

# livingmetals

EXCELLENCE IN POWDER METALLURGY

**plansee**  
GROUP

## HIGHLIGHTS 2008

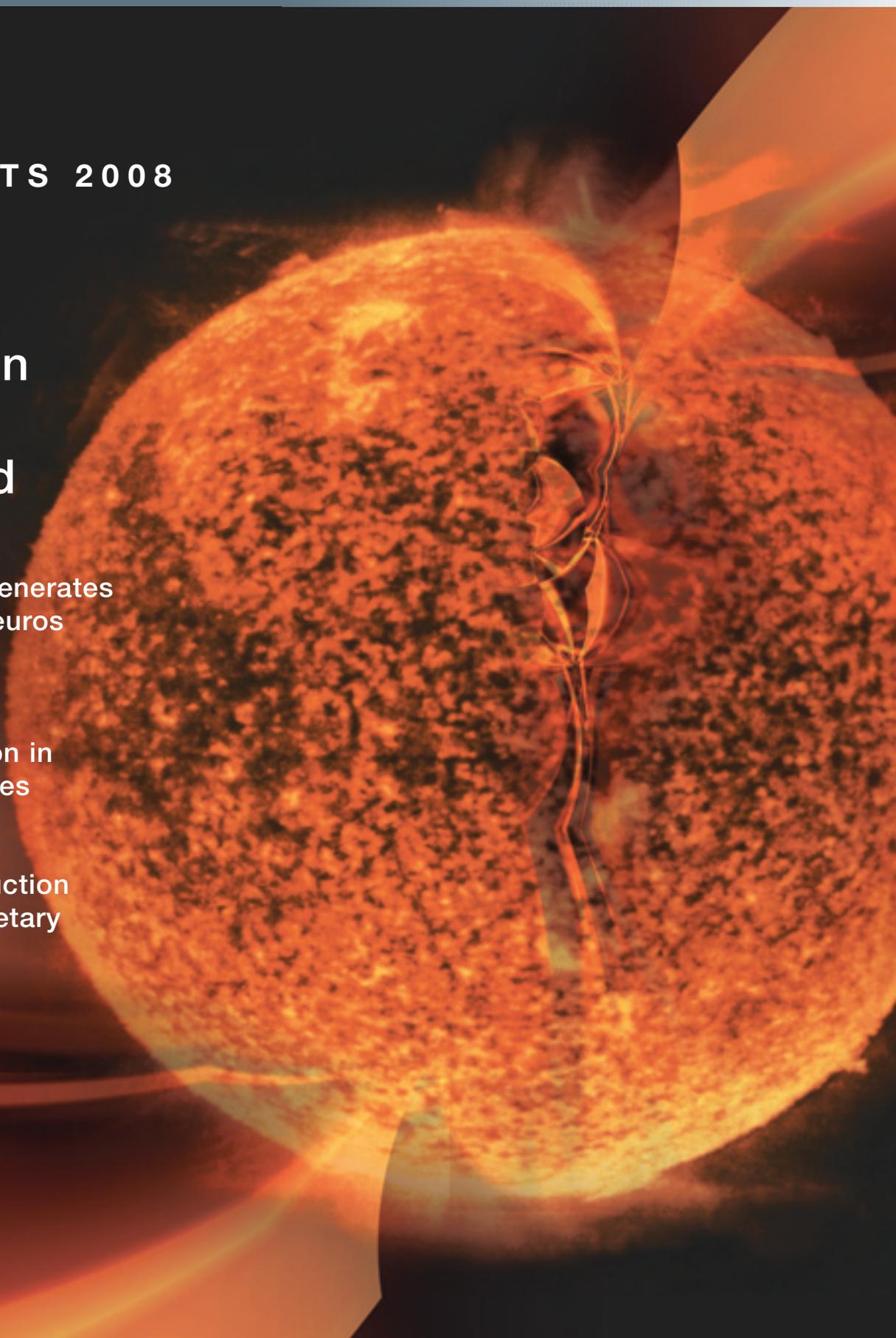


### Acquisition of GTP completed

Plansee Group generates  
over one billion euros  
in sales

Waste gasification in  
molybdenum tubes

Worldwide production  
network for planetary  
carriers



# Mission

“Our metals drive machines, light our houses, transmit words and pictures over long distances and do a thousand other useful and essential things.”

*Paul Schwarzkopf  
founded Plansee Group in 1921*

## Mission and objectives

### Mission

**All Plansee Group divisions achieve excellence in powder metallurgy, and have proven expertise in materials, technologies and applications.**

**We develop, produce and market products from high-technology materials.**

For over 85 years, we have produced powder metallurgical products that stand out in terms of their quality and availability – products that have enabled our customers to increase productivity and make major technological advances.

**Our production technologies cover every step of the value chain.**

It is our customers who determine how much internal added-value our products bring – whether it be powder, semi-finished or ready-to-use components. To ensure we remain the

preferred partner to our customers, we continuously invest in training for our employees, in the latest technology, and in increasing our production capacity – right from the production of core powder metallurgical products through to the moulding, further processing and finishing stages.

**We tailor our customer services, development and production to suit the requirements of our markets.**

The market defines what properties are required of our products. In order to best serve our different markets, we group our activities into business segments. This ensures that we can achieve strong working relationships with all of our customers, while offering them made-to-measure product solutions. We continue this focused customer relationship management during the development and production stages.

### Objectives

**The Plansee Group aims to be the world's leading and preferred supplier of powder metallurgical products manufactured from high-technology materials. The following Group objectives are valid for all divisions:**

#### Leading market position

Our business activities have market-leading positions worldwide.

#### Above-average development

Our companies outperform the market. They are clearly positioned, profitable over the long-term, and achieve ambitious financial targets.

#### Employer of choice

The Group is an employer of choice throughout the world.

# Excellence

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## IMRINT

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## Creative pow(d)er

Dear readers,

With the acquisition of powder specialist GTP, the Plansee Group has not only extended its value chain, it has also become one of the leading powder suppliers in the western hemisphere. As the Group's fourth division, GTP will help Plansee to expand its powder activities in the future.



As a result of the acquisition, the Plansee Group has achieved several key goals: to safeguard its supply of raw materials (particularly of tungsten), to strengthen its refractory metals activities in North America, and to have another production site in the dollar zone.

The Plansee Group is also supporting its global expansion strategy with several excellence initiatives. These include a logistics initiative, which aims to tailor the value chain for our many and varied products to the exact requirements of our customers, all over the world. And the employer initiative aims to show potential new recruits worldwide why the Plansee Group – a privately owned, sustainably managed company – is such an attractive employer.

We have brought numerous product innovations and developments to market in recent years by working closely with customers and business partners. In part, these have resulted in completely new applications for many leading-edge technologies – you can read more about this on our “key developments” pages in this magazine.

I wish you a very pleasant read.

Dénes Széchényi

for the editorial team  
of Living Metals



Picture: NASA/GSFC/LaRC/JPL, MISR Team

## Largest acquisition in the Group's history

The Plansee Group acquired the Global Tungsten & Powders (GTP) business unit from Osram on 1 August 2008. With the acquisition, the Plansee Group has increased its competitiveness, safeguarded its supply of raw materials (particularly for tungsten), and expanded its refractory metals activities in North America. GTP employs 1,050 people and generated sales of 280 million euros in the last fiscal year.

**GTP used to be** part of the lamp manufacturer Osram for many years. Its expertise in processing tungsten ore concentrate and recycling scrap hard materials has enabled the company to become the leading supplier of tungsten powders in North America. Its product range includes molybdenum-based powders and semi-finished products, as well as other powders that are relevant to the Plansee Group's markets. GTP's main customers are from the aerospace, automotive, coating, electronics, energy and lighting industries.

“This acquisition is an important strategic step, and will ensure the long-

term supply of tungsten raw materials. It will also allow us to further strengthen our position in the North American refractory metals market,” says Michael Schwarzkopf, Chairman of the Plansee Group Executive Board. To meet the Group's increasing requirements for tungsten, the Group plans to expand the Towanda site.

Once GTP has been integrated into the Plansee Group, the sales organization will undergo a restructuring. This means that, in future, sales of all powders and other selected product groups will be handled via the GTP sales

organization. Sales of semi-finished products and components made from refractory metals will be handled via the Plansee HPM sales organization. |



*The world's largest hot rolling mill for refractory metals in Reutte, Austria.*

# Success

## Sales reach over one billion euros for first time ever

Plansee Group's consolidated sales rose by 11 percent to a total of 1.079 billion euros in the 2007/08 fiscal year. Its number of employees increased by 350 to 5,900. Record investment of 400 million euros over the last three years has supported the Group's stable growth path. A range of acquisitions and the establishment of new subsidiaries has strengthened the Group's global presence. Excerpts from the speech of Michael Schwarzkopf, Chairman of the Executive Board at Plansee Group, given at the annual press conference in Reutte/Austria:

"In the last fiscal year the Plansee Group increased its sales by 11 percent to 1.079 billion euros. All three Group divisions – Plansee HPM, Ceratizit and PMG contributed to this growth.

Despite the strength of the euro and rising raw-material and energy costs, we increased our market share in all business areas and geographical regions. We achieved even better growth in the USA than in the successful European export markets.

The Plansee Group also recorded excellent sales growth in emerging markets such as Eastern Europe, China and Taiwan. Sales in key markets such as mechanical engineering, automotive and electronics contributed significantly to the growth.

By acquiring the US companies Electro-Graph and Newcomer Products, and by setting up six new sales offices in Mexico, Spain, Italy and China, we have increased our international presence to 70 companies worldwide. The number of sites in

North America went down by two due to production areas being consolidated. The number of people employed by the Group increased by 350 to 5,900.

The Group's profits were satisfactory and in line with long-term objectives. The investment of 116 million euros was financed from operating cash flow. The equity-to-assets ratio amounted to 60 percent of the total balance sheet.

Plansee made investments of 400 million euros over the last three fiscal years, half of which went into our companies in Austria. Key investments were made in expanding the production plant in Breitenwang/Reutte, in building a new hot rolling mill for flat products and a new recycling facility for hard metals. We also invested in developing our factories which focus on particular product areas, for example PMG Polmetasa in Spain.

### Outlook for the current fiscal year

In the 2008/09 fiscal year, we expect a generally stable development for the Group. However, because the economic situation in some markets is quite unstable, particularly in North America, we need to focus firmly on safeguarding our competitive position. We believe that the way to do this is, firstly, by continuously investing in technologies, products and employees; secondly by improving business processes (in particular by focusing factories on particular product areas); and thirdly, by implementing a clear raw material sourcing strategy.

We will help achieve this by expanding the capacity of our hard-metal recycling activities and by taking over US powder specialist Global Tungsten & Powders (GTP). The agreement to acquire GTP was signed on April 22 this year. With the

acquisition of GTP we strengthen our presence in North America, and we ensure that we have a sufficient supply of tungsten raw materials in the long term. GTP employs over 1,000 people and has annual sales of 280 million euros and is the Plansee Group's fourth division." |



*Michael Schwarzkopf  
Chairman of the Executive Board  
at Plansee Group*



*The world's largest shock absorber components plant in Spain.*



*Increased insert production capacity in Reutte, Austria.*



*Expansion of Reutte plant in Austria.*



## Powder metallurgical solutions for the industries of the future

**MOBILITY**

**HEALTH**

**ENERGY**

**INFORMATION TECHNOLOGY**

All over the world, where materials are subjected to extreme external forces, customers rely on Plansee Group powder metallurgical products.

It is their combination of temperature, corrosion and wear-resistance, with electrical and thermal conductivity (as well as many other characteristics) that make Plansee solutions so successful.

Every one of our products draws on our expertise in the production and machining of PM items, and our knowledge of materials.

Customers in high-tech industries such as energy and medical technology, IT and mobility are always looking for new combinations and classes of materials for their products. The Plansee Group is committed to aiding the technological advancement of these customers by providing high-performance materials, working as a development partner and as a reliable supplier

of semi-finished and ready-to-install components.

The Group's extensive product portfolio demonstrates the diversity of our material solutions, industrial applications, and technological processes. What's more, it shows that we have lived up to our slogan of "Excellence in powder metallurgy" for over 85 years. Below are some highlights of our work:

**Energy – from production to distribution**

The Plansee Group is heavily involved in the development of future energy sources: we develop sophisticated materials for thin-film solar cells, fuel cells and nuclear fusion reactors.

**Health – from diagnosis to treatment**

An increasing number of medical technology manufacturers rely on high-technology products made by Plansee Group. Our key components are used in CAT scanners, devices for radiation therapy and for dental drills and denture products.

**Mobility – from production to maintenance**

The Plansee Group manufactures a wide range of products for the automotive, aviation and rail industries. These include tools for machining airplane components, engine blocks or high-speed train wheels.

**Information technology – from tools to components**

The Plansee Group helps the IT industry meet demand for ever smaller and better-performing components. Our products are used for manufacturing microchips, cooling down electronic components and machining tiny circuit boards. |

future

## Independency in powder supply

On August 1, 2008, US powder specialist GTP became Plansee Group's fourth division. Michael Schwarzkopf, Chairman of the Plansee Group Executive Board, and Bob Fillnow, President and CEO of GTP, talk about their strategy and the next stages in the integration process.



### What was the rationale behind the acquisition of GTP?

Michael Schwarzkopf: In recent years, we have significantly strengthened our activities in the dollar zone, and by acquiring GTP, we will generate 25 per cent of our sales in America, 25 per cent in Asia and 50 per cent in Europe. The acquisition of the Global Tungsten & Powders business unit from Osram also represents an important strategic step forwards.

### Why?

Schwarzkopf: By buying GTP, we are extending our value chain. Previously, we would manufacture semi-finished and ready-to-install products from

the finished metal powder, but now we can make the powder ourselves. GTP is the leading manufacturer of tungsten in the USA, and so availability and quality of this metal are now ensured. As a result, we are no longer dependent on Chinese suppliers, particularly for tungsten powder.

### How is GTP being integrated into the Plansee Group?

Bob Fillnow: GTP is the Plansee Group's fourth division. And, in the same way as the other divisions, it has its own branding, its own management, and manages customer relationships in a way that is tailored to their specific requirements. However, we will of course share group-wide service functions where it makes sense to do so.



Manufacturing tungsten powders is now one of the Plansee Group's core competencies. The different stages of the production process can be seen here from the bottom up:

- 1 Wolframite
- 2 Scheelite
- 3 Ammonium Para Tungstate (APT)
- 4 Blue oxide
- 5 Yellow oxide
- 6 Tungsten metal
- 7 Tungsten carbide

### GTP supplies metal powder to Plansee Group's competitors. Does this cause a problem?

Fillnow: After the acquisition, we made it very clear that GTP would continue to supply powder to its existing customers as normal. Customers can continue to rely on the same high quality, supply and excellent service. In order to meet the Plansee Group's demand for tungsten and molybdenum powder, we will be significantly expanding GTP's production capacity.

### How is the role of GTP within the Plansee Group?

Schwarzkopf: By buying GTP, we have not only safeguarded our supply of raw materials, we have also strengthened our refractory metals activities in North America

### And what makes GTP special as a company?

Fillnow: We specialize in the production of tungsten, molybdenum and phosphor powder. In addition, we use this powder to make powder metallurgical semi-finished and ready-to-install products. In recent years, we have achieved excellent results as a business unit of Osram Sylvania. However, being part of the Plansee Group means we belong to the core business – and this gives GTP better long-term prospects and the opportunity to achieve sustainable growth. |

# WW74

### COMPANY PORTRAIT ON GTP

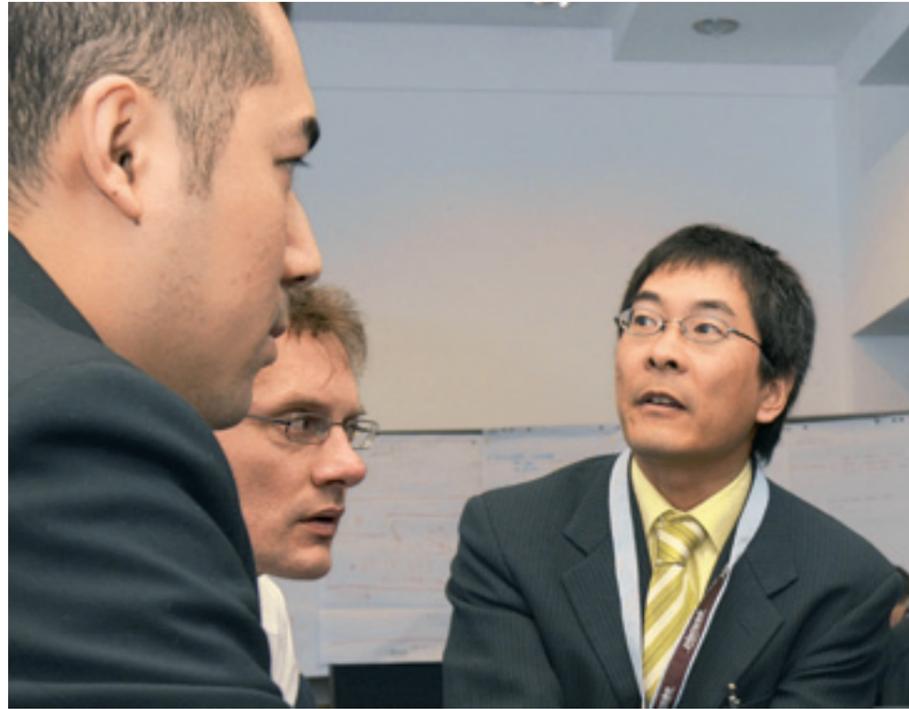
The Global Tungsten & Powders (GTP) division belongs to Plansee Group as of 1 August 2008. The company has two production sites in Towanda/Pennsylvania and Bruntál/Czech Republic.

GTP is one of the worldwide leading suppliers of powders, semi-finished products and components made from tungsten, molybdenum and phosphor. GTP supplies to customers from the aerospace, automotive, coating, electronics, energy and lighting industries.

In the fiscal year 2007 GTP has achieved sales of 280 million euros and employs 1,050 people.



# interview



## Staff and company growing as one

Using the slogan “Wanted: bright ideas. And bright thinkers”, the Plansee Group aims to recruit talented, ambitious employees to support the organization’s dynamic growth with sound knowledge and innovative ideas.

### Careers fair recruitment

The Plansee Group has targeted young material scientists, mechanical engineers and metallurgists as part of a wide-ranging recruitment campaign since early 2007. Over 150 specialist scientists and engineers work at the Reutte site in the development of materials and technologies, and potential new hires can meet some of these experts in person at a number of career fairs. Applicants start at Plansee, Ceratizit or PMG on work experience programs, university sandwich years, or

as graduates, trainees or permanent staff in attractive positions.

### Employee and management development

The Plansee Group’s dynamic growth offers talented staff a wide variety of exciting career paths, as either technical specialists or managers, with opportunities around the world. The “8 out of 10” program has been introduced with the aim of filling eight out of every ten management positions with internal staff – provided they are properly qualified. There are a range of employee development schemes designed to ensure this, the most prestigious of which is the “General Management Training” program, a one-and-a-half year course that began in autumn 2007.



# people

### Devolving responsibility for proper corporate governance

Plansee Group has a long and proud tradition of responsible corporate governance. To ensure this continues as the Group expands, a set of guidelines have been drawn up concerning workplace conduct, the protection of information and expertise, and non-disclosure agreements. The managing directors of each of the Group’s 70 companies are responsible for ensuring these guidelines are implemented and followed.

### Excellent remuneration

Employees at the Plansee Group’s largest site in Reutte, Austria, enjoy wages and bonus that are far above the national average.

For many years now, staff at the site have shared in the company’s success in different ways: via annual bonuses that depend on the profitability and productivity of the company, and via process bonuses dependant on the achievement of specific line targets and management objectives.

Many other Plansee Group sites have profit sharing schemes, with systems varying between countries and locations. A policy introduced in autumn 2007 means temporary and permanent staff at Reutte are offered the same wage and bonus scales – a move that sets a shining example to businesses across Europe.



The Plansee Group is similarly exemplary in terms of retirement provision: all staff are offered the chance to pay part of their salary into their pension plan. The company subsidizes these contributions and guarantees an attractive rate of interest on the pension fund. |

Detlef Bartsch,  
Head of HR at Plansee Group.

*Snapshots of the Plansee Group’s general management training.*



## Intelligently shaping logistics processes

The extensive range of products offered by the Plansee Groups means that implementing efficient logistics processes is no easy task. In order to provide the flexible and transparent systems that our customers require, the Plansee Group offers tailor-made logistics solutions for every type of customer and product group.

In order to be able to deliver these tailor-made solutions across the whole Group, a corporate logistics function was set up in May 2007. Its aim is to deliver consistent logistic processes and cost structures, to enhance the speed and transparency of the Plansee Group's logistics in the long term, and to ensure that the company makes constant innovations in the logistics chain.

A global IT system supports the entire global value chain, from the purchase of raw materials to the delivery of the finished product. The main projects of the company's logistics function are as follows:

### Optimizing the flow of goods

The Plansee Group's sales and production network aims to provide all customers with one contact person for the whole logistics process, no matter which production site is delivering the goods to them. In order to make sure that this system is a success, global value chains for select product groups are examined

in detail. This ensures, for example, that every aspect of sputter target production, processing, bonding and logistics is specifically tailored to the needs of the electronic industry.

### Minimizing costs and lead times

Several pilot projects within the Plansee Group have led to a significant reduction in production lead times. Improved production planning offers shorter delivery times and improved reliability.

### Reducing stock levels

The Plansee Group is working alongside its customers to help them reduce their stock levels and develop solutions to improve supply security. Added to this, the Plansee Group is making comprehensive investments across the value chain, developing software-based planning aids and taking on additional logistics work for customers, e.g. managing warehouses for the semiconductor industry.

### Optimizing processes

To deliver impeccable logistics alongside impeccable product quality, the Plansee Group and its customers are together identifying the best ways of organizing demand planning, the ordering process and the actual delivery of the product. A flexible logistics process is essential here, as it offers the manoeuvrability necessary to meet specific customer requirements along the value creation chain. This is based on the just-in-time

delivery approach that we have been using when dealing with the automotive industry for many years now.

### Transparency and controlling

By ensuring logistics costs are fully transparent within the value creation chain, both partners can identify the added value of intelligent logistics solutions in euros and cents. In the near future, the Plansee Group will outline this added value as part of a logistics statement – and will actively offer this service to its customers.

### Simplifying customs procedures

Plansee Group companies will now refer all queries relating to customs procedures when importing and exporting goods to an internal panel of experts. This will ensure goods move around the world swiftly and simply, while meeting all legal obligations. |

*Harro Borowski, Head of corporate logistics at Plansee Group*

## Cost transparency, speed, and innovation

Plansee Group logistics solutions meet the following customer requirements:

**Cost transparency:** as the timely management of order, production and distribution processes becomes evermore complicated, logistics account for an increasingly greater proportion of the end product's cost. At the same time though, efficient logistics processes can lead to major competitive advantages. The logistics statement transparently outlines

logistics costs and revenues, highlighting their impact and showing why they are included in the overall costing.

**Speed:** if the demands made of logistics by the market increase, it is more likely that problems will arise in established business processes, such as in material procurement, quotation and order processing, production planning and production management. It is the responsibility of the logistics department to

ensure that any problems are kept to an absolute minimum via clear regulations, and innovative, flexible business and information exchange processes.

**Innovation:** this refers to the development, adaption and implementation of specific process models, organizational structures, and (IT) systems that will help our business and our customers to improve process efficiency – and therefore enhance overall value. |

## Plansee HPM – the world market leader

The rapidly increasing global demand for energy offers Plansee HPM several opportunities in the area of energy provision and distribution, with Plansee HPM supplying key components to many new systems – from solar cells, fuel cells, and nuclear fusion reactors, to the production of semiconductor base plates and switching contacts for energy distribution.

### Sales and production expansion

By acquiring US company Electro-Graph, Plansee HPM has become the world's leading supplier of tungsten, molybdenum and graphite components for the semiconductor industry.

The company has also expanded its sales team in key markets such as Europe, Taiwan, China, South Korea

and India, and has established new companies in China, Italy and Mexico.

The huge investment made in previous years in production capacities and standardization is now being supported by a program to further increase operational excellence. An innovation initiative aims to ensure that new products account for 30 percent of all sales in the long-term.

To capitalize on the excellent awareness of the Plansee core brand, and to help the organization penetrate and expand in new markets, almost all companies belonging to the Plansee HPM Group now feature the same worldwide branding. |



## Ready-to-install PM components for fuel cells

Key Plansee HPM components for high-temperature fuel cells enable decentralized electricity generation – a cleaner, more reliable and affordable energy solution.

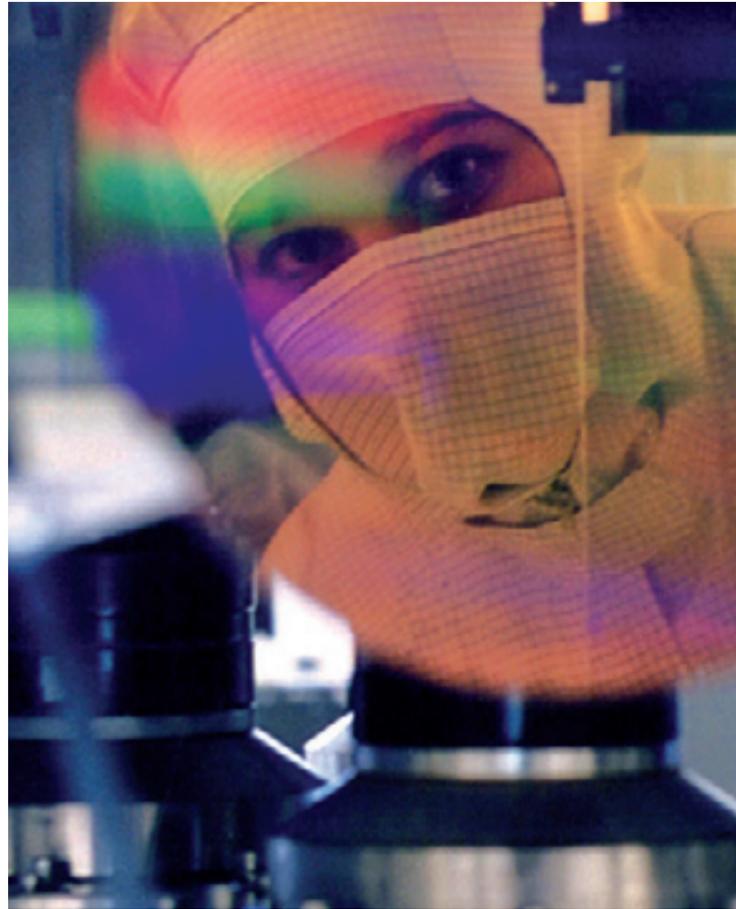
**The components**, known as interconnectors, are produced by powder metallurgy and are used in stationary fuel-cell power plants, and as power units in cars and trucks.

To manufacture the components, Plansee uses its extensive knowledge

and experience of producing and coating net-shape sintered components.

As part of an effective network of research institutions and industrial firms, Plansee is a leading supplier of ready-to-install metal components for high-temperature fuel cells. |





## Leading supplier to the semiconductor industry

With the integration of US company Electro-Graph, Plansee HPM boasts a global production and sales network for ion implantation components.

**Ion implantation** is an important part of producing integrated circuits. The process is carried out in an ionization chamber, which must be able to withstand extreme temperatures and aggressive environments. As a result, it is made of extremely heat, corrosion and wear-resistant materials.

Plansee HPM supplies the semiconductor industry with components for the ion source and beamline. These are made from molybdenum, tungsten, tantalum, graphite, ceramic and steel. This wide selection of products is used by all system manufacturers in the semiconductor industry.

Plansee is able to guarantee consistent quality materials, as it is the only manufacturer worldwide to boast

production facilities that are fully integrated – from powder processing to the pressing, sintering and rolling of the refractory metals, right through to the machining process.

As the global market leader in components for ion implantation, Plansee HPM offers first-rate applications, exceptionally high quality, and excellent availability. And the company is continuing to reduce process costs.

The company's efficient storage and logistics system means it can supply over 1,000 ion implantation products anywhere in the world within a very short space of time. Innovations and developments to existing products are also always carried out in close cooperation with customers. |

## Waste gasification in molybdenum tubes

It almost sounds too good to be true: an on-site, low-emission waste disposal process that also provides electricity and heat.

**This vision of** the future is already a reality at a pilot facility at Munich airport, where all types of crushed garbage – including toxic and harmful waste – is treated at temperatures of up to 1,700 degrees Celsius. The process is known as ultra-high temperature gasification, and converts over 97 percent of all organic substances into gas. This gas is then used to power generators and produce electricity, with the waste heat used for district heating, or to generate electricity. The process is ideal for small or medium-sized sites, allowing them to dispose of refuse on the premises, and leaving only energy-free materials that can be transferred to a landfill site without harming the environment.

The materials used by one of Plansee HPM's customers required temperatures of between 1,250 and 1,500 degrees Celsius, as this was the only way to produce a tar-free

synthesis gas containing energy, which could then in turn be used to generate energy in a variety of ways.

A molybdenum tube made by Plansee HPM is the key element in the system, and is where the ultra-high temperature gasification takes place. Molybdenum is particularly well-suited for this application – it is able to withstand fluctuating temperatures of up to 1,700 degrees Celsius, aggressive acids from varying garbage types, and the inductive heating needed to bring the tube up to its operational temperature.

Plansee HPM has worked with its customer on this joint development since the end of 2002, and the project marks a major technological breakthrough. This was made possible due to the high-temperature resistance of molybdenum, as well as the processing technique used to manufacture the molybdenum tube.

Although oxygen is excluded from the garbage ultra-high temperature gasification process within the tube, there are often remains of the gas inside the garbage granules, and these could damage the highly reactive molybdenum. This is why Plansee HPM has developed a special patented coating called Sibor, which offers exceptional protection against oxidation. |

### REFRACTORY METALS

Plansee HPM offers a unique range of products made from the refractory metals molybdenum and tungsten. It is a leading specialist in the development of customer-specific solutions.



The Plansee molybdenum tube for waste gasification can withstand temperatures of up to 1,700 degrees Celsius.



## Key components for high-end computed tomography

*The Somatom Definition: advanced X-ray technology from Siemens.*

The dual source Somatom Definition CT scanner represents the most advanced generation in X-ray diagnostics. The system enables heavily overweight patients to be examined, and provides images of beating hearts, despite subjecting patients to lower radiation doses.

**These advances** have been made possible due to the addition of a second X-ray source. This doubles the scan speed and performance of the device – placing increased demands on Plansee HPM’s rotating anodes, one of the core components of the CT tubes.

The focal track (the surface of the rotating anode struck by the electron beam) now has to withstand more severe loading conditions and to conduct the heat created by the huge energy input out of the X-ray tube as quickly as possible.

Plansee HPM worked closely with Siemens to further improve the rotating anodes, which are based on TZM and tungsten-rhenium. The result is a new combination of materials, which are integrated into the rotating anode structure, specially suited to active cooling. Plansee HPM’s expertise in manufacturing technology proved particularly useful for mass producing these components.

As well as rotating X-ray anodes, Plansee HPM supplies a range of other key components for the X-ray tube. These include a doped tungsten foil for the production of the electron beam emitter, which must meet the highest demands in creep resistance and thermomechanical loading capability.

Plansee HPM has also developed extremely thin tungsten foils (known as collimators) with exceptional absorption ability for the detector, the part of the CT scanner which transfers the X-rays into images once they have passed through the patient. Several stages of rolling and a sophisticated stamping technique, ensure the components deliver the level of precision required. |

## Covering the entire coatings market

Plansee HPM has gradually developed its product offering to include a complete range of coating material solutions for the tooling, solar and electronics industries.

**The company now** offers almost all target materials for thin-film solar cells in a variety of forms. This enhances productivity during the coating process.

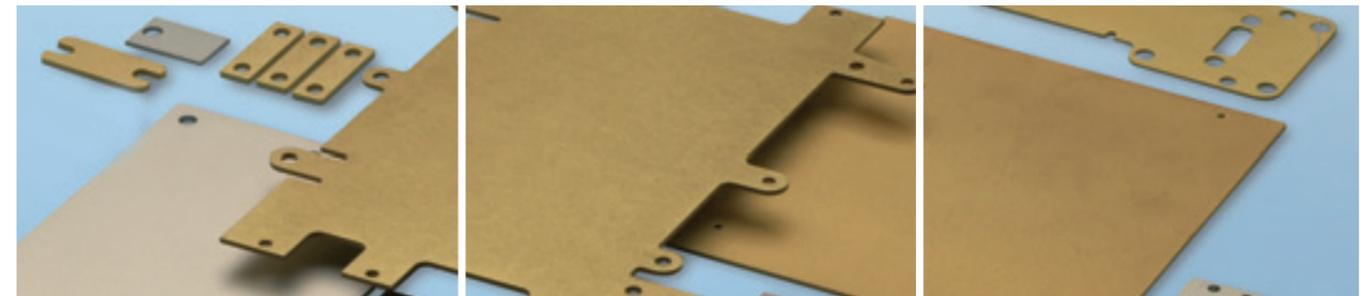
In addition to titanium/aluminum, aluminum/chrome and pure chrome coatings, and targets made of titanium-silicon, Plansee HPM now offers a comprehensive range of sputtering products for

tool manufacturers and coating centers.

Cutting tools coated with titanium-silicon remain extremely hard even at the highest temperatures, which means they are ideal for tasks that require high speeds, such as machining components for the aviation industry. |

### COMPOSITE MATERIALS

Plansee HPM’s range of products for selected niche areas consists primarily of powder metallurgically-produced composite materials.



## Keep cool

Plansee HPM has developed advanced metal diamond composites for cooling of electronics. Owing to their superior thermal properties, the composites ensure efficient thermal management for improved performance and reliability of high-performance laser diodes, power transistors and microprocessors.

**In modern semiconductor** devices, the amount of heat loss can be more than 50% of the power input, depending on the efficiency of the device. More than half of semiconductor failures occur as a result of thermal stress and degradation. Excessive heat needs to be removed from the system in an efficient way to keep the temperature of the semiconductor below critical temperatures of about 125°C to 175°C. Effective thermal management increases the performance, life time and reliability of electronics.

The diamond composites are produced via an infiltration process capable of near net shape production of complex shapes. Sizes as small as a paper clip to as big as a phone book can be produced using this technology. Different metallic matrices of silver, copper and aluminum alloys with diamond particle reinforcement are commercially available for different applications. The composition of diamond and metal leads to a combination of extraordinary high thermal conductivity and coefficient of thermal expansion matched with

that of the semiconductor materials, e.g. Silicon or Gallium Arsenide.

Plansee metal diamond composite heat sinks are optimized for use in microelectronics as heat spreaders for servers, power modules for industrial drives, electric locomotives and hybrid engines, as well as high-performance laser diodes and LED. |

## Ceratizit enjoys success in niche areas

**The acquisition** of US company Newcomer Products enabled Ceratizit to strengthen its position in North America. Based in Latrobe, the company has now become Ceratizit's head office and logistics centre for its US operations. The Columbia site in South Carolina has been closed down. To further expand the global sales network, new offices have been opened in Mexico, and in Langfang, China, while WNT, the sales organization for cutting products for small and medium-sized businesses, has opened an additional office in Spain.

The Focus Future project has been introduced to enable Ceratizit's main production sites in Horb (Germany), Mamer (Luxembourg) and Reutte (Austria) to specialize in certain product groups. The realignment is part of the company's

efforts to be more flexible and react more quickly to market changes, as well as to secure Ceratizit's leading position as a supplier of high-quality technology at cost-effective prices.

Regardless of order size and product specifications, customers today expect to receive their products faster than ever, and Ceratizit has launched numerous projects to reduce delivery times. An express line for rods and cutting inserts has been set up for particularly urgent requests, with rods produced to customer specifications and delivered within just three days of first receiving the order.

A sales optimization project has been launched, with the aim of making the sales structure and operations more focused on customer requirements. The project should

lead to greater transparency for all customers.

The recycling of scrap hard metal is an increasingly important issue within the company. After the successful completion of a pilot project, Ceratizit is now investing heavily to increase production capacities. |

## Hard-metal head for drills

The latest innovation from Ceratizit and Hilti's 25 year development partnership is a drill bit that guarantees reliable service and a high degree of wear resistance, while also offering clear added value for users.

**The new drill** bit has a gradient design, and has an extremely tough and wear resistant head, which is securely welded to the steel shaft.

The different properties of hard metal and steel make welding the two materials together one of the most complicated tasks involved with drill making. The drill head of the revolutionary new tool from Hilti is either welded or soldered onto the steel body. This method allows more

flexibility when designing the cutting arrangement, which in turn enhances the performance of the drill, particularly when drilling abrasive concrete or concrete reinforcements. |

### STONE-WORKING EXPERTISE

As well as an extensive range of standard drill plates for stone working, Ceratizit also provides customer-specific solutions right up to the production stage.





Ceratizit carbide cases for Swiss watchmaker Rado: injection moulded parts before sintering.

## Carbide for scratch-resistant watches

Over 45 years ago, Swiss fine watchmaker Rado produced the first ever scratch-resistant watch. Since then, Ceratizit has supplied the firm with thousands of carbide cases.

**The story begins** with some very disappointed watch customers, who upon taking their beautiful gold and silver pieces home, discovered that they began to scratch within days and needed constant repolishing. Up until this point, carbide had only been used for special tools, but Rado began to consider employing the material to produce a truly scratch-resistant watch.

Ceratizit immediately set about developing prototypes, and soon struck up a successful partnership with the watchmaker. The company has supplied Rado with carbide cases for decades now, proving exceptionally reliable and guaranteeing a product that delivers perfection in both shape and surface finish. Ceratizit also helps the Swiss watchmaker to introduce new products, by offering extremely short development times.

Thanks to a special carbide injection moulding technique, Rado is now able to incorporate a raised logo on the bottom of every watch case. This is a particularly effective weapon in the fight against product piracy, as it is extremely difficult to replicate. |



The final product: a high-quality, scratch-resistant Rado watch.

### WEAR RESISTANCE

Carbide solutions for applications that require very high wear resistance. Powder metallurgy production allows wear parts to be tailored to customers' exact requirements, with materials specifically chosen for the pressure, temperature, or abrasive or aggressive forces they will be subjected to.

## Delivering machining excellence

When machining crankshafts, Audi Hungaria insists on quality and efficiency. To achieve this, they use specially tailored cutting inserts from Ceratizit.

**Audi Hungaria** employs cutting inserts developed by Ceratizit and by machine manufacturer GFM to produce its crankshafts. The crankshafts are supplied as forgings and weigh around 26 kilos – eight kilos are then removed during the machining process.

When producing the crankshafts, Audi requires reliability, long service lives, low tolerances and optimum tool costs. The blank crankshaft is irregular and shows varying properties and its surface is not homogeneous. This means hard and irregular strain on the inserts.

The shape of the Ceratizit cutting inserts is largely dictated by the contours of the crankshaft. Ceratizit has been working with Audi on crankshaft machining for four years, during which time the company has continually improved and refined the cutting material and the shape of the cutting edge. |

### TAILORED CUTTING SOLUTIONS

Ceratizit is a cutting expert in selected niche areas. It provides customers with a complete range of services, including working with them to develop unique technical solutions, and training staff to use the tools.



Before milling, a crankshaft for the 3.0 TDI engine weighs 26 kilos. The machining process reduces this to 18 kilos.

Highlights Ceratizit



## Maximum durability for producing rolls

*Before and after: Åkers rolls weigh up to sixty tons, and are produced using Ceratizit cutting inserts.*

Swedish roll producer Åkers uses Ceratizit cutting inserts to manufacture its products.

**The rolls are** supplied to major steel businesses, weigh up to 60 tons, and are used to convert aluminum and steel into sheets and strips. After being cast, the rolls are either cut, turned or milled according to requirements.

Up to 50 percent of the roll's volume is removed in this way, and is returned for recycling. Ceratizit supplies ceramic and hard metal cutting inserts for machining the rolls.

It is essential that these inserts are safe to use and exceptionally wear-resistant. As it can take several

hours or even days to complete a roll, the production process needs to run constantly for long periods of time – and changing cutting inserts because of breakages or excessive wear is simply not an option.

Ceratizit also develops special solutions for cutting depths of up to 100 millimeters and for rolls with a high alloy content. This makes the roll harder, more resistant and longer-lasting, though it also places extra demands on the cutting tool. |

## A world-first: aluminum processing without coolants

Ceratizit has developed a cutting tool which features a compressed-air cooler – this makes dry processing aluminum wheels simpler and cuts production costs.

**The cooling system** MAC uses compressed air instead of coolant. The extremely cold air lowers the temperature of both the aluminum chips and the tool, preventing the two parts from sticking together.

Another advantage is that the chips do not need to be cleaned before being recycled. |

*The world-first cooling unit MAC enables aluminum wheel machining without costly wet processing.*



## Always ready: the WNT tooling machine

Simply enter the code, select a tool, and pick the product – tooling has never been easier than with WNT's Tool-O-Mat.

WNT installs the Tool-O-Mat directly in customers' production areas, and whenever machine operators require a new tool, they simply take it from the machine. The Tool-O-Mat offers the following advantages:

**24-hour availability:** the most used production tools are always available, even for workers on night shifts.

**Monitoring of removal and use:** all tools removed from the machine are recorded, with the time, person, type and number all noted.

**Stock-keeping:** a connection to WNT's central warehouse means stock can easily be managed and supplies delivered as required.

**Billing:** an invoice is sent at the end of every month. Customers are

only charged for the products they have used. The Tool-O-Mat and its contents remain the property of WNT.

Customers also benefit from faster set-up times, greatly reduced inventory levels, and a significantly less complex ordering system. |



### CUTTING TOOLS FROM WNT

WNT is a sales organization within Ceratizit that is responsible for selling standard cutting tools to small and medium-sized businesses.

*The Tool-O-Mat is like a small WNT warehouse located right in the customer's factory.*

## PMG enters new business areas

With a wide range of technology and product transfers, PMG is now able to provide its customers with locally manufactured products. For example, the company now offers planetary carriers for automatic transmissions in Japan, Europe and the USA. Similarly, DensiForm technology, used to produce sintered components with an exceptionally dense film on heavily loaded surface areas, is now available in China and Japan. And local customers are supplied with sliding sleeves for manual transmissions in Spain.

PMG considers the powder metallurgical production of soft magnetic components a particularly

promising field for the future, and is currently developing and supplying a wide number of prototypes and first complete products to customers.

### Commitment to Asia

With the sale of the Ohio plant to a private investor, PMG has strengthened its production network in the USA.

At the same time, PMG has extended its site in Indiana, USA. This included building a new press for producing planetary carriers, and investing in a new research and development center.

In Reutte/Austria, a fully automated production line for planetary carriers was commissioned in April 2008.

To satisfy the demand of several customers for powder metallurgically manufactured components for engine and chassis, PMG has founded the subsidiary PMG Shanghai Fengxian and builds a 5000 square meter plant in Shanghai. |

## Awards for PMG

The American Powder Metallurgy Association has awarded top prizes to two components produced by the PMG Group. The awards ceremony took place during the World Congress in Washington in early June.

**PMG Füssen** picked up the grand prize in the automotive engine category for its stator used in a variable valve timing system, which replaces two parts with one.

The second grand prize went to PMG Japan for its gear set in the automotive chassis category. The parts are used in steering columns, and mean that forged parts are no longer required. |



Stator from PMG Füssen (left) and gear set from PMG Japan.



## Soft magnetic inductor cores for electric motors

The PMG Group's newly-formed Electric Applications business unit works to develop and market PM soft magnets.

**Soft magnetic** inductor cores are found in electric motors, alternators and servo motors used in the automotive, energy, and medical sectors. PMG has now made comprehensive improvements to the production process for soft magnetic materials, and so further increased the advantages offered by this technology.

PM products also boast superior electrical, magnetic and thermal characteristics, and offer significantly reduced energy loss in the core. This method of production process also offers savings in volume, weight and cost. |

Customers prefer using PM-produced soft magnets because of the additional three-dimensional design opportunities offered for components such as inductor cores.

Highlights  
PMG

## Worldwide production network for planetary carriers

With the commissioning of a fully-automated planetary carrier production line in Reutte, Austria, PMG now boasts a global production network for what are key components in automatic transmissions.

**With production** facilities in Japan, Europe and the USA, PMG can supply international transmission and automotive manufacturers with locally-produced planetary carriers around the world.

Planetary carriers are complex components that are made up of several elements. PMG makes them using a particularly efficient production process, sintering and brazing the components in one single stage. This has a positive effect on process, machining and energy costs.

The fully-automated facility in Reutte is the newest, most modern production line in the PMG Group. PMG's strategy is to focusing on select product groups, and produce these in large quantities at sites that are geographically close to key customers – and the Reutte facility is an impressive example of this strategy in action. |



## First sintered sliding sleeves

The PMG Group is now able to mass produce sliding sleeves using powder metallurgy – previously the components were made out of cast steel.

**Sliding sleeves** are used in manual, but also in automatic dual-clutch transmissions to change gear, and transfer the power between the transmission shaft and gear wheel.

When producing the component using powder metallurgy processes, it is essential that the shape, dimensions

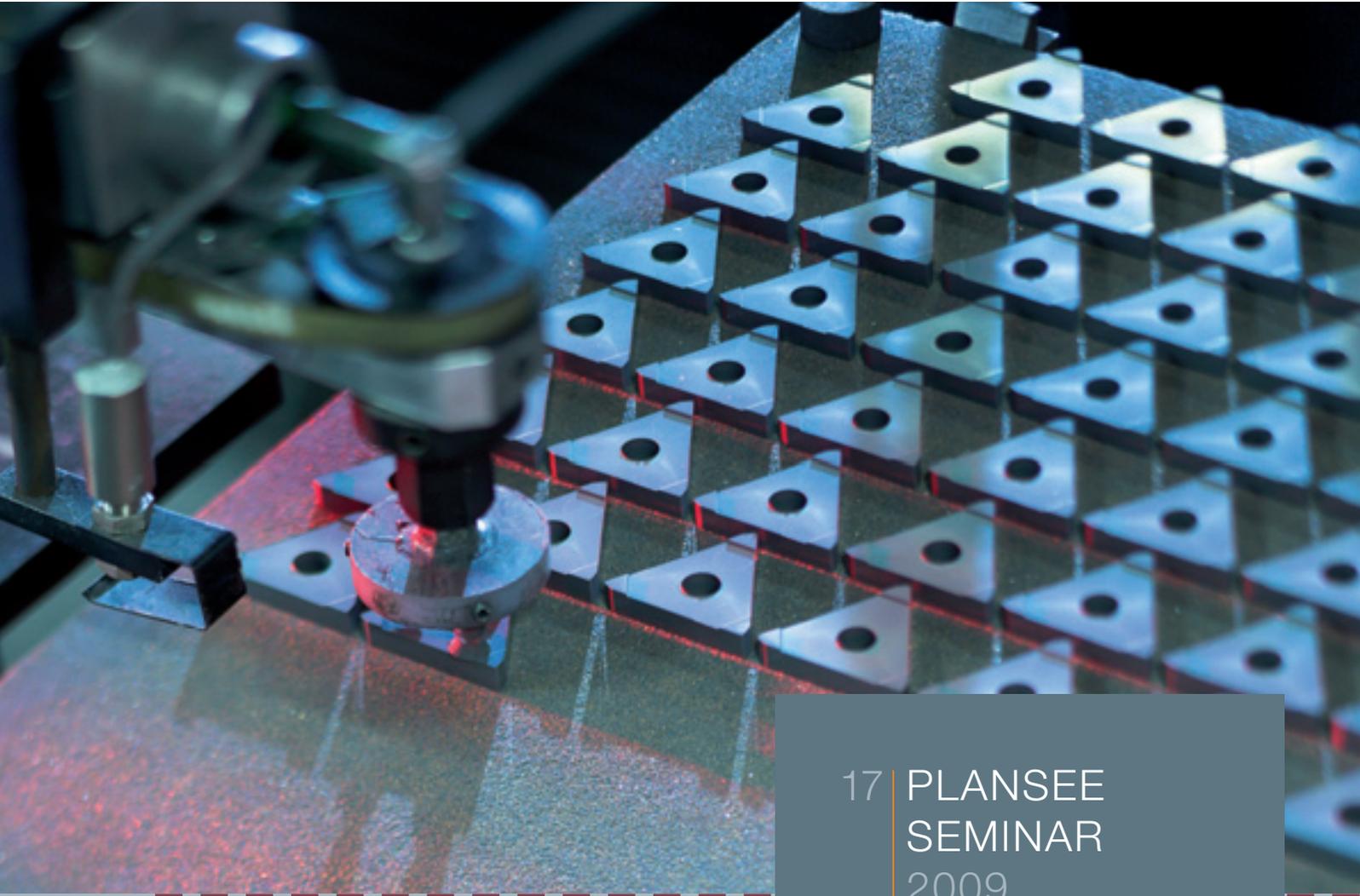


and mechanical characteristics are all exact. Otherwise, smooth gear changes cannot be guaranteed.

PMG's solution meets the high quality demands of the automotive industry with ease, while offering low costs and being exceptionally easy to work with. |

*A sliding sleeve for the five-speed transmission of a 300-Nm Iveco light truck.*

Mobility



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The presentations at the **17<sup>th</sup> Plansee Seminar** will cover all market segments where products made from high performance P/M materials are currently playing an important role, or where they offer promising alternatives to current material solutions.

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