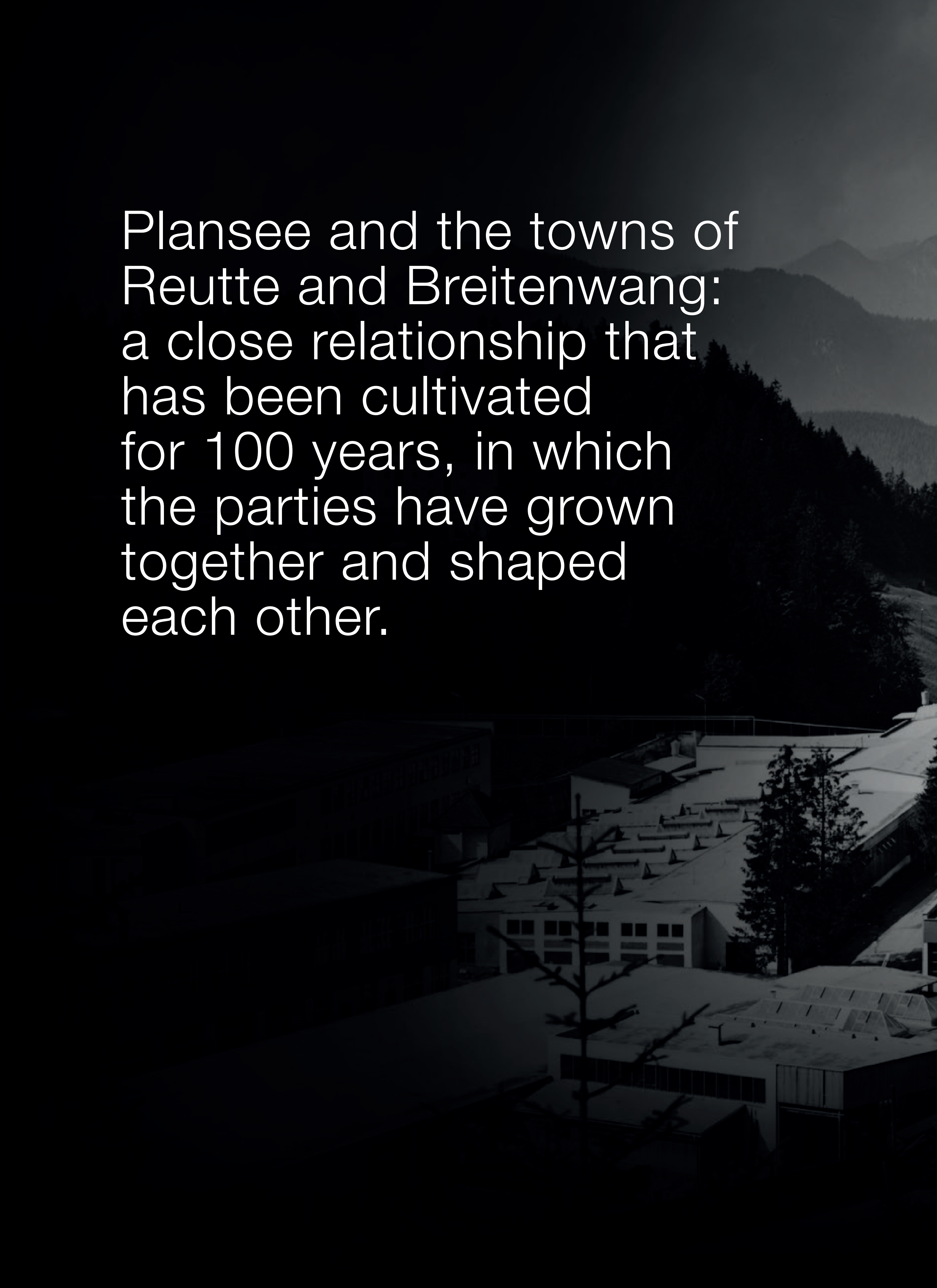
Participants

1952

A. Johnson & Co. Ltd.
A.E.R.E.
AEG Berlin
Aluminiumindustrie AG
American Electro Metal Corp.
American Equipment Comp.
Andas
ARD AG
Associated Electrical Industries Ltd.
BSA Group of Companies
Bofors AB
Bound Brook Bearings Ltd.
British-Thomson-Houston Co. Ltd.
Cavendish Laboratory
Cérамétal
Chrysler Corp.
Continental Tool Comp.
Degussa, Industrieofenbau
Deutsche Edelstahlwerke AG
Düsseldorfer Eisenhüttengesellschaft
EDIPO
Eisenwerk Breitenfeld
Escher Wyss AG
ETH Zurich
Fagersta Bruks AB
Research Institute for Precious Metals
Gebr. Böhler & Co. AG
Gebr. Sulzer AG
General Electric Co. Ltd.
George Cohen Sons & Co.
Gerätebau-Anstalt
Gesellschaft für Elektrometallurgie mbH
Gesellschaft für Stahl- und Röhrenuntersuchung mbH
Hard Metal Tools Ltd.
Hard Metals Ltd.
Hermann C. Starck AG
High Speed Steel Alloys Ltd.
Höganäs-Billesholms AB
Hollandsche Electro Chemische Industrie
Husquarna Vapenfabriks AB
Industrial Distributors Sales Ltd.
Innocenti S.G.
Minerva Institute
Joseph Lucas Ltd.
Kanthal AB
Kohlswa Jernwerks AB
Tyrolian state government
Maschinenfabrik Meer AG
Massachusetts Institute of Technology
Metallgesellschaft AG
Metals & Controls Corp.
Metro-Cutanit Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Mich. Powdered Metal Products Co. Inc.
University of Leoben
Murex Ltd.

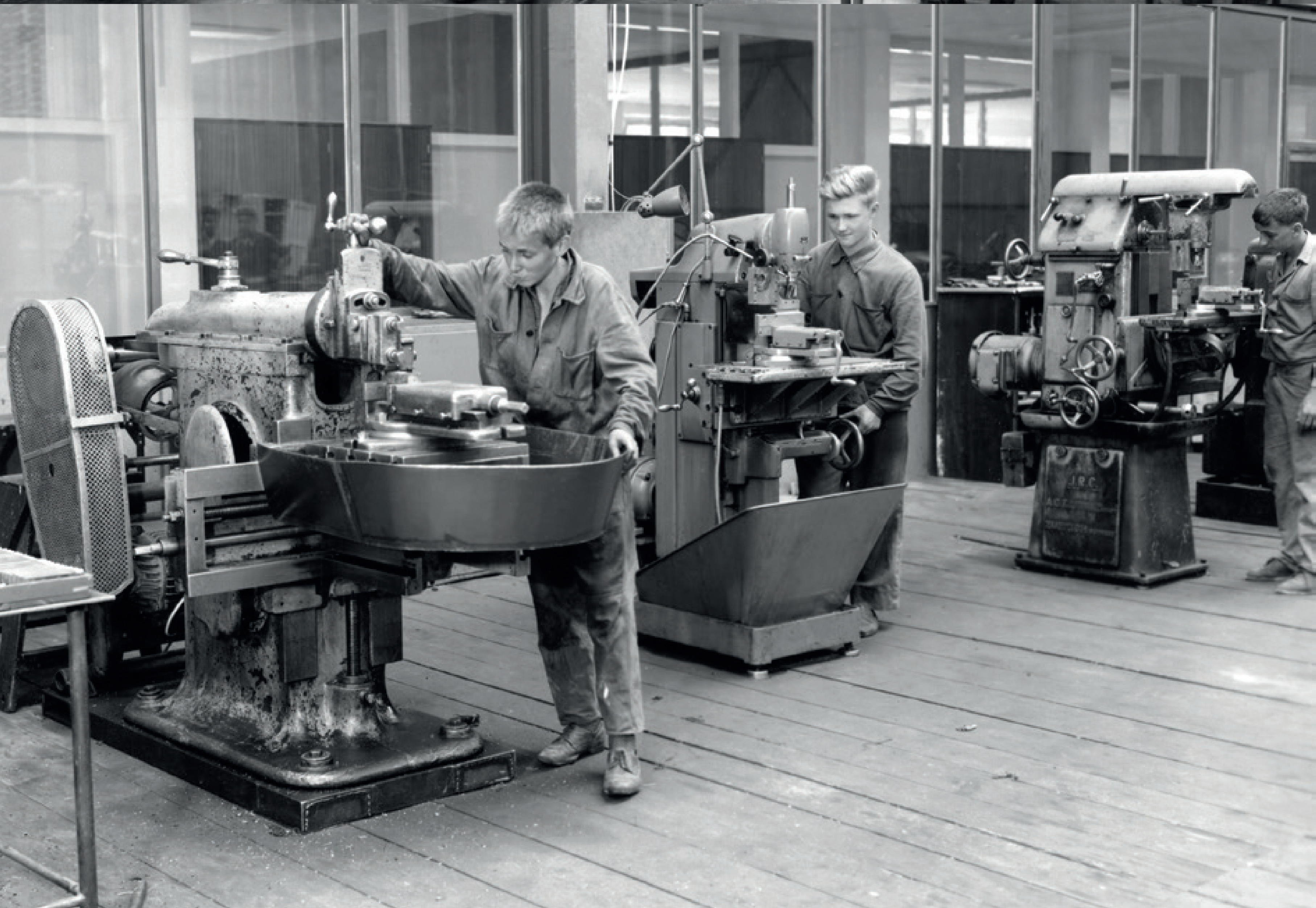
N.V. Philips Gloeilampenfabrieken
Office Commercial Technique
Office National d'Études et de Recherches Aéronautiques
Office of Naval Research
Optische Werke C. Reichert
Österreichisches Produktivitätszentrum
OY. Kovametall AB
Philips GmbH
President's Materials Policy Commission
Production Tool Alloys Co., Ltd.
Purley Surrey
Rensselaer Polytechnic Institute
Sandvikens Jernverks AB
Schoeller-Bleckmann Stahlwerke AG
Siemens & Halske AG
Siemens Plania AG
Siemens-Schuckertwerke
Sintermetallwerk Krebsöge GmbH
Société d'Electro-Chimie
Société Electrométallurgique de Montricher
Société le Carbone Lorraine Paris
Söderfors Bruk AB
Stevens Institute of Technology
Surahammars Bruks AB
Svenska Metallverken AB
Sylvania Electric Products Inc.
Graz University of Technology
Stuttgart Technology University of Applied Sciences
Vienna University of Technology
Berlin University of Applied Sciences
Berlin Institute of Technology
Tekniska Högskolan Helsinki
Tyrolian glassworks
Uddeholms AB
University of Freiburg
University of Graz
University of Halle
University of Innsbruck
University of Munich
University of Münster
University of Strasbourg
University of Vienna
University of Durham
Vacuumschmelze AG
Vereenigde Draadfabrieken
Association of German Ironworkers
Vereinigte Aluminiumwerke AG
Vereinigte Drahtwerke AG
Vollweiler & Co.
W.C. Heraeus Platinschmelze
Werkzeugmaschinenfabrik Oerlikon, Bührle & Co.
Whiston Grange

Plansee and the towns of Reutte and Breitenwang: a close relationship that has been cultivated for 100 years, in which the parties have grown together and shaped each other.



I am of the opinion that middle schoolers are only properly prepared for continuing their studies or, if they cannot afford this, for joining the workforce when they are provided not only an education in humanities, but also in technology, and more particularly not just theoretical technical training, but also hands-on.

Paul Schwarzkopf



Plansee at the top of its class

Material science in Reutte

When in 1922 production started in Breitenwang, there was a lack of metal workers. The company had to develop them on its own, which is the reason why apprenticeships and in-house training were one of the top priorities at Plansee from the very start. The bell in the Plansee company vocational school rang for the first time in 1939, which in addition to the Reutte vocational college provided apprentices with technical instruction – and it did so under public-law status starting in 1956.

In the 1960s, a boarding school became affiliated with the company vocational school. Once a week, all apprentices had to complete nine and a half hours of class. Starting in 1982, the school installed a second branch, providing foreman training.

Plansee made academic history when, in 1959, the secondary school (Realgymnasium) founded in 1952, in response to Paul Schwarzkopf's initiative, added the metallurgy branch to its curriculum and became Planseeschule Reutte. Plansee offered a facility at no charge and financial assistance to the secondary school. In 1967, the educational institution – which to this day is without equal – occupied a new building designed for 20 classes and became part of the school administration of the Republic of Austria.

With invaluable support from the Plansee Group, the Ausserfern region was added as a new location to the nation's education map in 2020: a Technical College (HTL) for Industrial Engineering, with a focus on business information technology. The students enjoy their theoretical instruction in subjects such as software development, mechatronics, marketing and accounting on the premises of the Reutte Commercial Secondary College, while they gain their practical experience at Plansee. The Training Center opened in 2020 offers ample space for as many as 240 young future skilled workers. Overall, this doubles the Plansee Group's training capacity. The company strives to teach its demanding specialized skills to more apprentices than ever.

Plansee is also committed to pre-school education: in 1955, the plant kindergarten opened, which was a matter especially dear to Paul Schwarzkopf's wife Mary during her lifetime ▬

Living ‘ex-works’

Real estate development with a Plan(see)

The founding of a metal factory came quite as a surprise for Reutte and Breitenwang in 1921: neither the labor market nor the real estate market of the Ausserfern region were prepared for a company of Plansee's magnitude and ambitions. As a result, the agriculturally dominated region lacked skilled labor for many years. Nonetheless, Plansee grew, also attracting a large number of employees from far away. This, however, in turn generated another shortage: housing.

Plansee itself remedied the situation by acquiring real property in the locality of Mühl and, in 1948, building 14 single-family homes inside of six months, modeled after the Maria Theresia concept as designed by timber industrialist Josef Fritz. The cluster of residential homes was named the Dr.-Paul-Schwarzkopf residential area.

The lack of housing in Reutte and the surrounding area, however, was not solved by this measure alone. In 1951, Plansee founded the Plansee non-profit residential building and settlement organization. The private, community spirit-minded builder constructed 348 residential units by 1988. Still, Plansee not only built hundreds of accommodations – such as the home for single guest workers in 1970 – but also rented living space for the employees on a large scale.

After the real estate market changed in recent decades and a lot of living space was also created by private initiatives, the Plansee Group today focuses on facilitating new or temporary staff a fast and smooth start with Plansee. To be able to do so, the Plansee Group has a range of apartments of various sizes available: single apartments for interns, undergraduates or postgraduates, as well as multi-room residences for new employees who, together with their families, relocate from far away to the Ausserfern region ■

Debut

Vibrant cultural scene

When Walter Schwarzkopf in 1958 returned from the Massachusetts Institute of Technology (MIT) in the USA to Reutte, he built on his father Paul Schwarzkopf's priorities in many respects in his role as a new member of the Plansee Executive Board. A humanist and democrat with a passion for education, Walter Schwarzkopf proceeded with Plansee's schooling initiatives and made every effort to support the young Reutte secondary school with its metallurgy branch. In the company itself, he encouraged a mindset that promoted a thirst for knowledge and ongoing development for which Plansee, prompted by Walter Schwarzkopf, established an ambitious educational program for employees.

Still, Schwarzkopf's educational concept went far beyond economic and technical topics and also encompassed the arts. Starting in the late 1960s, progressives were calling for "Culture for all!" and cultural policies. Hilde and Walter Schwarzkopf fulfilled the goal in almost exemplary fashion by turning the plant into a stage: in 1975, the two organized the first of many Plansee Concerts.

The debut was a high-level visit by the Los Romeros guitar quartet from the USA to Tyrol, and some 200 music aficionados from Reutte and the surrounding area secured their subscription to the concert series in the very first season. With this, Reutte became an established name in the Tyrolian cultural scene and increasingly met the cultural need in the Ausserfern region with superior musical performances. The Plansee Concerts hosted renowned guest orchestras such as the Leipzig Mendelssohn Chamber Orchestra, the Concilium musicum Wien, as well as soloists such as the virtuoso pianists Fazil Say and Roland Batik, star violinist Gidon Kremer, cellist Daniel Müller-Schott, or the Swedish opera and concert singer Maria Bengtsson.

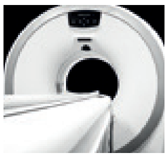
Ever since 1981 – and continuing to this day – the events have been held in the Walter Schwarzkopf Hall in Plansee's employee facilities bearing the same name – an extremely popular venue among artists and the audience alike because of its atmosphere and superb acoustics. With the Plansee concert band founded in 1947, the public also has a versatile and accomplished local champion. The repertoire of the ambitious brass players, who have become a fixture in Reutte during festivities of the Plansee Group, ranges from richly ornamented rock music à la Queen, through musical and opera composers such as Andrew Lloyd Webber and Gioachino Rossini, to baroque-era grand master Johann Sebastian Bach ■

Christian Altenburger
Kit Armstrong
Maria Bengtsson
Julius Berger
Boris Bloch
Gabor Boldoczki
Jörg Demus
Helmut Deutsch
Till Fellner
Bernd Glemser
Raphaela Gromes
Hagen-Quartett
Franziska Hölscher
Interpreti Veneziani
Benedict Kloeckner
Gidon Kremer
Elisabeth Leonskaja
Daniel Müller-Schott
Ferhan and Ferzan Önder
Quadro Nuevo
Otto Sauter
Fazil Say
Martin Stadtfeld
Tyrolian Symphony Orchestra
Vienna Boys' Choir
Wilten Boys' Choir

One company, 75,000 products: with strong metals, the Plansee Group makes life safe, cutting-edge, mobile, and digital – with components for energy transmission and distribution, medical technology, consumer electronics, semiconductor production, the construction industry, as well as road, rail and air traffic.

Computer tomography

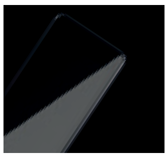
Rotating anode



In medicine, diagnostic imaging necessitates extremely powerful computer tomography machines, which supply images in the highest quality. Plansee equips the high-tech machinery with shields, collimators and flat emitter films, and above all with their core component: the rotating anode.

Display

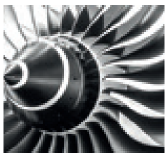
Sputtering target



Products from Plansee were already used in early cathode ray tube television sets. Today, materials made by the Plansee Group make a crucial contribution to all flat screens that provide fantastic image resolutions – whether in laptops, smart phones, TVs or smart watches. The ultrathin functional layer made of molybdenum or tungsten ensures that the millions of transistors adhere to the glass of the display and all pixels are precisely activated.

Turbine blade

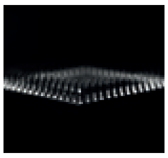
Milling head



Brought into shape with indexable insert cutters made by Ceratizit, turbine blades made of superalloys withstand the enormous heat in the hot gas area of the turbines in jet engines.

Power semiconductor

Base plate



Since molybdenum and tungsten expand very little when exposed to heat, they are ideal materials for the base plates of high-performance semiconductors, which in the hottest spots reach a heat flux density of up to 1,000 watt per cm^2. By comparison, a cooktop reaches only 8 watt per cm^2 during operation.

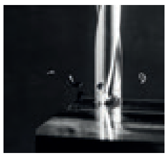
Chronograph

Oscillating weight

Tungsten-heavy metal alloys are non-magnetic, pore-free, and easy to machine. These properties are tailor-made for the production of chronographs, in which the material from the Plansee Group is used as the oscillating weight.

Machining center

Hard metal drill



In the machining centers of high-tech companies, the going often gets tough. This is the case, for example, when Ceratizit hard metal drills work through aluminum, steel and similar materials and show their stuff: hardness, wear resistance, and durability.

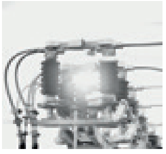
Injection molding

Hot runner nozzles

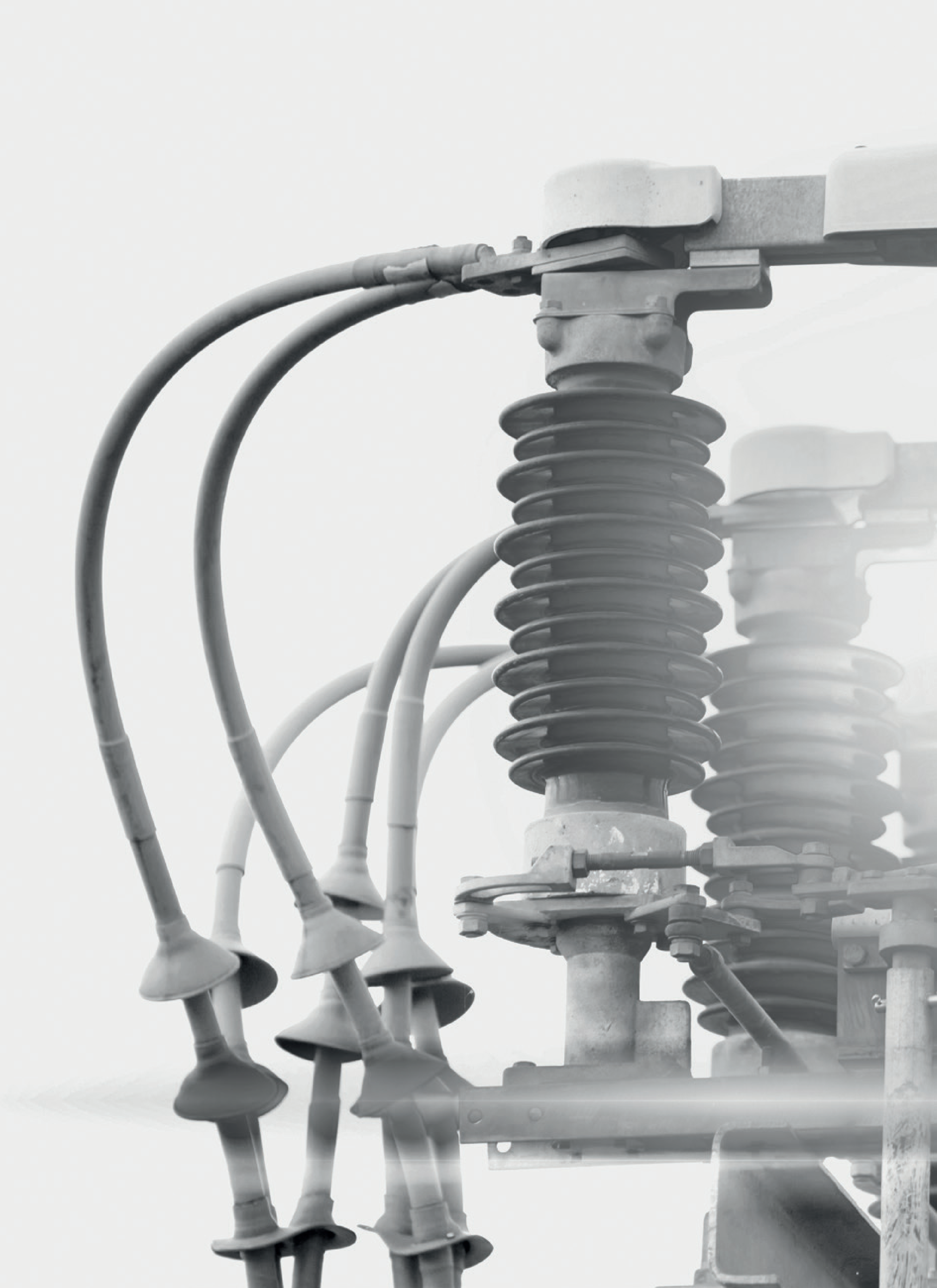
Plastic injection molding is an extremely hot undertaking. The polymer compound is molded under high pressure through nozzles into a defined shape. The Plansee Group produces these corrosion-resistant, wear-resistant and dimensionally stable hot runner nozzles from a molybdenum alloy or hard metal.

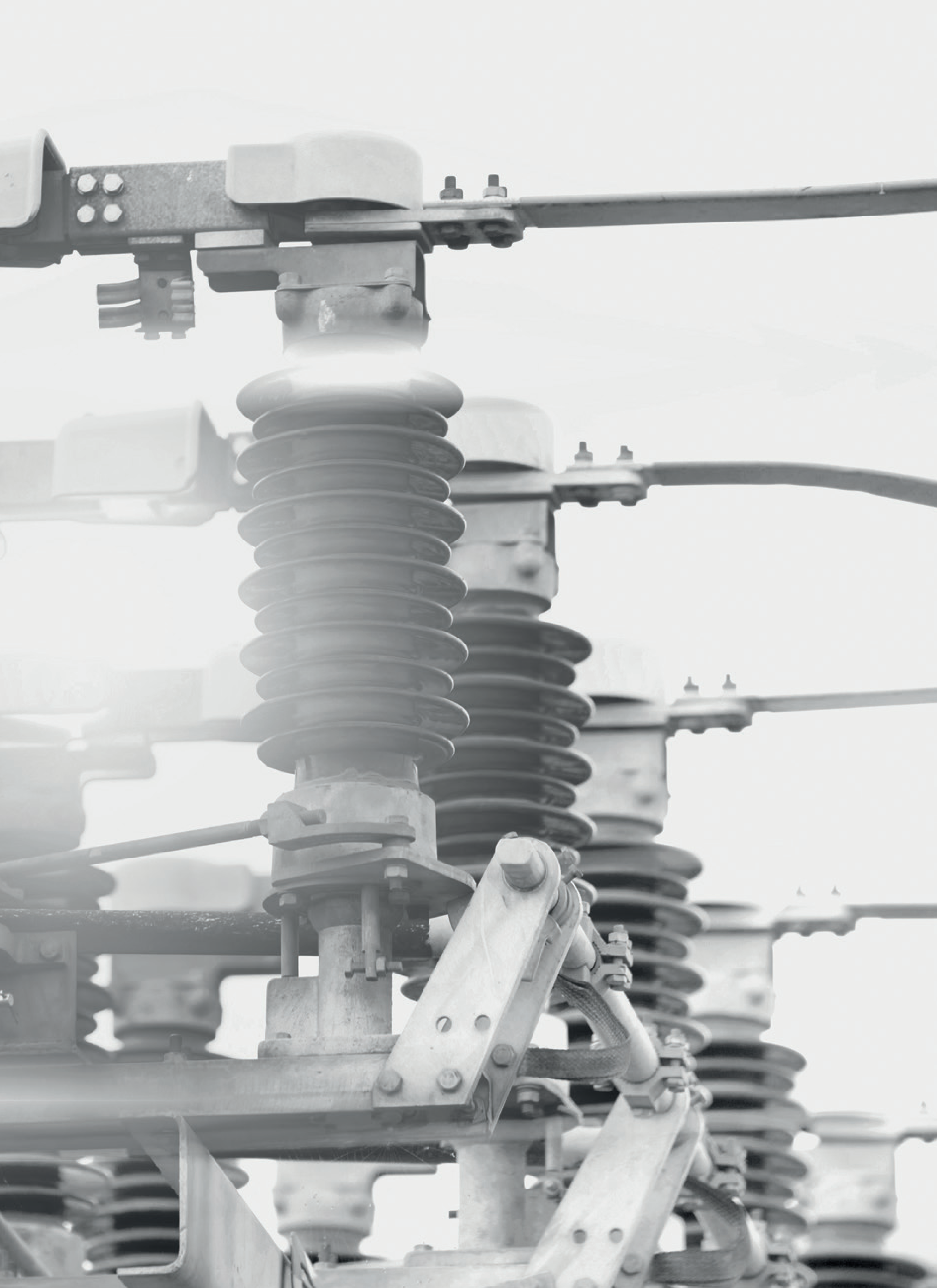
Substation

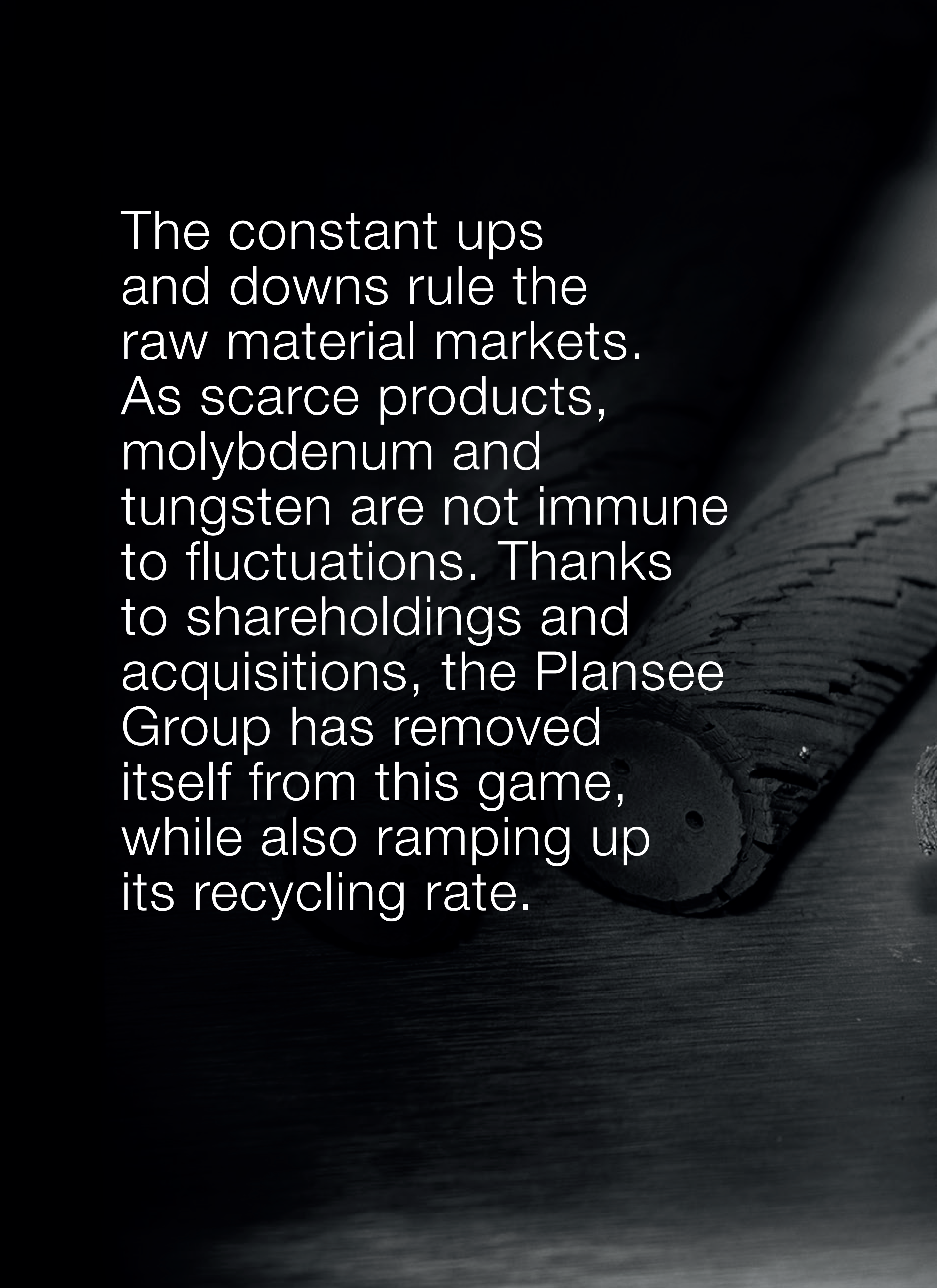
Switching contacts



Electrical power substations must be able to handle tremendous voltage and current levels, which cause arcing temperatures as high as 20,000°C. Arcing contacts made of tungsten-copper reliably control the power even under these extreme conditions.







The constant ups and downs rule the raw material markets. As scarce products, molybdenum and tungsten are not immune to fluctuations. Thanks to shareholdings and acquisitions, the Plansee Group has removed itself from this game, while also ramping up its recycling rate.

Raw materials: above all

After acquiring (and later selling) a stake in Austria’s Wolfram Bergbau- und Hüttengesellschaft, Plansee closed the gap in its value chain, becoming its own raw material supplier. In the course of the single largest investment up until that point, Plansee in 2008 first acquired the Global Tungsten & Powders division from Osram Sylvania, followed since 2011 by the incremental acquisition of interests in Chile’s Molymet, which specializes in molybdenum and rhenium processing and treatment. Thanks to GTP and Molymet, Plansee now has assurance that its supply of consciously mined molybdenum and tungsten is sustainably and reliably secured.

Regeneration lessons

It takes a lot of sorting and technological expertise to give tools made of hard metal not just a second, but third, fourth and fifth lives. Still, the effort is worth it: tungsten can be reused almost indefinitely. And conditioning is far less energy-intensive than producing tungsten from ore concentrate.

Within the cycle

The goal of the Plansee Group is to minimize the consumption of tungsten raw materials extracted from mines, and to conserve the finite resources.

Exercising care with rarities

The Plansee Group covers the majority of its need for tungsten from recycled material. This is also growing ever more important for customers. In the consumer electronics industry, for example, products in which components made of recycled tungsten are used, are becoming increasingly commonplace.

Urban mining

The Plansee Group has been in the recycling business for 60 years. In addition to developing mechanical, thermal and chemical recycling technologies for tungsten, the Plansee Group creates new business models for the purchase and treatment of tungsten-containing scrap. In this effort, we start on our doorstep, where we systematically collect end-of-service life tools and metals and repurpose them.


Extraction from ore
Recycling from scrap metal
250 kg
ore
1kg
scrap metal
~1kg
new metal
+75%
Energy expenditure when metal is extracted from ore
Energy expenditure when recycling from scrap metal

The future remains open, but one thing is certain: as a result of the digital transformation, the partnerships between the Plansee Group and its customers and business partners will change as much as the production processes in Reutte and all over the world.

Non-binary

Long gone are the times where digitalization is merely one of two digits, 1 or 0, or converting analog content to digital formats. We are in the midst of the digital transformation that will change and optimize our production, sales, logistics processes, and all administrative areas, with far-reaching effect.

The Plansee Group has ambitious goals: we want to capitalize on the opportunities of the digital shift as intelligently as possible, to become faster, better, more productive, and more attractive to our customers. As a result, we openly, inquisitively, and intensely explore intelligent tools, machine learning, robotics, numerical simulation, and 3D printing.

The new challenges lie in becoming part of a highly complex, global value chain, and producing and supplying each of our products at the exactly defined time, in the correct quantity and quality, and in a specific region.

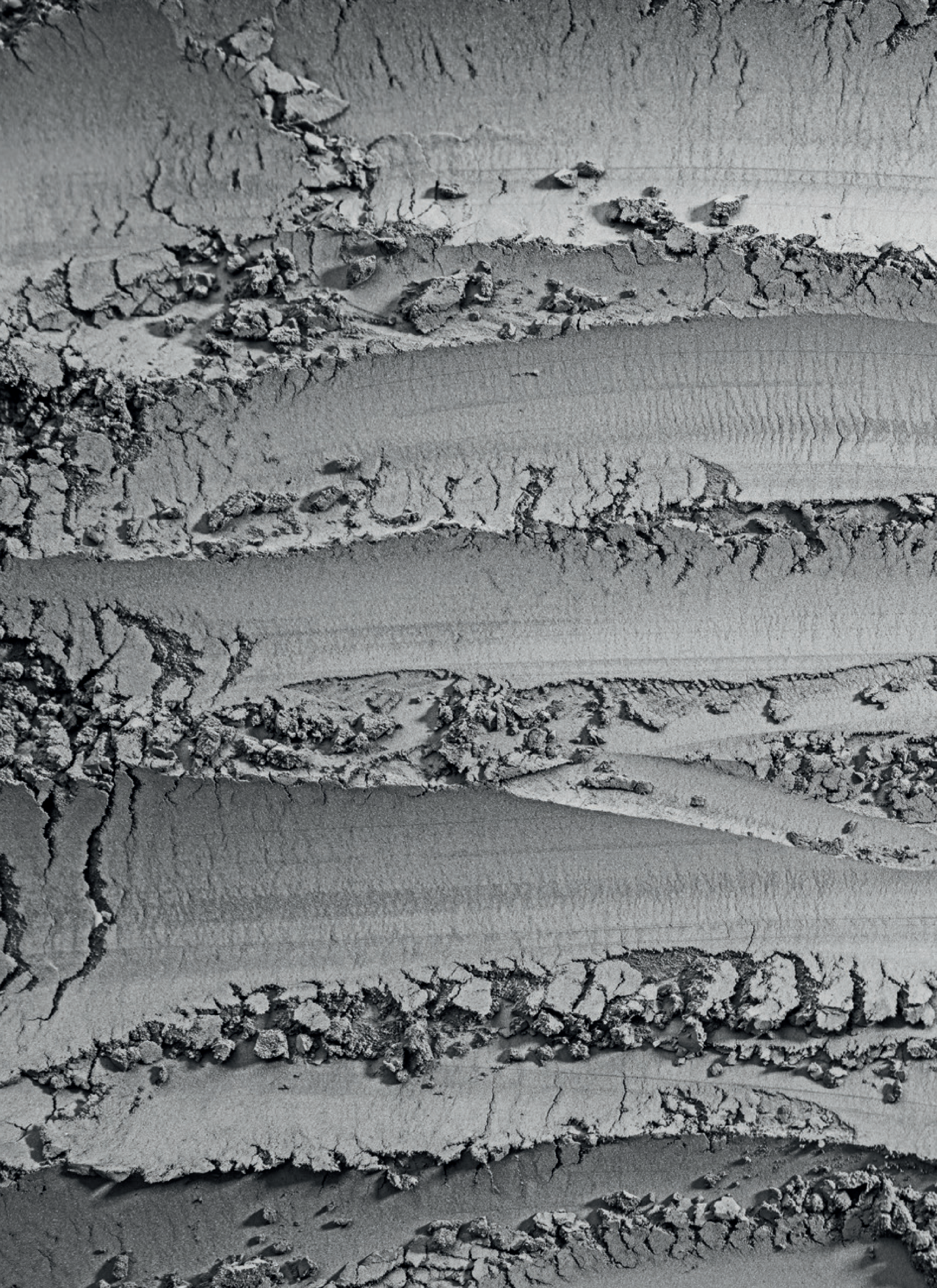
Karlheinz Wex
Spokesman of the Executive Board of the Plansee Group

The powerhouse and administrative center of the Plansee Group is located at the root of its history: near Lake Plansee in Reutte. Here the Group is managed. With a clear strategy, with a focus on sustainable growth and work, and great responsibility for the living environment that surrounds the plant. It is a clear-sighted growth process that also offers room for mergers & acquisitions at the right time. And a globalization approach that at all times follows the logic of having our sales and production operations, as allies, located in close proximity to the customers where they want and appreciate us.

Countries with production facilities
of the Plansee Group

Chile
Mexico
USA
Belgium
Bulgaria
Germany
Finland
France
Italy
Luxembourg
Austria
Poland
Switzerland
Czech Republic
China
India
Japan
South Korea
Taiwan


Mamer
Headquarters
Ceratizit
Reutte
Headquarters
Plansee Group
Plansee SE



The essence of Plansee is the ability to evolve. For 100 years, Plansee has continually built bridges for its customers to new applications with the sophisticated molybdenum and tungsten materials. And in this process, repeatedly transforms itself.

Wolfgang Köck
Member of the Executive Board of the Plansee Group

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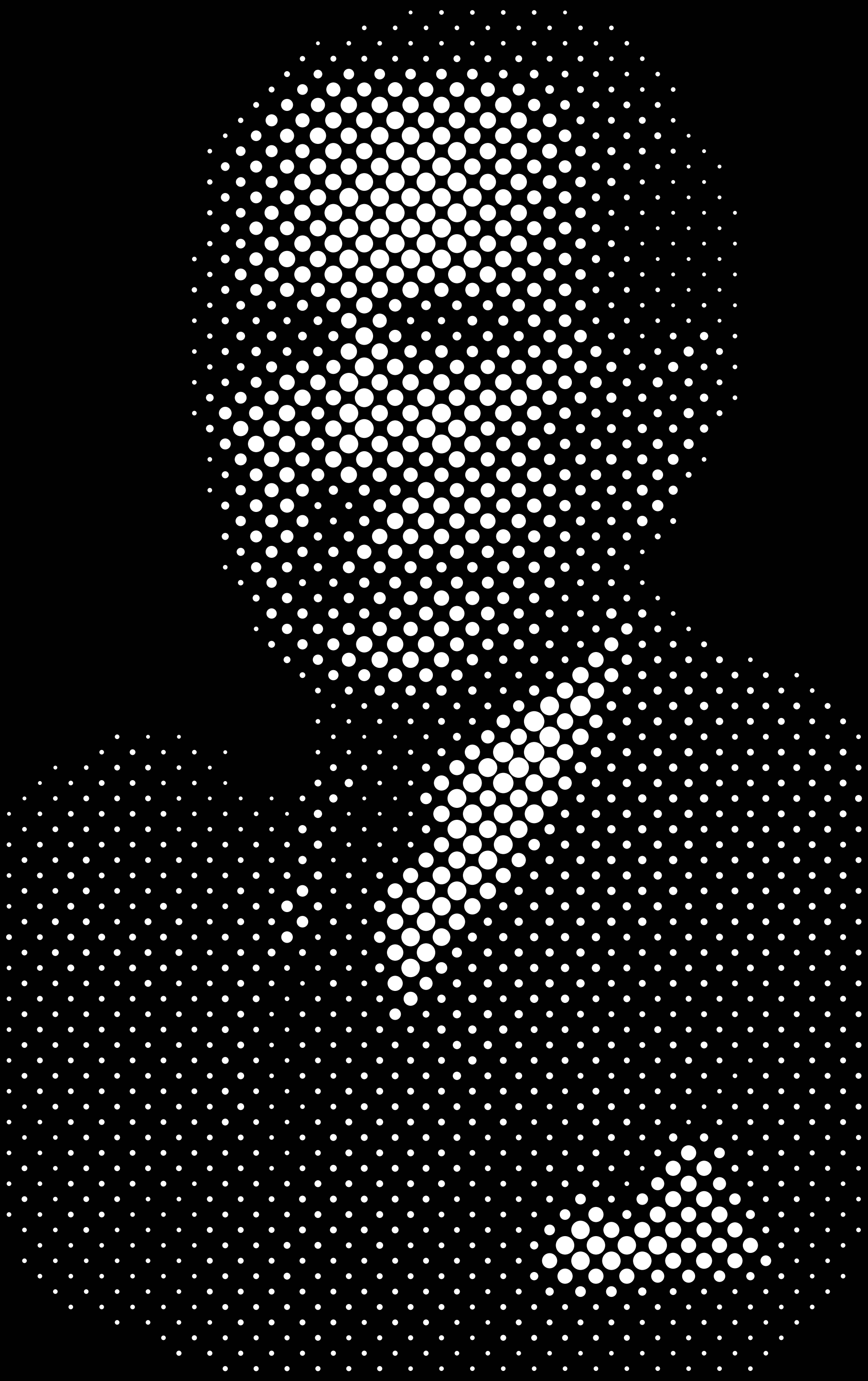

Paul Schwarzkopf and molybdenum: The inventor, metallurgist and entrepreneur has a lifelong close working relationship with the refractory metal.