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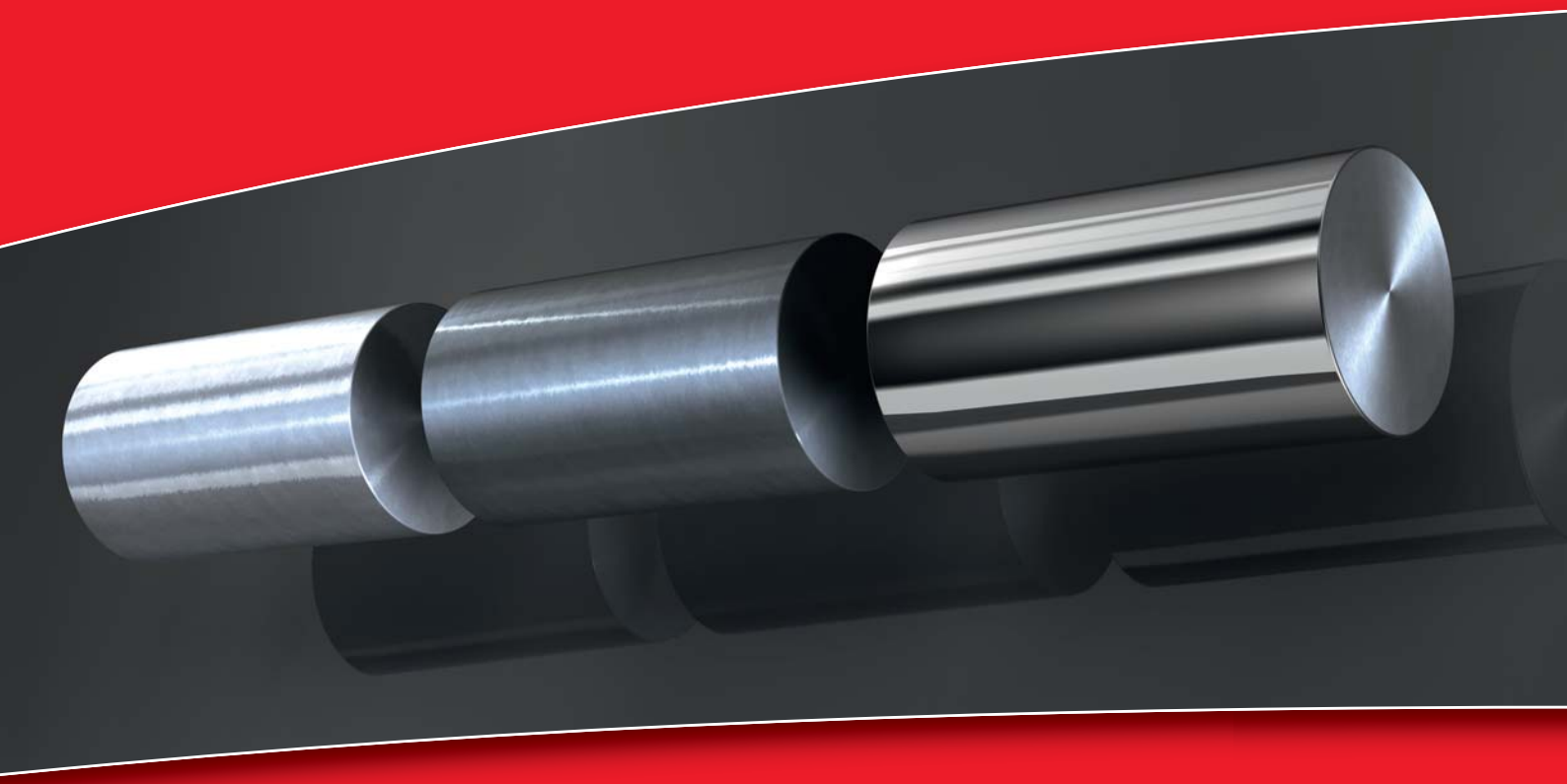


Surface Finishing Systems

Technologies for better surfaces

Rainer Waltersbacher
Managing Director

Editorial

All that shines…is not necessarily smooth – unless it was processed in a special-purpose Supfina machine to produce the ideal surface.

Whether visible or concealed, in the household, the car or on the high seas – it is both amazing and fascinating to discover the many and varied products and applications that use superfinishing and grinding technologies made possible by Supfina.

Supfina, with its state-of-the-art technology founded on its traditional roots has perfected the technology required today for excellent surface finishes. Our continual research efforts contribute to the development of cutting-edge surface finishing technology to enable us to build machines of the highest quality to empower our customers to achieve the high standards of functional surfaces they require.

Accompany us on a journey through the world of functional surfaces.

Contents

Protecting resources.

Get in, start up, drive off – a simple habit. Individual mobility is a key feature of our society. Cars contain numerous moving parts and where they meet, low-friction surfaces are the key to the environmentally aware use of energy.

Crank drive and valve gear

We expect a lot of a modern internal combustion engine. It has to be small, compact and quiet. It has to meet the toughest environmental standards and use as little fuel as possible. At the same time, it has to provide maximum performance.

To meet these needs, such components as the crankshaft, camshaft and balancer shafts are subjected to particularly tough conditions. Engineered finished surfaces created with tape or stone finishing processes guarantee ideal functioning – at a consistently high quality standard.

Gearboxes, power trains and suspension

A powerful engine is simply not enough to move a car forward. The gearbox, drive shaft bearings and journals are indispensable for transmitting force to the wheels. And this is where technology comes in to produce the right surfaces to make the most efficient use of energy. Functional surfaces offering the best possible glide characteristics and optimized microgeometries fully meet these requirements. Surfaces like these are generated in a tape or stone finishing process that guarantees the highest degree of reliability and accuracy.

Supfina for automotive.

Steering

Getting to one's destination safely and in comfort is a key part of mobility today.

Modern automotive technology has turned the simple steering wheel into a complex technical device.

To enable it to fulfil all these needs, the design of the steering linkages and racks requires highly complex geometries. However, it is also the Y section, ball spindle and the cylindrical backs of toothed racks that require perfectly finished surfaces – economically achieved using superfinishing machines made by Supfina.

Frictionless motion.

Several kilometres offshore: enormous wind turbines generating electricity in an environmentally friendly, sustainable manner. Size matters here: the more wind the machines "harvest" the greater their efficiency. Rotor diameters of 100 metres have already been achieved.

The trend in information technology, on the other hand, is exactly the opposite. Performance increases the smaller the components get.

But the requirements regarding the accuracy of component manufacture are extremely demanding in both cases.

Offshore and aerospace

When the wind gets up, the tips of the rotor blades can reach speeds of 300 km/h or more. The forces that occur in the process become concentrated in the rotor shafts and bearing components of these turbines. The sheer size of the components creates particular requirements: the bearing race of a wind turbine, for example, can be up to two metres in diameter.

In the aerospace industry, these requirements are raised to an even higher level, in rotors for helicopters or the bearings for jet engines, for example.

Since these applications involve protecting human lives, accuracy cannot be compromised.

Information technology

Today's computer harddisks take up less space than before and yet offer far greater storage space. These enormous volumes of data can only be safely managed if the individual disks rotate at speeds of several thousand revolutions per minute. Microscopic precision is needed just to manufacture the tiny bearings required for this application.

Supfina for bearings.

Anti-friction bearings and bearing rollers

There is almost no limit to the types of bearings available. Deep groove ball bearings, angular ball bearings, cylindrical roller bearings, tapered roller bearings and self-aligning roller bearings – numerous different shapes and sizes are in use.

Supfina is always able to offer a suitable solution for perfect surfaces.

Our superfinishing machines not only fulfil our customers' requirements in terms of economy, versatility, reliability and quality, they even exceed them.

Our unceasing commitment to development work in cooperation with the anti-friction bearing industry ensures that Supfina technology will remain at the cutting edge in the years to come.

Bearings reduce friction – we reduce friction in bearings.

Quality on the roll.

The manufacture of glass was one of the first great human achievements. Over three thousand years ago, man discovered how to heat sand and create glass. The demands placed on the quality of glass are, understandably, far higher than in those far-distant times, and the fields of application far broader.

Flat glass is manufactured by rolling out the glass when it is still hot, so the accuracy of the rollers has a decisive influence on the quality of the glass – the better the roller, the better the glass.

Glass production

Over the centuries, glass has taken on an increasingly important role in our lives and the trend is likely to continue in the future. Building frontages made of special-purpose glass, for example, enable environmentally-friendly building management coupled with completely new design possibilities. Applications using glass are increasing in the field of solar energy and, in the automotive industry, state-of-the-art glass is offering new freedoms.

Although the basic principles of glass manufacture have remained unchanged for years, today's production processes present a new array of challenges to be overcome.

New shapes, faster, better, cheaper – these are the requirements: and Supfina's top-grade technology is designed to satisfy them.

Supfina for rollers.

Printing, paper and film rollers

It is not only glass manufacture that requires perfectly smooth surfaces. The printing industry, paper manufacture and the production of film all depend on high-precision rollers. The quality of the final product is directly linked to the surface quality of the rollers, which includes both the exact shape of the rollers and the smoothness of their surfaces.

Supfina technology is the ideal answer when it comes to the economical manufacture and maintenance of these rollers.

Ball control.

Dripping taps are annoying. But if that sort of leak is scaled up to the size of a reservoir dam, it becomes a catastrophe.

In environments of this kind, fittings manufactured to the highest quality standards are essential. Only if the ball surfaces within these fittings actually meet the most demanding requirements is it possible to realise construction projects of this magnitude reliably.

At the other end of the scale, medical technology also requires the highest standards of precision – in the interests of human life.

Fittings technology

Dams, refineries, pipelines and chemical plant – all environments that involve total control of fluids and gases need reliable fittings. At the heart of many such fittings is a ball valve. Ball-shaped surfaces are the ideal geometrical shape for accurately controlling technical processes of this kind.

They have to be leak-proof, withstand tremendous loads and have the longest service life achievable. This is only possible if the surface is of the required quality – and Supfina has the technology to create these surfaces.

Supfina for ball joints.

Medical technology

It is not as easy to replace a hip joint as it is to change the washer in a leaky tap.

Right from the word “go”, everything has to be a perfect fit. The ability of the patient to move freely and without pain is due not only to the skills of the surgeon but, in particular, to the extremely high standard of accuracy applied to manufacturing the artificial femur heads and acetabula. In many cases today, ceramic is used for this purpose. This material requires very specialised processes and is more difficult to process than steel.

With superfinishing technology from Supfina, even the surfaces of these ceramic parts are given the required high quality.

Masses on the move.

According to an estimate from 2010, there are approximately seven billion people living on this planet. And the number is steadily increasing.

This means that the need for every-day products is not only enormous, it is growing every day. As a result, there is an ever increasing need for the economical machining of large quantities of industrial components.

Supfina for flat components.

Flat components

Accurate flat surfaces are often required even if the workpieces they belong to are not visible. In household appliances, in entertainment technology, in the manufacture of clocks and watches, in the automotive field – nearly every product today contains small, flat parts.

Due to the high demands made on tolerances, evenness and parallelism, the workpieces have to be ground to a very precise degree to enable them to perform as intended. They are often components that the user never sees but which are essential so that the clock, watch, pump, gearbox and car function properly. The manufacturing process requires both quality and economical processes to be in the foreground.

Economy

This is where Supfina is setting new standards. Our double-disk flat grinding technology enables high product quantities to be machined to consistently high standards in the shortest possible times. The result is workpieces with high surface quality, evenness and parallelism while adhering to the tightest of tolerances and keeping costs per part to a minimum.

Technology for every surface.

An ideal surface is the result of a number of factors interacting with each other. We are just as aware of this as our customers, which is why we have built our successful corporate philosophy on an integrated approach. In other words, we combine traditional knowledge, skills and experience with leading-edge technology and an uncompromising customer-driven focus.

Supfina Grieshaber has dedicated considerable resources to targeted research and has many decades' experience of superfinishing using stones and tapes. By applying our experience of upstream and downstream processes, we are able to provide practically-orientated solutions. Our superfinishing applications for the fields of automotive, OEM, anti-friction bearings, precision engineering in general and medical technology, for which our machines are renowned worldwide, are supplemented by economical machining systems for double-sided and tape grinding operations.

As a supplier of integrated systems, we can provide you with solutions comprising versatile machines, knowledge of processes gained though many years of experience and tried-and-tested processes.

This is backed up by our premium after-sales service to ensure that you, as the customer, will always be able to rely on us as manufacturers and the machines you operate.

Supfina worldwide

You will find Supfina products all over the world. Our regional coverage is as broad as our range of applications. Supfina has now achieved an export ratio of 60 per cent.

Rapid, uncomplicated communication between Supfina, our representatives abroad and you, our customers, has high priority.

We are the specialists.

Our idea of quality

Our idea of quality is providing process capable solutions to customers' requirements.

We apply the full range of our knowledge to achieve the required technical quality economically and efficiently taking into account the upstream and downstream manufacturing processes.

Gauging the advantage

We want to prove how effective our systems are. To enable us and our customers to verify the results of our developments and the machining quality, we work closely with the manufacturers of gauging systems and software.

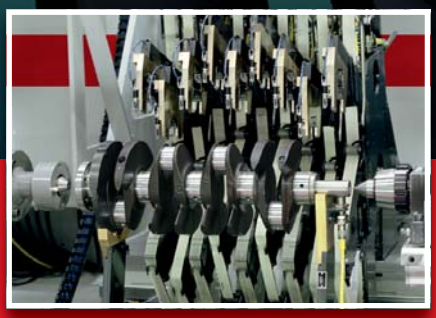
Accurate measuring results gained as the process progresses guarantee continuous monitoring of the surface quality and the adherence to your needs.

Successful partnerships

For over 50 years, Supfina Grieshaber has been this market's leading supplier of engineering and know-how in all matters relating to the economical manufacture of highest-quality surfaces and geometries.

Many product innovations such as diesel injection systems and stepless automatic transmissions would not have been possible without Supfina's surface finishing technology in use worldwide.

What is superfinishing?



Tape and stone superfinishing

Superfinishing is a chip removing machining process. But not one that is comparable to any other. In contrast to the classic lathe turning and grinding methods, there is full surface contact between the tool and the workpiece.

This is precisely the feature that produces the unique characteristics of a perfectly machined surface. This is superfinishing!

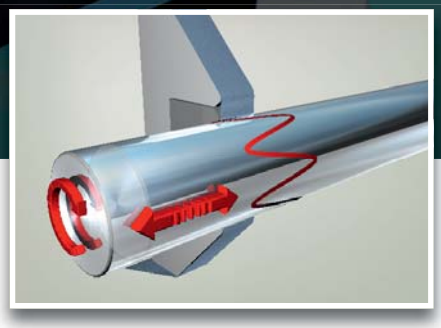
By overlaying workpiece rotation and tool oscillation, each individual grain travels along a sinusoidal line – a feature typical for this process.

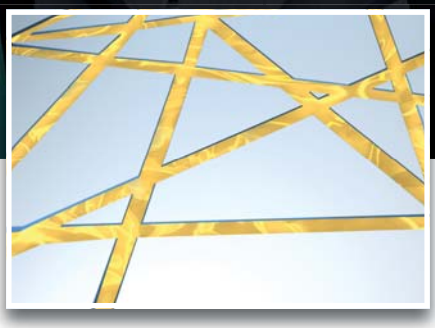
All the grinding grains in contact with the workpiece create a machining pattern by means of overlaying individual sinusoidal lines that cross each other at a particular angle. This generates a specific, defined pattern of grooves and plateaux, which, in turn, results in the particular advantages of the superfinishing process. The grooves act as channels to aid uniform distribution of the lubricant, while the plateaux guarantee a high percentage contact area.

The tools in use here are either bonded grinding compound on a solid substrate, such as ceramic, or on a flexible backing such as a textile tape.

Uniform lubricant distribution, higher bearing ratio, improved microgeometry, optimized peak heights – this is workpiece quality made by superfinishing.

The perfect finish.





Superfinishing - the advantages

- Less friction
- Lower wear
- Low noise levels
- Low energy costs
- Safe application
- Short machining times
- Lower tooling costs
- Low capital investment
- High degree of flexibility
- Reduction in surface roughness
- Increase of bearing ratio to over 90% thanks to the plateau-like surface texture
- Improvement in microgeometry regarding roundness, waviness and such associated qualities as cylindricity
- Optimization of tribological and run-dry properties by means of cross-hatch finishing

What is superfinishing?

Machinable materials

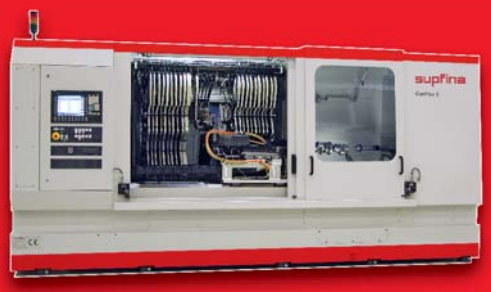
The materials used today are many and varied. It is not only steel in all its many alloys and qualities that can be machined using Supfina machines. The superfinishing process is suitable for all those materials that can be machined with geometrically undefined cutting edges.

These materials include ceramic, plastic, monocrystalline silicon, cast iron and non-ferrous metals.

But such coatings as tungsten carbide, chromium and copper are also processed in Supfina machines to provide them with the perfect surface finish.

- Machining of various materials using superfinishing technology
- The right machining process for each specific workpiece
- The right superfinishing system for the current requirement

Flexible and universal.



Precision grinding.

Planet V - this name stands for one of the most ground-breaking developments in grinding technology. The Planet V series of machines defines a new dimension in double-disk flat grinding. This high-performance, innovative new development by Supfina was conceived jointly with users and features an extraordinarily rigid, compact machine construction. The vertical spindle arrangement provides end customers with the highest workpiece qualities while, at the same time, reducing costs per part.

Some of the unique features are the patented tilted navigation and integrated tool-change device, which reduce retooling time to an absolute minimum.

Thanks to the Planet V's modest footprint, the machine can easily be integrated into new or existing production lines. Loading and unloading can be either manual or automated.

Depending on the workpiece requirements, a choice of tools (conventional/CBN) and methods (throughfeed/plunge-cut) can be used. All suitable dressing technologies can be used.

Simply quicker.

Supfina's SpeedFinish® technology was developed to combine the advantages of grinding with those of superfinishing, i.e. to achieve high removal volumes in the shortest possible finishing times while achieving homogenous surface roughness free of half-moon markings.

The name says it all: it is not only called SpeedFinish®, this system is faster than comparable processes. Workpieces are machined at high speed, which reduces the machining process by as much as 75 percent.

This improves efficiency while, at the same time, improving competitive advantage thanks to reduced costs.

Our service.

Evening time in Germany means early morning in Asia and lunchtime in the Americas. This amounts to a 24-hour day filled with requirements and tasks to be dealt with.

We are ready for it.

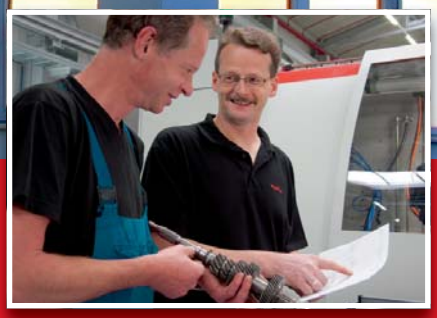
Service is a key component in our company's corporate philosophy. We advise our customers intensively and, together with them, develop the best possible solution for their specific surface requirements.

Our pre-sales service with its application advisors and trial runs is just as natural to us as our after-sales service, which includes maintenance, repairs and the supply of replacement parts and superfinishing tools.

Services at a glance

- Pre-sales service
- After-sales service
- Technology advice
- Training opportunities
- Process development
- Machines on loan

Always available – for you.



We are available around the clock, which does not only apply to our service hours but also to the availability of our range of products.

For every requirement for accurate fine-finishing of surfaces, we have the most appropriate professional solution for you. The flexible machine concept makes it possible to adapt the machine to changing workpieces or modifications to the surface requirements quickly and easily. Exactly the way your production needs it to be. In this way, you can respond rapidly to the changing needs of your customers and consolidate your own market position.

Supfina Grieshaber is your reliable partner worldwide – when it comes to economical machining solutions that are up to your high quality standards – today and in the future.

Let us solve your machining task. Quickly – economically – flexibly.

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