

LEUCOline

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Magentify Wood Processing.

Our tools and services make production processes more efficient and improve the quality of the results.

Picture: Tamedia Media building, Zurich (CH)
Photographer: Didier Boy de la Tour

SAWING:

Burr-free cuts in aluminum and plastic profiles

RUN-THROUGH:

Join abrasive front materials with 6 times the edge life

CNC:

Practical tips for nesting of solid core panels

FINGER JOINTS IN A RUN-THROUGH PROCESS:

Finger joint cutters for higher quality and longer edge life



Frank Diez, chairman of the LEUCO executive board (on the left) and Daniel Schrenk, CEO for Sales and Marketing of LEUCO

PREFACE

Last year, the Corona pandemic presented us with completely new challenges, which we will continue to face in 2021. Time and again, we have successfully demonstrated our innovative and creative strength, especially in difficult times. In addition to the construction of a new hall for the production site in Beinheim (France) and the new construction of the ServiceCenter in Horb (Germany), we have also succeeded in further developing the area of digitalization. The topics of digital twins and e-commerce are just two representative examples.

LEUCO products and services – permanently available and accessible.

The strength of the LEUCO group is its ability to face new challenges whenever they occur.

The key to this ability is our enthusiasm to develop and manufacture efficient and resource-saving tools for the machining of a living, renewable resource.

Equipped with these characteristics and experience, we will continue to be a competent and reliable partner for you – our customers in industry and craft businesses.

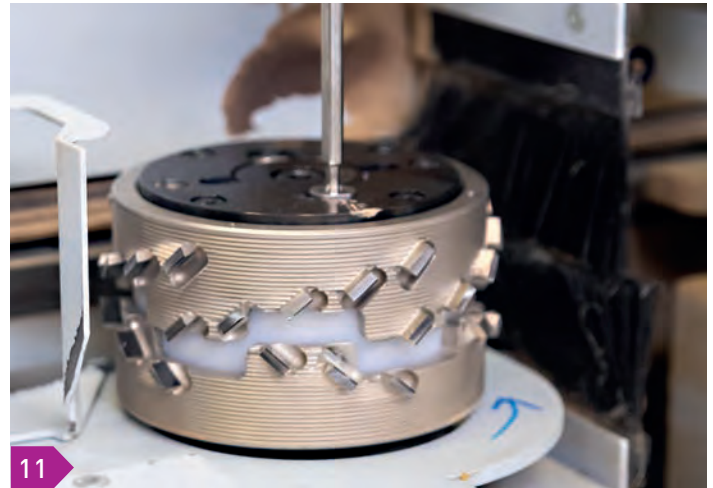
LEUCO Tools and Services, your partner for economical processes and best results.

Magentify Wood Processing.

Your Frank Diez

Your Daniel Schrenk

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»» Our tools and services make production processes more efficient and improve the quality of the results. Magentify Wood Processing.

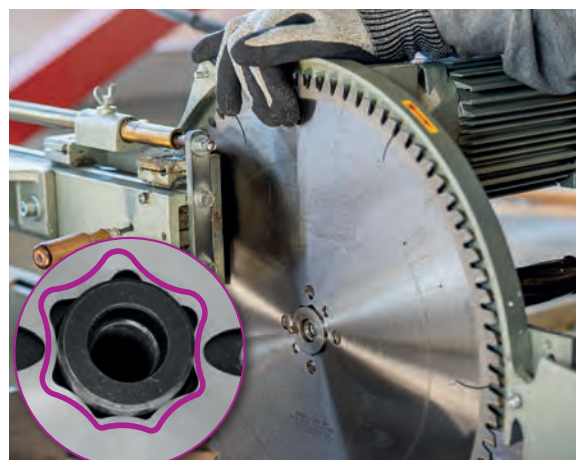
LEUCO EASYFIX SAW BLADE HOLE BETTER THAN ROUND

LEUCO introduces the easyFix mounting hole for saw blades. It is non-circular instead of round. The new shape is easier to slide onto the shaft. This allows tighter tolerances. These ensure smoother running and better sawing quality.

LEUCO has developed the classic round mounting hole for saw blades further. The result is the non-circular easyFix hole, which has nine points of contact with the shaft. Due to less friction, this makes it easier to push the saw blade onto the tool holder – it does not jam.

Another advantage is even more precise saw cuts. By making it easier to slide the blade on, LEUCO was able to go one step further and minimize the fit between the shaft and the hole in the saw blade. In this way, LEUCO's easyFix mounting hole ensures a clean cut with easy installation at the same time.

As the first, chop saw blades with tungsten carbide tips for clipping and miter saws offer the new hole shape. Others are scheduled to follow.



The new chop cut saw blade for cross cuts in solid wood is supplied with the innovative and user-friendly "easyFix" saw blade mounting hole. The user can push the saw blade onto the shaft with almost no resistance. In addition, the precision mounting hole results in more accurate cuts when cross-cutting solid wood.

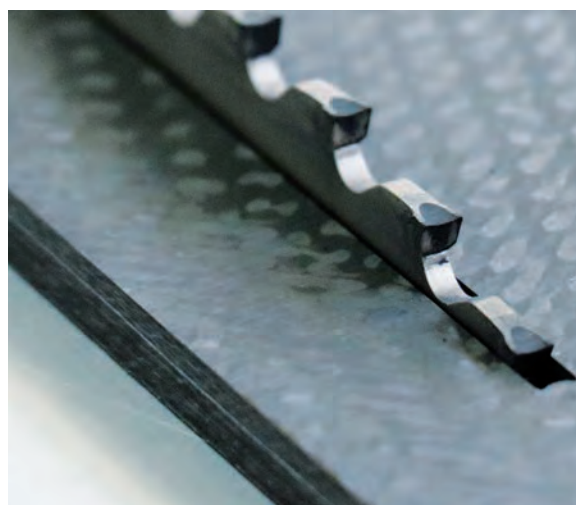
SAWING FIBER-REINFORCED PLASTICS SAW BLADES FOR DIFFICULT CASES

The material mix for woodworking companies continues to grow. Fiber-reinforced plastics such as CFRP or GFRP need to be processed ever more frequently. However, common saw blades wear out extremely fast with such materials. LEUCO offers saw blades with diamond-tipped cutting edges and special tooth geometries that last considerably longer.

Fiber-reinforced plastics have one thing in common: They are very difficult to process. This is because very hard materials are usually selected as the fibers. Most of the time, these materials are glass, carbon and aramide. These abrasive fibers cause severe wear on the cutting edges of saws. In such materials, saw blades with tungsten carbide tips often last for only a few meters.

LEUCO offers a solution for these situations: Saw blades with diamond-tipped cutting edges and special tooth geometries. They make processing of fiber-reinforced plastics economically feasible. These saw blades achieve a 10 to 50 times longer edge life.

The DIAREX DP HR sizing saw blade is the favorite for reinforced plastics: It achieves outstanding results in all materials up to a thickness of 20 mm. Three other saw blades also achieved good to very good results, depending on the material. These are the sizing saw blades DP G5, nn-System DP flex and DP "TR-F-FA" Pos-Neg. They process fiber-reinforced elastics with acceptable edge lives.



The diamond-tipped saw blade "DIAREX HR" is currently the most economical solution on the market for cutting CFRP ("Carbon"), GFRP and AFRP. Diamond as the cutting material and the special tooth shape ensure long edge lives with good cut quality when cutting panel material or trimming profiles made of fiber-reinforced plastics.

DIAMOND-TIPPED PANEL SIZING SAW BLADES WITH AND WITHOUT COATING

WHEN TO USE DP SAW BLADES? WHEN DOES A COATING MAKE SENSE?

Markus Erkenbrecher is Product Manager for circular saw blades at LEUCO and answers the most frequently asked questions about diamond-tipped circular saw blades.

I Most of the panel sizing saw blades used in the industry segment are tungsten carbide-tipped. When does it make sense to use a diamond-tipped saw blade on a panel sizing saw?

When cutting "common" wood-based panels, the decision regarding whether to use a tungsten-carbide tipped saw blade or a diamond-tipped saw blade depends on the amount of material to be cut. We make an exception in the case of materials with a high percentage of recycled content and recommend the use of tungsten-carbide-tipped saw blades when a high throughput is needed. For abrasive materials such as cement- or glass fiber-containing panels, there is actually no alternative to a diamond-tipped saw blade.

I Who will benefit from this new option of a diamond-tipped saw blade with an additional coating?

If a user processes a large amount of homogenous materials, e.g. MDF, solid-core materials or materials containing adhesives that melt when heated and then stick, the edge life can be extended considerably thanks to the additional coating.

I Which tooth geometry should users of diamond-tipped saw blades choose?

For finish cuts in unfinished and plastic-coated composite wood boards, individually or in packages up to 80 mm, users should select the tooth geometry with the tooth group configuration "G6".

If the user wishes to achieve finish-cut quality in fiber-containing wood-based panels such as veneer plywood and lightweight panels, the tooth group configuration "G3" offers the optimal tooth shape.

For finish cuts in HPL and solid-core materials, the best results are obtained with the hollow back and triple chip tooth combination – "HR-TR". The geometry is only available with a "topcoat" coating.

I How are we to understand a coating and is it retained when resharpenering?

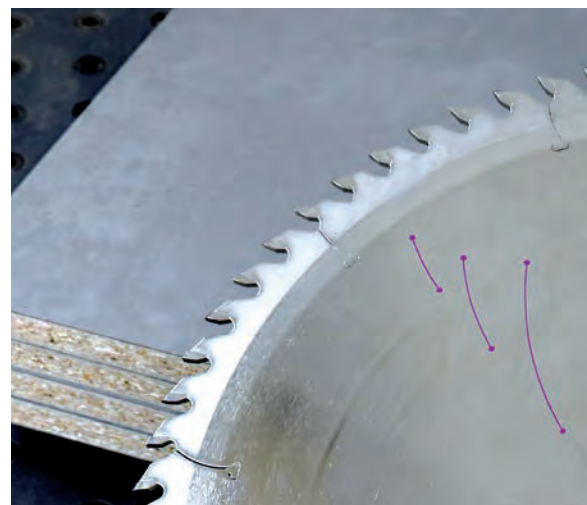
The coating increases the hardness of the cutting edge while reducing sticking and adhesion on the cutting edges. This effect is retained for the most part after resharpenering.



Markus Erkenbrecher, LEUCO,
Product Management for Saw
Blades

I Someone has recognized the benefit of such a saw blade for their situation. Could I have my existing diamond-tipped saw blade coated? How is an order processed? Does the situation involve a normal saw blade that is to be coated at a later date?

Since the diamond-tipped saw blades from LEUCO are always nickel-plated, they no longer can be coated. Ordering such a saw blade is quite simple. In the LEUCO catalog, the customer finds a corresponding ID no. after the required dimension and orders it. Common dimensions are available from stock, others are produced as needed.



LEUCO offers almost all diamond-tipped panel sizing saw blades optionally with "LEUCO topcoat" coating of the tooth flanks. Customers achieve an edge life that has never been seen on the market.

G5- AND G7-SAW BLADES FROM LEUCO FOR SCHOCK FENSTERWERK

The best tailor-made SOLUTIONS



Matthias Waffler (production manager at Schock Fensterwerk, left) and Christian Stark (LEUCO) coordinated the requirements for the saw blades.

LEUCO has adapted saw blades for miter cuts for Schock Fensterwerk. The challenge was to process complex window profiles while providing high quality. The development proceeded smoothly and with minimal commitment of time by Schock Fensterwerk.

"LEUCO has so much know-how that when modifying the tools we were involved as little as possible, but as much as necessary", explains Matthias Waffler, production manager at Schock Fensterwerk. "This was important for us, since we do not have the time to take delivery of 10 saw blades and then test them for days".

The specialist for windows, doors and sun-rooms located in Denkendorf places great value on quality. To guarantee this together with long service lives, LEUCO develop modified G5 and G7 blades for the customer. With these, both aluminum and plastic profiles with a wide variety of seals and geometries can be mitered on three CNC machines at Schock Fensterwerk.

Work took place in the test center

Modification of a tool by LEUCO involves effort – but not on the part of the customer. "Christian Stark, the field representative from LEUCO, visited us routinely. I told him that we needed high-quality saw blades with a long service life", states Matthias Waffler. "Having heard that, Mr. Stark went right to work on the matter. He came with into production, recorded all relevant machine parameters and the sequence of operations, and took samples".

Further development took place in the test center at LEUCO. "We were kept up to date regularly", reports Matthias Waffler. "Once the technicians at LEUCO were satisfied, Mr. Stark brought a few test tools to us for trials".

The best solution with much know-how

After the initial test runs at Schock Fensterwerk, a final optimization was carried out at LEUCO. "A short time later, Mr. Stark brought us the finished saw blades", summarized Matthias Waffler. "Our contact persons at LEUCO were creative, motivated and really addressed our requirements. This can be seen from the final result; we are very satisfied".

»» MODIFICATION OF A TOOL BY LEUCO INVOLVES EFFORT – BUT NOT ON THE PART OF THE CUSTOMER.



Schock Fensterwerk cuts window profiles using standard and modified LEUCO saw blades with long service lives.



Schock Fensterwerk requires clean and burr-free chop cuts, even when the seals are already installed. Schock Fensterwerk requires clean and burr-free chop cuts, even when the seals are already installed.

NEW SAW BLADE HW TR-F-K COMPARED TO THE G7

TRUMPS FOR ALUMINUM AND PLASTIC PROFILES

With the new HW TR-F-K and the G7, LEUCO offers two powerful saw blades that are used primarily for aluminum profiles. Both are characterized by outstanding features, but they differ in details. The HW TR-F K achieves even longer tool life, while the G7 saw blade also handles plastics well.

Both tools confidently saw light metals such as aluminum, copper, brass and magnesium. Most of the time, factories use these saw blades for cutting aluminum profiles. They are used in large quantities in industries such as window and facade construction, conveyor and linear technology. Both blades can be used on clipping and miter saws as well as sizing circular saws. They offer good cut quality and long edge lives. But the HW TR-F K is one step ahead of the G7 in both areas. It achieves even better, burr- and chip-free edge quality. This applies equally to untreated, anodized or coated aluminum. It also sets standards in edge life and outperforms the equally durable G7 saw blade.

On the other hand, the G7 is more versatile. Because besides aluminum, it also saws PVC and other plastics with good results in terms of quality. This makes it ideal when profiles made of light metal and plastic are to be machined alternately on one machine. In the premium window category in particular, manufacturers often combine aluminum, plastic and elastomer seals in one profile. For this variety

of materials, the versatile G7 is better suited than the HW TR-F K, which is specialized for light metals.

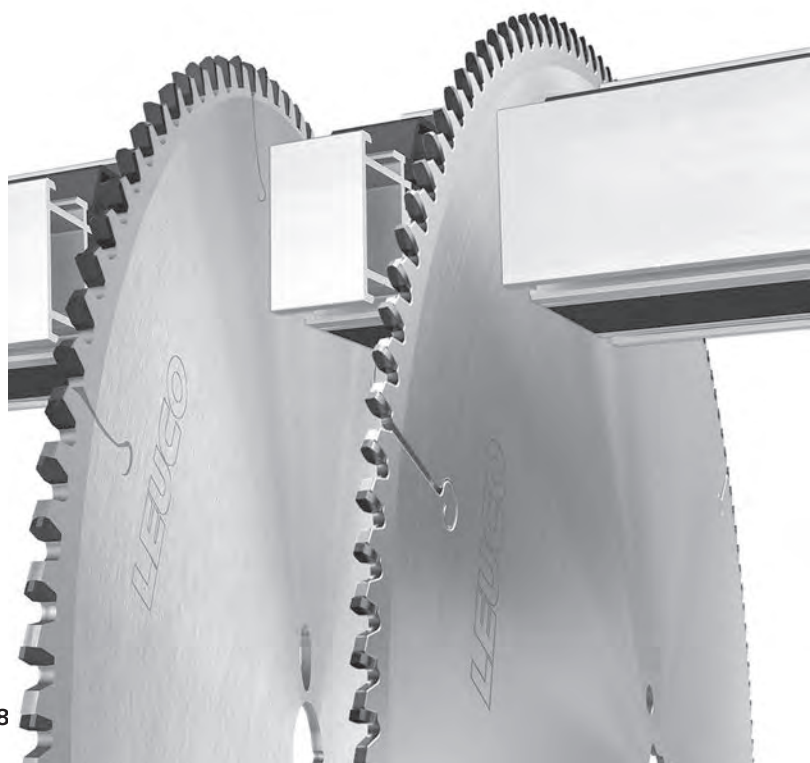
The two saw blades also behave differently regarding repair. HW TR-F K does offer longer edge life. The G7 saw blade, however, allows more resharpening. In addition, resharpening of the G7 is less expensive. In terms of cost-effectiveness, the G7 is thus on a par with the HW TR-F K despite the shorter tool life. The choice between these two high-quality saw blades should thus be made according to the materials processed. The HW TR-F K is the favorite when the machine processes only light metal. If profiles made of plastic or several materials also need to be cut, the G7 is the better choice.

The two saw blades, in comparison:

	G7	HW TR-F-K
Suitable for NE*	Yes	Yes
Suitable for plastic	Yes	No
Cut quality	++	+++
Edge life	++	+++
Resharpener (number of times)	+++	++
Resharpener (economical)	++	+
Availability	D 250 - 550 mm	D 350 - 600 mm
Tooth configuration	G7	Triple chip - flat convex
Machines	Table, clipping and miter saws	

*NE = Non-ferrous (i.e. Al, copper, brass no steel)

The proven LEUCO g7 system saw blade (left) and the new "TR-F-K" are perfect for cutting light metals, especially for trimming aluminum profiles. The new "HW TR-F-K" sets a new standard in the industry and scores with an even slightly finer cutting quality and longer tool life. In contrast, the g7 blade can be resharpened more frequently and more easily.



JOINTING CUTTERS SMARTJOINTER AIRFACE INDEPENDENT CUTTING EDGE CHANGING FOR EVERYONE

The SmartJointer airFace jointing cutter from LEUCO has replaceable segments. Now, it is available in smaller sizes. This gives carpentry shops and users of smaller machine types the ability to replace the diamond-tipped cutting edges by themselves.

LEUCO now offers the SmartJointer airFace jointing cutter in sizes starting at a diameter of 70 mm. This makes it possible to use the tool on various edge banding machines used by tradesmen. Machines from the manufacturers EBM, HOLZ-HER and OTT can now be equipped with these from stock, for instance. The new sizes fit the smaller machine models from these manufacturers.

Supplementing this, effectively immediately there is a program for manual feed that is intended for use on various table shapers. The cutting edges can be replaced easily. In addition, quick replacement means that one tool set per machine is enough.

The cutting edges are fixed in place precisely by a 3-point bearing. Consequently, replacement does not require rebalancing and readjustment on the machine. This exact positioning guarantees constantly high milling accuracy and diameter consistency.

A further benefit: Segment and gullet form a single unit and are replaced entirely. As a result, the lightweight aluminum tool body achieves a very long service life and can be used multiple times.



The proven SmartJointer airFace jointing cutter is also now available in small diameters starting at 70 mm. This enables smaller, more compact edge banding machines to benefit from the advantages of exchangeable diamond-tipped segments and a constant diameter even after the knife change.



New: Diamond tips for table shapers. The proven LEUCO SmartJointer airFace™ jointing cutter equipped with exchangeable diamond-tipped cutting edges is now available for MAN feed.



The jointing cutter for MAN feed is available with a 125 mm diameter, a cutting width of 43 mm, and 12 segments or, in an alternative model, with 64 mm and 18 segments. What makes the SmartJointer stand out is the fact that the diameter remains consistent even after replacing the cutting edges so that the machine does not have to be recalibrated or adjusted. Also, potentially damaged or heavily worn cutting edges can be replaced individually in place, thus extending the service life.



The 35° axis angle enables the diamond-tipped SmartJointer to joint solid wood and woodbased materials without chipping. The diamond tips also mean longer edge lives.

MAGENTIFY YOUR EFFICIENCY

ADJUSTABLE JOINTING CUTTERS FOR MOTOR SHAFTS WITH 30 OR 40 MM DIAMETER

PRECISION CUT FOR DISTINCT EDGES

Leicht Küchen has been using a synchronously adjustable jointing cutter from LEUCO for several months. This newly developed tool is designed to significantly extend the tool life of jointing cutters when producing fronts. The team at Leicht is already convinced by the concept, especially since it is available for hydraulic motors with shaft diameters of 30 and 40 mm.

Leicht Küchen's location in Waldstetten, Swabia, is far from the center of activity for a kitchen builder. After all, this industry is found for the most part in Eastern Westphalia. In terms of quality and technology, however, the southern German kitchen specialists are the focus of attention. Leicht cabinets and countertops are in the premium segment. That's why the Swabian manufacturer makes no compromises when it comes to accuracy of fit and surface quality. A key challenge for Leicht is to combine top quality with the best possible cost-effectiveness. "With the new synchronously adjustable jointing cutter from LEUCO, we want to improve profitability in the future. Since this tool is also available in a compact design, we can use it on our machine with a 30-mm hydro bushing," explains Konrad Schurr, head of parts production at Leicht Küchen.

ADJUSTMENT EXTENDS USEFUL LIFE OF THE CUTTING EDGES

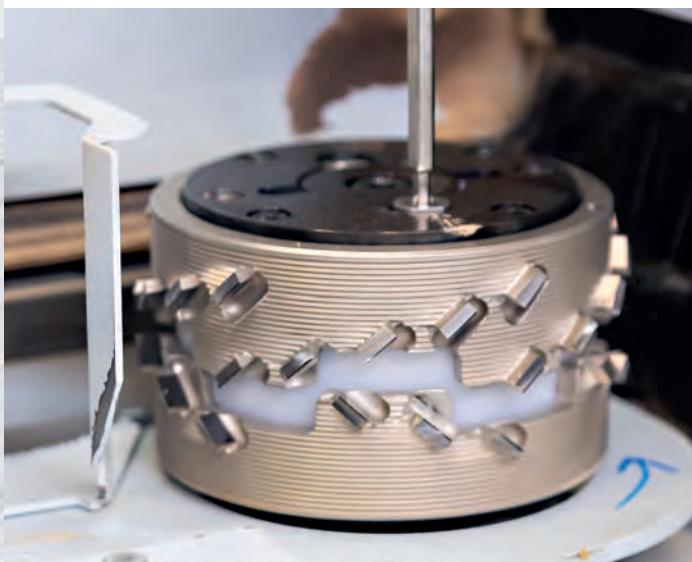
This concept is tailor-made for the production of 19-mm-thick front panels at Leicht Küchen. Konrad Schurr states the reason for the decision: "We process abrasive coatings. They always abrade the cutting edges of our LEUCO jointing cutters in the same place, which is why they wear out quickly. We have to change them after about four weeks. The change is always associated with adjustment work and an interruption of production. We would like to reduce these interruptions by using the synchronously adjustable jointing cutter."



Leicht, the cutter is used for economical joining of the 19 mm thick front panels with an abrasive antifingerprint coating. In this way, the same point on the cutting edges of the jointing cutter is always used.

Leicht Küchen has been using the milling tool on a KAL 370 edge banding machine from HOMAG since December 2019. The compact version for the motor shaft with 30 mm diameter fits into this machine. It operates there at a feed rate of 20 m/min. "The transition from the countertop's surface to the edge must be clean, straight and even, because we manufacture true zero-joint quality there," explains Konrad Schurr. "For this purpose, the HOMAG machine has a laser unit that melts the adhesive layer. This creates a tight and longlasting bond. Uneven edges would easily lead to product defects."

There is a second reason why milling on this machine at Leicht Küchen is a tricky business. Coated panels are processed there to a large extent. "These surfaces are much more delicate than those of simpler kitchens," Schurr says. "Even small microcracks that can only be seen under a magnifying glass can damage these surfaces." That's why machining must only be done with perfectly sharp, nonchipping cutting edges.



Leicht Küchen uses the new synchronously adjustable diamond-tipped jointing cutter "DIAREX airFace" with a 30 mm hydro bushing. If a certain area of the cutting edge is worn, the two cutter halves are moved towards each other slightly. When joining constant panel thicknesses, this makes an unused, freshly sharpened section of the cutting edge available for use.



To adjust the tool, the machine operator simply opens the hood. The tool does not have to be removed for adjustment.

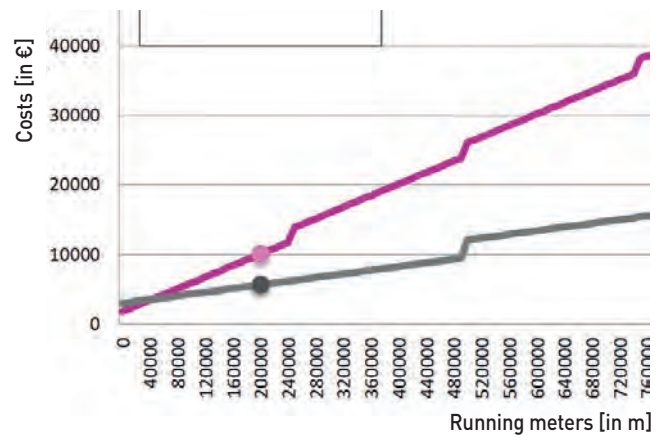
With LEUCO's synchronously adjustable jointing cutter, machine operators now use new or freshly sharpened sections of the cutting edge within minutes. To do this, the HOMAG machine is stopped and opened. Adjustment is easily made from above by a small turn of an adjusting screw. This moves the two halves of the twopart cutter a little closer together. This is enough to push other cutting edges or sections of the cutting edge into the machining position. Synchronous adjustment and maintenance of the tool diameter also eliminate the need for readjustment of the motor, both in height and in the feed to the workpiece!

How often can the synchronously adjustable jointing cutter be readjusted? This depends on the amount movement during adjustment and the thickness of the abrasive surface layers. LEUCO calculates carefully and specifies at least four readjustments. "For us, the milling cutter exceeds expectations," comments Konrad Schurr: "We have already carried out five readjustments, and the tool is still running. It is anticipated that the cutter can be readjusted six or seven times."

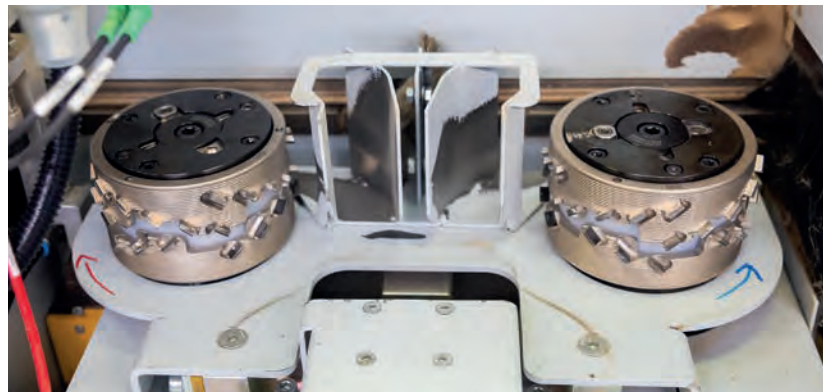
THE TOOL IN DETAIL

The tool is available for motors in two sizes: for 30mm shaft with tool diameter 125/150 or for 40mm shaft and tool diameter 180/200/220/250. Both are intended for hydraulic clamping devices. The smaller shaft diameter in particular is the trend right now. This is because more and more machine manufacturers are using hydraulic clamping instead of double key-way clamping in their compact edge banding machines. The motor shafts used here usually have a diameter of 30 mm.

Productivity calculation – an example

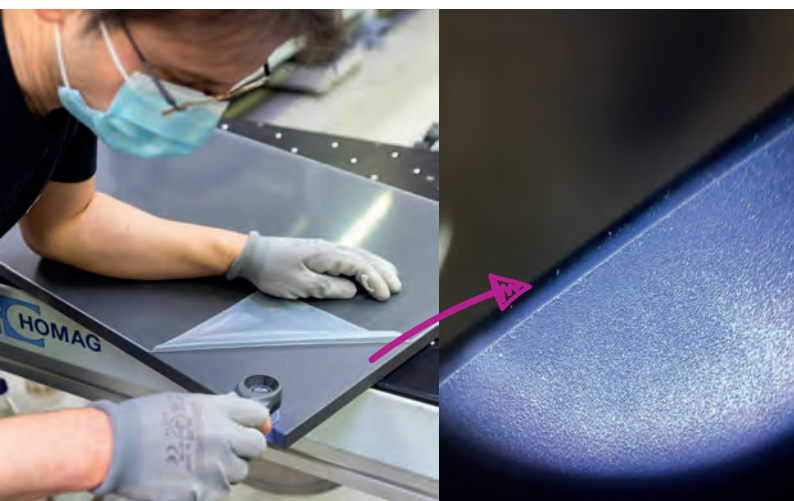


In other test modes, LEUCO analyzed that the synchronously adjustable jointing cutter is profitable for highly abrasive surface courses starting at 40,000 running meters. The higher cost to purchase the synchronously adjustable jointing cutters is amortized quickly.



Another advantage of synchronous adjustment is obvious in a concept when two tools are used for jump milling: The jointing cutter working against the feed has significantly fewer running meters and with less wear needs to be readjusted less frequently. Until now, both cutters were usually changed at the same time, although one cutter had less wear.

This is how zero joint must be. A magnifying glass is used at Leicht to check the quality. It shows an absolutely clean transition from edge to panel without microcracks.



OTT MULTI-PROFILE SHAPE CUTTERS FROM LEUCO

THREE CUTTING EDGES SAVE TIME

For the first time, an adjustable shape cutter is available for edge banding machines from OTT. The tool, developed jointly by OTT and LEUCO, offers a choice of three cutting edges for use. This means that these machines can now cut different profiles with the very short change-over times.

LEUCO has developed the DP multi-profile shape cutter for edge banding machines from OTT. This tool features three profiles each of which can be placed alternately into the application position as needed. In this way, users can produce three different profiles with only very brief change-over times. When the work required changes, this ensures considerably higher machine utilization. Automatic change-over allows you to accept smaller orders that would otherwise not be profitable because of long setup times.

The tool can be used for both veneer and MDF edges as well as plastic materials. In the initial, basic version, the DP multi-profile shape cutter comes with cutting edges for the standard profiles R2, R1 and F45°. Alternatively, users can employ cutting edges for their special profiles. Radii up to 3 mm and chamfers up to 45° are possible. When wear occurs, only the worn-out profile needs to be replaced. The cutters that are still intact can remain in the tool. Based on experience, the R2 radius is the most commonly used profile (at about 80 %). That is why a usually only this profile needs to be exchanged. The change-over mechanism also remains in the tool.

The DP multi-profile shape cutter from LEUCO can be used on all edge banding machines from OTT with the AKF equipment option. On these machines, the AKF stands for automatic The shaping or shape cutting. The DP multi-profile shape cutter is available as an additional tool for machines with this equipment option.

3 QUESTIONS ABOUT THE NEW MULTI-PROFILE SHAPE CUTTER

I In cooperation with OTT, you have developed a DP multi-profile shape cutter for edge banding machines. What led to this project?

The managing director and a developer from OTT discovered an application for protection of a utility model relating to such a tool filed by LEUCO. The concept please them so well that they wanted this tool for their machines. They spoke with us and this is how the cooperation began.

I How were the tasks divided?

LEUCO developed the actual tool and OTT a rotary distributor for pneumatic actuation.

I What was the most important contribution of LEUCO in this project?

That was surely the time needed for the comprehensive tests. The team from LEUCO approach the best design for the tool slowly and always tested new prototypes. Finally, the solution we have today was achieved.



The interview was conducted with Benjamin Sitzler, developer at LEUCO.



Three profiles can be changed in a matter of seconds with the new multi-profile shape cutter for edge banding machines from OTT.

LEUCO JOINTING CUTTER WITH HSK 32 INTERFACE USED AT EWERT LADENBAU

VISIBLY BETTER QUALITY



Peter Ewert (3rd from the left) and his crew are specialists for high-quality store furnishings and interiors.



The pair of holes in front of the cutting edges is an Airstream feature. The holes guide the air flow with the chips directly into the dust extraction. In addition, they reduce air turbulence; the machine is noticeably quieter.

High-quality store furnishings and interiors are a specialty of Peter Ewert. The optics of the edges produced plays an important role when it comes to their quality. That is why he relies on the LEUCO DIAMAX AirStream jointing cutter with precise HSK 32 tool clamping.

For a long time, only jointing units on large machines were equipped with the high-precision HSK tool adapter. Despite this, HOLZ-HER introduced the smaller HSK 32 clamping on its more compact edge banding machines for tradesmen. And now, LEUCO has adapted the DIAMAX AirStream jointing cutter to this interface. The combination of tool and tool adapter achieves a radial runout of at most 20 µm – compared to the 60 µm of a classical double keyway tool adapter.

HIGH EXPECTATIONS WITH HSK CLAMPING

At his specialized plant in Genthin, Saxony-Anhalt, where he produces primarily store furnishings and interiors, Peter Ewert already had good experience with HSK tool adapters in the past. For this reason, he was very interested when he learned about the new development while looking for a new machine at HOLZ-HER. The manufacturer had announced an edge banding machine with HSK 32 tool clamping and a jointing cutter from LEUCO. The reduced radial runout through use of HSK clamping promised an even better appearance at the transition from the edge to the top layer on the workpiece. As a result, Peter Ewert immediately decided to purchase the new machine-jointing cutter combination: "I preferred to have the first new machine rather than the last old one".

For Peter Ewert, clean, precisely produced edges are very important – and this is clear from his orders. For instance, he has produced furniture for opticians as well as jewelry and leather goods stores; here, the quality of the stores furnishings must make a good impression.

QUALITY BENEFITS FROM MINIMAL RADIAL RUNOUT

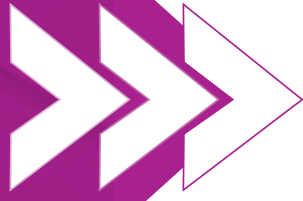
"We are a third-generation family-owned operation. Proper edges on the workpiece were always important for us, as this is the quality characteristic for the customer and what he pays for", explains Peter Ewert. "With the new machine, the quality has become visibly better; rework is not necessary. This saves time and money – jointing panels, producing edges, flush routing, rounding and finished."

Production is also cleaner with the LEUCO DIAMAX. Thanks to the AirStream system, which has been designed specifically to remove chips from the tool area and convey them to the machine extractor, LEUCO and HOLZ-HER have been able to increase the level of chip capture to 97 to 99 %. As a result, most chips are conveyed to the dust extraction and the machine can be cleaned faster after the work has been completed.

Furthermore, with its control of the air flow AirStream reduces the noise generated by the jointing cutter. "Our foreman noticed this immediately while passing through production", reports Ewert: "He said that the machines are noticeably quieter."



High precision despite simple handling: The DIAMAX AirStream HSK 32 F jointing cutter from LEUCO can be clamped in the machine quickly with an Allen key.



APPLICATION TECHNOLOGY FOR BATCH SIZE 1

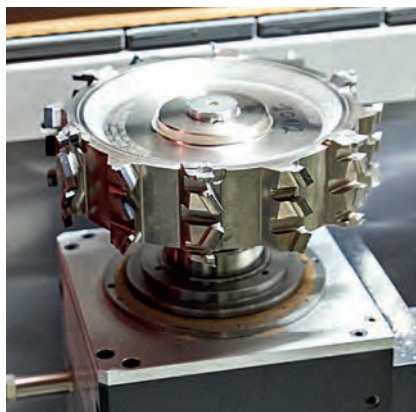
THROUGH-FEED MACHINES BECOME MORE VERSATILE



For a lot size of 1 on a through-feed machine, flexible as well as intelligent tools are key to joining or grooving a wide variety of materials while maintaining the best quality.

For some time, the trend at furniture manufacturers has been in favor of systems that can also manufacture short series. And without setting up for a lot size of 1. The right combination and the design of the tools play an essential role here, a specialty of LEUCO.

Through-feed machines at furniture and kitchen manufacturers are optimized for efficiency: They produce large series of furniture in a short area of time. However, end customers such as office furniture



Using the fewest tool locations possible with the fewest number of tools, a maximum variety of edge versions can be achieved, e.g. chamfers, grooves and rabbets. The machine's control system indexes the tool to the workpiece.

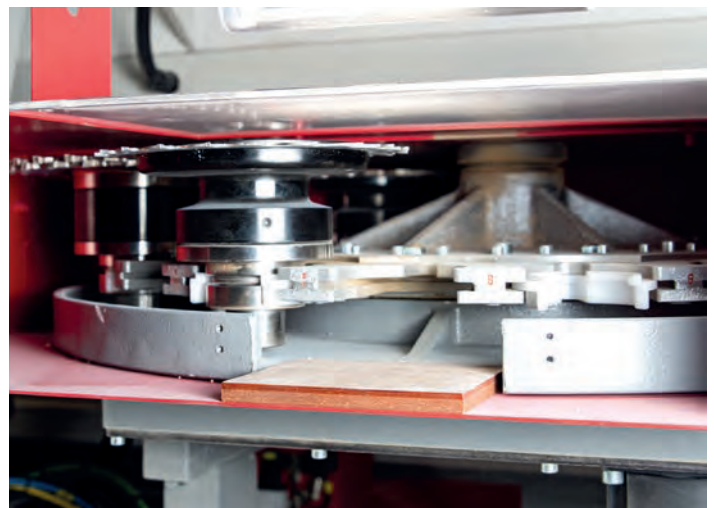
suppliers and hotels are increasingly ordering smaller quantities or custom versions. For this reason, furniture manufacturers expect more and more flexibility from a through-feed machine. As quantities change, the through-feed machine should be able to manufacture as many different products as possible without machine downtime.

Milling cutters from LEUCO play a key role in such projects. They are combined with one another in a way that allows a wide variety of profiles and shapes to be achieved on workpieces using only a few tools. The achievement of LEUCO in terms of application technology consists of planning and selecting these tools. When these tools are used together, it should be possible to manufacture all profiles with as few tool positions as possible. An example from actual practice: Using only 3 tools and 3 motors, 20 different processing steps can be performed.

LEUCO DEVELOPS TOOLS FOR ANY APPLICATION

For these highly innovative machine projects, the application technology department at LEUCO also develops special tools. They are designed specifically to meet the requirements of furniture manufacturers. In this way, a wide variety of profiles can be produced economically on a through-feed machine without the need for a new setup. At the same time, LEUCO takes the materials to be processed, which can be very different, into consideration. Based on its expert knowledge, LEUCO has achieved a leading position in numerous sectors.

The cooperation of all parties involved in these projects is essential and challenging. The user documents its entire catalog of profiles and processing steps. The application technology department at LEUCO develops the tool sets together with the machine manufacturer, who then designs the appropriate drive axes. During this process, regular meetings and test runs are important. Having a test center at LEUCO is beneficial. Modifications can be tested there immediately and optimized further until everything matches perfectly. In this way, the cooperation between users, LEUCO and machine manufacturers achieves the best possible result.



The ideal configuration and performance of expensive motors is achieved through intense cooperation between machine manufacturers, furniture manufacturers and LEUCO.

MAGENTIFY YOUR OPTIONS

p-SYSTEM CUTTERS AT KITCHEN CABINET MANUFACTURER NOBILIA
**SIX-FIGURE ANNUAL SAVINGS THANKS TO
 HIGH-END TOOLING**

Nowhere else in the world are more kitchen cabinets produced than at nobilia. Part of the success in terms of quality and cost-effectiveness is attributable to the 70° cutters from the p-System of LEUCO.

Producing 783,000 kitchens per year, nobilia is the largest European kitchen cabinet manufacturer. The two plants in Verl in eastern Westphalia are among the most modern and efficient production sites for kitchen furnishings in the whole of Europe. The clean joining of 16 and 19 mm thick particleboard is an important production step in cabinet body manufacturing. Because of the enormous production volumes, the tools used must be not only real endurance runners, but also deliver flawless quality. After all, demanding customers do not tolerate chipped edges. A high demand for quality, coupled with economical production – this is exactly the field of application for LEUCO's p-System.

Quality control at nobilia is largely automated. For instance, optical quality inspection systems are used and tools are changed regularly at planned intervals in cabinet body production. Under these high-end technical conditions and in an environment focused on predictability, the cost-effectiveness comes from the extremely long tool life of the diamond-tipped LEUCO p-System cutters with 70° shear angle. The change cycles are set at 500,000 running meters. A scheduled tool change is on average 15 minutes faster than an emergency change and is integrated into the maintenance and pauses of the rest of the machines. This means downtimes reduced to a minimum by optimized setup times, and virtually no rejects thanks to continuous quality control. The quality of the core layer and the edges is prepared perfectly for the immediately following edging due to the draw cut of the p-System despite different panel suppliers. Joining at nobilia takes place at feed rates of 60 or 80 m/min. Continuous improvement in processes

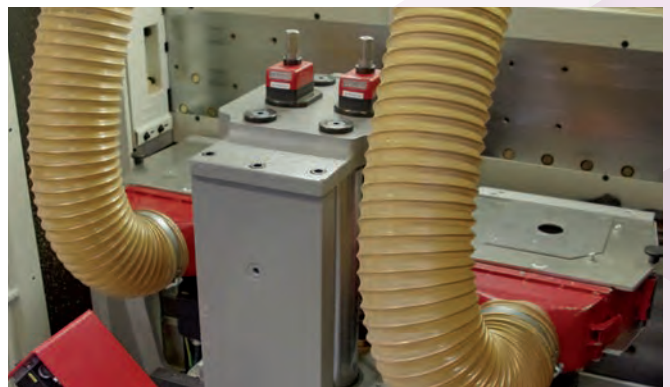


nobilia produces about 7.83 million cabinets annually. The p-System from LEUCO is used at the plants in Verl.

is part of daily business at nobilia. Since the p-System cutters have been in use, annual savings in the 6-figure range have been recorded as the result of setup time optimization and scrap reduction. With the 70° shear angle p-System jointing cutters, cost-effectiveness is a natural result when processing such an enormous volume of panels.



The diamond-tipped cutting edges with 70° shear angle on the p-System tool can be seen clearly.



nobilia uses two p-System cutters in one machine: one each for 16- and 19-mm-thick panels.

EXPLAINED BRIEFLY BY LEUCO: ...

... SHARPENING TOOLS

WHAT IS THE RESHARPENING AREA OF TOOLS?

The height of the resharpening area often decides how often a tool can be resharpened. In actual practice, whether a tool can be resharpened depends on the tool and machine.

Many offers from tool manufacturers state the tipping height, i.e. the resharpening area, sometimes there is no information whatsoever in this regard. What information actually helps me as a purchaser further? The tipping height only designates the height of the HW or DP cutting inserts used, but does not directly say anything about the number of times resharpening is possible. After all, the cutting inserts cannot be used until there is nothing left. From the customer's standpoint, what is relevant is to know the actual resharpening area in order to compare tool offers one to one. If the resharpening area is not stated explicitly, it makes sense to ask, since the height of the resharpening area has a direct effect on the overall service life of a tool.

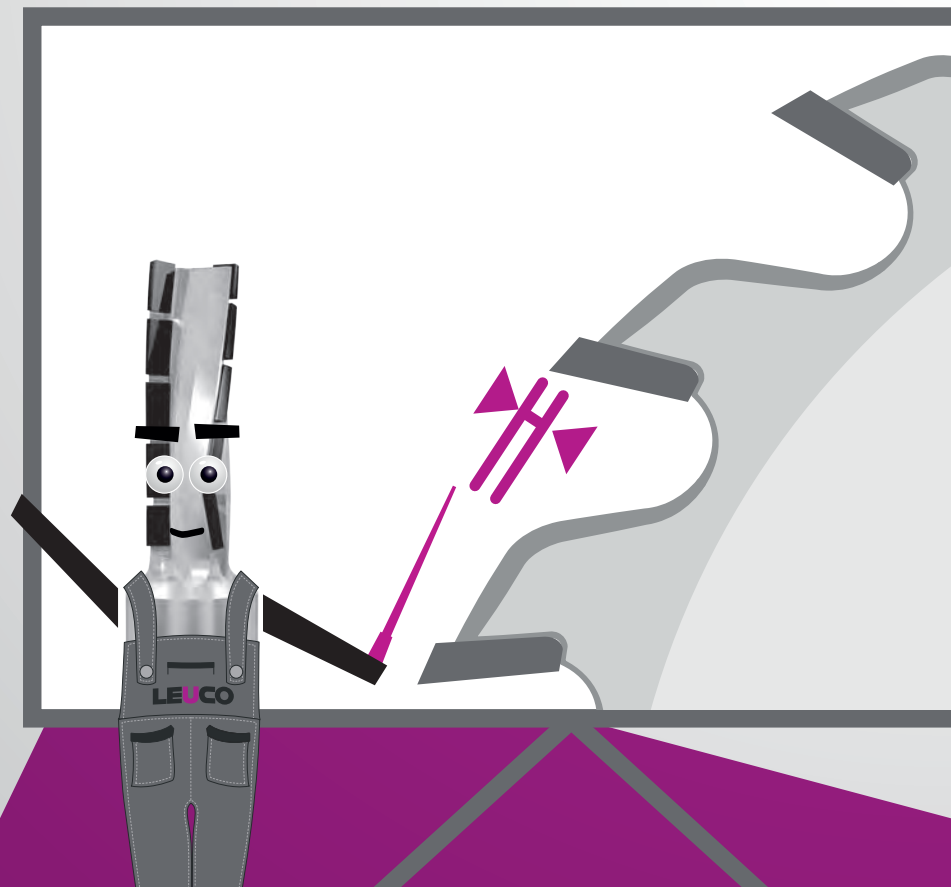
Why don't all tools have the same, maximum possible resharpening area? The cutting material is generally the most expensive material in terms of the overall costs of the tool. The higher the resharpening zone, the more mm² of diamond, for instance, are needed, and thus the higher are the costs of the new tool. In addition, there are machine types on the market that cannot compensate along the axis of the motor for a severe reduction in diameter as the result of frequent resharpening. This means: a high resharpening area sometimes cannot even be fully used. This can be the case, for instance, on small edge banding machines used in the woodworking sector.

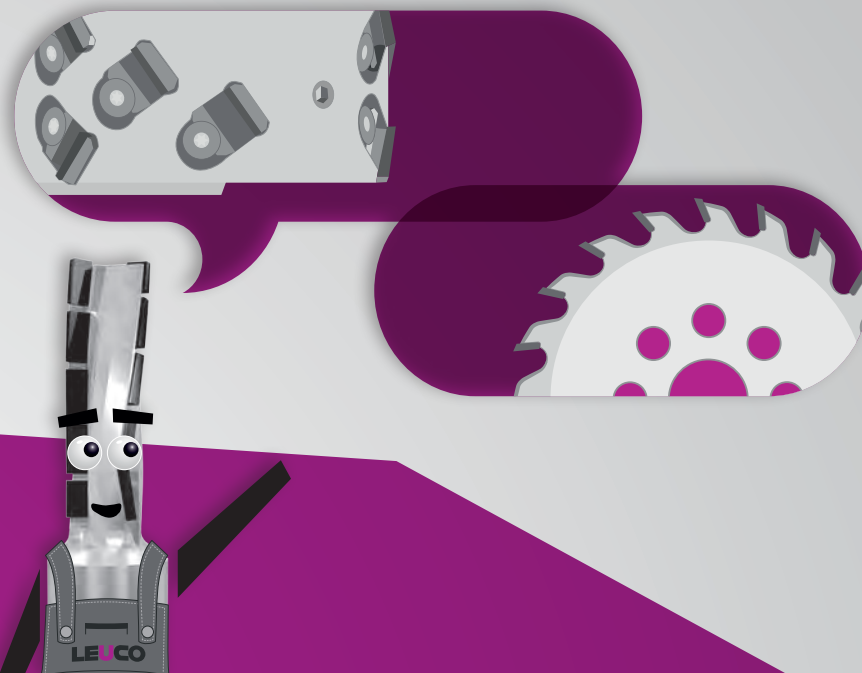
... SHARPENING TOOLS

HOW HIGH ARE THE RESHARPENING ZONES ON TOOLS FROM LEUCO?

Tools from LEUCO have resharpening zones with various heights. They differ depending on the product line. Industrial tools can be resharpened very frequently.

What is the range of resharpening areas on sizing tools from LEUCO? In the case of jointing cutters, for instance, LEUCO has various product lines in its program. These differ in their design in terms of shear angle, manner of clamping and resharpening area. The range extends from a diamond introductory model for tradesmen to tools for industrial applications. The resharpening zones vary, depending on the value of the particular product line, and range from 1.5 mm to 3 mm and 4 mm. Tools such as hoggers, for instance, that are used exclusively in industrial applications all have the maximum resharpening zone of 4 mm.





... CLAMPING MEANS

WHAT TOOL CLAMPING MEANS ARE AVAILABLE FOR JOINTING CUTTERS AND HOGGERS?

Although these tool types work very differently: **Mechanical as well as hydraulic clamping devices are available for both. Hydraulic clamping achieves the best concentric running characteristics (minimal radial run-out) in any case.**

1. for jointing cutters:

Conventional clamping uses the shaft or hub connection in conjunction with a double keyway on the tool. Since this clamping is not tolerance-free, the radial run-out tolerance of the motor or the tool system is 60 µm in the worst case. Hydraulic clamping involves more complex, but also more precise, interfaces; these are available for 30 mm shafts as well as 40 mm shafts. In addition, the HSK 63 F mod. as interface and new in the jointing cutter sector, HSK-32 clamping. With these high precision clamping options, the maximum run-out tolerance is 20 µm. Each type of clamping requires a specific motor mount and motor accuracy.

2. for hogs:

Yes, there are also different clamping options for hogs. The hogger base body is designed so that it can be used in combination with four different versions. There is the possibility to mount using so-called quick-clamping systems that remain on the shaft and where only the hogger is changed. Or the hogger in combination with a bushing that is permanently attached to the hogger. Both versions are available in a double keyway design and a hydraulic design. The combination with a hydraulic bushing is the most precise way of clamping a hogger.

... LENGTH OF EDGE LIFE

WHICH HAS THE LONGER EDGE LIFE: A JOINTING CUTTER OR A HOGGER?

Hoggers impress through their long edge lives at high depths of cut. On the other hand, jointing cutters achieve better surface quality. That is why many machines work with a combination of both tool types.

Hoggers and jointing cutters differ primarily in the way in which they are used, but both are used to size the workpiece. Is it true that hoggers usually have a considerably longer edge life than jointing cutters?

As the name hogger already indicates, this tool is used basically to remove large amounts of material, since the depth of cut does not have an adverse effect on the edge life. This is an advantage over jointing cutters, since the size of the depth of cut has a direct effect on their edge life. This means: The deeper the depth of cut, the shorter is the edge life. If the depth of cut during industrial sizing is always greater than 2 mm, use of hoggers makes sense to achieve a satisfactory edge life.

Because of the way they are used, hoggers usually achieve a better, smoother core layer quality. Jointing cutters, in contrast, achieve a better top layer quality. Since the latter usually has priority in the quality assessment of workpieces, most users favor jointing cutters for finishing. Therefore, for a depth of cut > 2 mm, double hoggers for presizing followed by a joining unit for finishing in the tenths of a millimeter range can frequently be found on the market. This concept usually achieves the longest tool edge lives.

LEUCO nn-SYSTEM DP FLEX CIRCULAR SAW BLADES

IT DOES NOT GET ANY SHARPER THAN THIS

In order to master any design with compound miter cuts, the Rothfuss joinery in Schopfloch actually only wanted to invest in the CAM module that was still missing. But what good are suitable dimensions and angles if the cut quality is not right?

Alex Bohnet makes a reception desk for a doctor's office at the Rothfuss joinery. The base body consists of a cuboid bent at right angles, 1.2 m high and 40 cm deep. In front of it and above it, in the area of the corner, there is a surround made of polygonal mitered panels of HPL-coated MDF, see the picture below. The shape is reminiscent of a crystal. There is no right angle anywhere on any of the surround's workpieces. All the way around, only compound miter cuts. The template for this piece of furniture had already been designed by product designer Theresa Kröcher based on a draft by an architect during her training period at Rothfuß using the 3D CAD software Palette CAD. Using the CAM module from the same manufacturer, she had broken up the design into individual parts, each with its own CNC program. The master carpenter and



Rendering of a reception desk designed with Palette CAD for a doctor's office. The surround of the cuboid resembles a crystal structure

production manager says, »Although we have an excellent sliding table saw, we would not have been able to produce this surround in this quality from this material using a conventional approach. CAD/CAM, a swivel unit and a saw blade that produces sharp, chip-free cut edges on the top, bottom, front and back of the workpiece make possible in simple design and manufacturing steps what we previously would have spent days struggling to achieve with jigs and countless test cuts.«

WITHOUT A JIG AND TEST CUT

The Rothfuss joinery in Schopfloch near Freudenstadt is located in the middle of the village, employs 17 people on a production area of 2000 m², specializes in furniture and interior design and serves the upscale segment. The workshop is located only 300 m from the Homag plant and is well equipped with technology for panel processing. It has been working with CNC technology since 1989 and in 2014 equipped the 4-axis CNC »Venture 22 L« from Homag, purchased in 2008, with the »Flex5« unit from Homag subsidiary Benz to enable the spindle to be tilted for compound miter cuts. Three years ago, the joinery added a CAM module to its Palette CAD software, which it purchased in 2006, making it easy to create complex designs like the polygonal surround of the doctor's desk.

The Flex5 aggregate could only be used to its full extent with the CAM module. However, the cut

The nn-System DP flex cuts an extremely sharp-pointed miter on the CNC at Rothfuss



The individual parts require compound miter cuts all the way around



Axel Bohnet installs a brand-new saw blade on the swivel unit ...



... and hangs it in the tool magazine of the 4-axis CNC



The miter just cut effortlessly slices a sheet of paper

quality caused problems, so the investment in the CAM module also brought a new saw blade to the joinery, the »nn-System DP flex« from LEUCO. The diamond-tipped circular saw blade features long edge life and excellent, chip-free cuts that are only 2.5 mm wide. Small chip spaces and small hollow back teeth lower the noise level, noticeably reduce the cutting pressure and enable virtually recoilless work.

Alex Bohnet was so impressed with the cut quality, the outstanding edge life and the quiet operation that he also ordered it for the panel saw, not for cutting to size, but for grooving bending panels that can be used to produce column cladding, for example. The narrow, precise and clean cuts ensure uniformly curved bending surfaces.

SHARP CORNERS, ROUND COLUMNS

Alex Bohnet says, »With the nn-System DP flex saw blade from LEUCO, we cut excellent miters. However, we also use it to bevel the underside of a tabletop at a very shallow angle, for example. The cut surface is free from knife marks and drag lines, much better than planed. We only have to go over it once lightly with the random orbital sander before painting. Furthermore, the blade helps us to produce excellent bending parts on the panel saw. I also appreciate the quiet and smooth operation as well as the tremendous edge life of 5 km.«

Original article was published in the dds magazine, March 2021 issue



Two curved quarter-segment columns with a particularly uniformly curved surface



The joinery also uses the nn-System DP flex on the panel saw for grooving bending panels

»With Palette CAD/CAM, the Flex5 unit from Benz and the nn-System saw blade from LEUCO, we no longer shy away from any compound miter cut. Everything fits right off the bat. Only on visible surfaces do we have to regrind slightly.« ALEX BOHNET, ROTHFUSS JOINERY





LEUCO TIP

LEUCO COMBI CNC MACHINE ADAPTER FOR SAW BLADES WITH A THIN TOOL BODY

The LEUCO CNC combination saw blade adapter with HSK 63F interface allows use of saw blades with different bore diameters. In fact, if necessary, the user can choose from interchangeable centering adapters in different diameters, so that saw blades with larger bores (\varnothing 31.75; 32; 35; 40 mm) can be used on the same saw blade adapter.

As standard, the adapters are designed for saw blade bores of 30 mm. The scope of delivery also includes an additional counter flange in each case. The screw kits supplied allow the saw blade to be mounted either with a counter flange (cheese-head screws) or, for example, for compound miter cuts, via flat-face mounting using countersunk screws.

A corresponding \varnothing 30 mm centering adapter is available from stock (LEUCO ID No. 185666) for the above-mentioned flat-face mounting of saw blades with extra-thin body blades (< 2.2 mm) or cutting widths (< 3.2 mm), such as the LEUCO G5 saws or also the DP Flex nn circular saw blades.

The combination saw blade adapters are also available from stock in various lengths (A dimensions) (40, 50, 100, 130 and 160 mm).

NEW, USEFUL, TIME-SAVING

DIAMAX SHANK-TYPE CUTTERS FOR 8.5 MM BACK WALL GROOVES

Back wall grooves are often made slightly oversized to facilitate easy fitting of the back wall. LEUCO provides a useful and time-saving solution: the DIAMAX 8.5 mm shank-type back wall groover with alternating shear angles enables grooving in the finished width dimension of 8.5 mm.

The lower positive arrangement of cutting edges promotes good chip transport away from the bottom of the groove, while the upper region with negative cutting edge provides clean cutting of any top layers.

Another often helpful technical detail is the relatively short design of the positive cutting edge, which allows groove depths as shallow as 4.5 mm. The maximum groove depth achievable with the DP shank-type cutter is 14 mm.

Grooving saws with an 8.5 mm cutting width for use in grooving units on CNC machine are already relatively widespread. However, if the grooving unit is equipped for a smaller groove width that is required even more frequently, the only option is to produce the 8.5 mm back wall groove with a shank-type cutter. Usually, an 8 mm grooving cutter is almost always found in the tool cabinet. It is then used to cut the 8.3 or 8.5 mm groove in two passes.



The new DIAMAX 8.5 mm shank-type back wall groover with alternating shear angles enables grooving in the finished width dimension of 8.5 mm.

NEW LEUCO AUXILIARY TOOLS IM CNC AREA

MOUNTING DEVICES AND LENGTH MEASURING DEVICE

The new mounting device helps you to mount the tools safely and easily in preparation for installation in the CNC machine. It offers the possibility to mount different tool holders at a mounting station professionally and safely.

The tool holder is fixed completely by itself with this holder. This means that the user has both hands free to operate the tool to be clamped during the actual clamping process.

The risk of slipping with the clamping tool is greatly reduced, and the assembly or disassembly process is more relaxed than is often the case in rollertype mounting devices.

The mounting devices are available for adapters with HSK, BT or even ISO tapers in the respective common sizes and with corresponding mounting forks.

The optional modular digital mounting and measuring device enables easy preparation of the tools before integration in the CNC machine. Thanks to the modular kit system, the measuring device can be combined with the abovementioned mounting devices.

The customer is thus equipped for mounting and length measurement of tools in all common holders of various sizes.



New in LEUCO's program: The mounting devices ensure the safe and easy mounting of shank-type tools in clamping elements.



Combination of mounting device with digital length measuring device: Tools can be inserted into clamping elements with exact values.

MORE ADJUSTMENT IN THE Z-AXIS

DIAMAX SHANK-TYPE CUTTER PRODUCT RANGE EXTENSION

The LEUCO DIAMAX Z=1+1 shank-type cutter stands for optimum cutting quality, extremely smooth cutting behavior due to its eye-catching, very stable body shape and high flexibility in use, e.g. also for chip-out-free grooves starting from a 4.5 mm depth.

LEUCO is now expanding its program with four more dimensions, but with a longer positive shear angle range than on the standard tools. In this way, LEUCO is responding in particular to the wishes of the customer group for whom more adjustment options in the Z-axis are especially important in order to be able to add edge life.

The "long-life cutters" are available in the dimensions Ø12x28, 16x35, 18x43 and 20x52 mm,

each for rotation in the clockwise direction, directly from stock.

The DIAMAX Z1+1 shank-type cutter program is used for jointing and rabbeting of raw, melamine-, paper-, HPL-laminated as well as foil-coated and veneered wood-based materials.

With these four new additions to the DIAMAX Z1+1 program, the extra-long positive shear angle section provides additional adjustment options in the Z-axis to provide additional edge life.





The diamond-tipped LEUCO DP solid core panel roughing cutter (left) and the LEUCO DP solid core panel cutter Z=2 or Z=3 are ideal tools when the above application parameters are taken into account.

APPLICATION DATA AND TIPS

NESTING OF SOLID CORE PANELS

With their continuous alternating shear angles and application-oriented cutting edge geometry as well as PCD quality, LEUCO DP shank-type cutters for machining solid core panels achieve clean, chip-free cuts when parting and formatting. When used together with LEUCO's expert tips, clean and economical machining is guaranteed.

Part in a single pass with finish-cut quality at an appropriately reduced feed rate. As an alternative, you can pre-size the workpieces in order to then finish-cut with a lower removal volume at a correspondingly higher feed rate. The significantly reduced machining needed by the finish cutter greatly extends the edge life of the quality-enhancing tool.

In addition to the familiar finish cutters, LEUCO offers for this purpose a diamond-tipped roughing cutter with which correspondingly high material removal rates can be achieved.

THE MAIN OBJECTIVE: AVOID HIGH TEMPERATURES

Particularly with nesting and the associated limited chip ejection possibilities, excessively high speeds and overly low feed rates can lead to severe heating of the material (lumpy chips!) and the tool.

The known effects of heat are

- | high cutting edge wear → short edge lives
- | loss of teeth → tooth replacement and lower overall life
- | poor cutting surfaces/lubrication → rework required or rejects
- | Fire hazard in the extractor hood due to the possibility of extremely hot / glowing chips

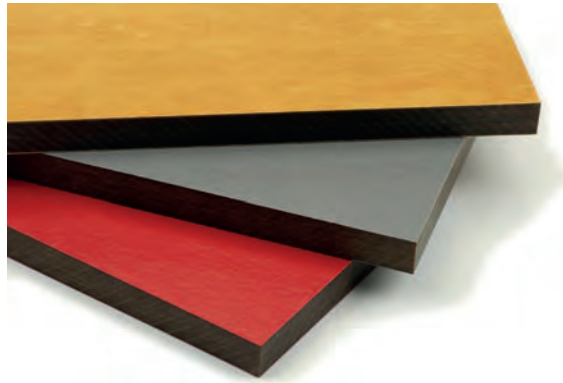
It is therefore even more important to avoid multiple cutting in solid-core materials than in conventional wood-based materials.

The speed should generally not be set too high.

The number of teeth must be matched to the feed rate. Note: The feed rate value entered into the control often is not the actual average feed rate, since this is frequently not reached at all. This is particularly the case with relatively small-format workpieces and narrow, nested structures. Here, a two-flute cutter instead of a 3-flute cutter is often the better and more economical choice.

These feed rates are to be regarded as max. values for guidance. They also depend, among other things, on the required cut quality and the nature of the material to be processed. In some cases, there are relevant differences in terms of hardness and temperature sensitivity.

Solid core panel nesting is challenging, because the panels react in particular to the frictional heat during milling and thus have a highly abrasive effect on the milling cutters.



THE FOLLOWING STARTUP PARAMETERS FOR MACHINING ARE PROVIDED FOR ORIENTATION

Tool	DØ	SL	Z	Rotation speed	Feed when joining	Feed when parting
Roughing cutter	14	20	2	16.000	—	8 - 9
Finish cutter	12	15	2	16.000	10 - 12	6 - 8
	12	15	3	16.000	12 - 14	10 - 12
	16	20	2	16.000	10 - 12	7 - 9
	16	20	3	14.000	14 - 16	11 - 13
Rounding cutter	22/18	14	3	14.000	12 - 16	10 - 14

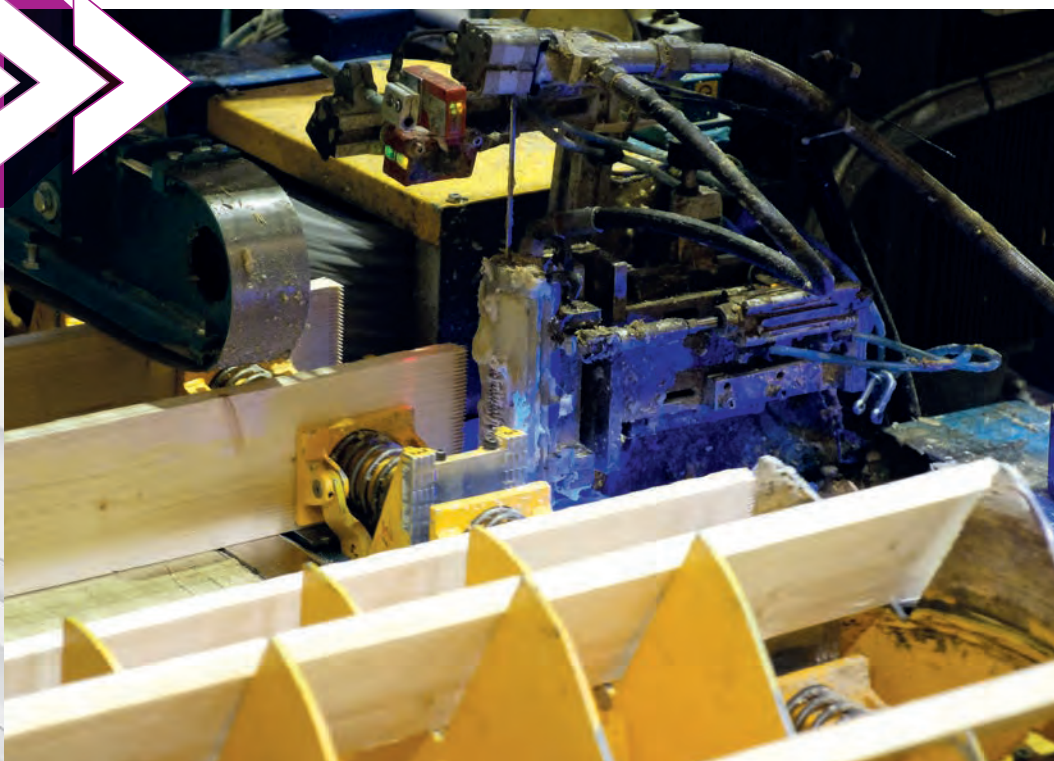
The data refer to the processing of panel thicknesses of up to 10 mm. For higher material thicknesses, feed rates must be reduced accordingly.

Higher speeds are possible, but resulting higher temperatures can greatly reduce single edge lives and also the overall life of the tool, especially at $n > 18,000$.

hydro expansion chucks, TRIBOS power shrink chucks or heat shrink chucks. A proven means of effectively avoiding multiple cutting can relatively often also be the use of suction turbines with hydro expansion chucks. The ideal application parameters and the achievable results can be determined within the framework of a test carried out together with the tool supplier on the customer's machine under real-world conditions. An appointment can be made at any time.

HIGH-PRECISION CLAMPING ELEMENTS

And the following applies not only to all diamond-tipped tools: Tools should only be used in highly precise clamping elements:



Using a "custom" geometry, LEUCO was able to improve the finger jointing quality and the service life on the through-feed finger jointing system at best wood Schneider

QUALITY AND SERVICE LIFE IMPROVED

FINGER JOINTS PRODUCED IN THROUGH-FEED SYSTEM

When it comes to production of finger jointed lamellae for industrial manufacturing of glued laminated timber and solid wood panels, it is essential that the process be fast. However, it is not possible to "speed up" indefinitely – with increasing speed, the sources of trouble and problems also increase exponentially. For this reason, Best wood Schneider spoke with LEUCO and had its finger joint cutters optimized. With success: The interval between tool changes was extended from twice a week to once in nine weeks – with considerably better cutting quality at the same time.

The Schneider group of companies is a complete supplier for construction of modern wood homes, explained Lukas Bärsauter, who is responsible for quality management:

"From glued laminate timber to insulation, we produce everything, above all, ceiling elements in the form of glulam construction timber or cross laminated timber." The sawn wood required comes from our own cuts and is processed into finger-jointed lamellae. When

finger jointing is involved, one really has to be prepared for anything, states Markus Schindhelm, LEUCO Segment Manager, fluctuating moisture levels in the wood above all:

"Drier wood behaves differently during finger jointing than wood with a higher moisture level." This can lead to differences between the fingers:

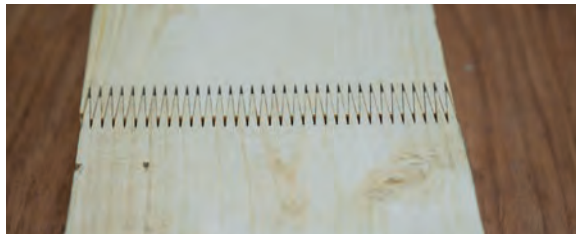
"It is thus necessary to observe the course of the tip. Since at Schneider a through-feed machine is involved, the boards are clamped, but there is still a certain tendency to deflect. As a result, the course of the tip can already differ from when the cutter enters and when it exits. This, in turn, can result in differences in basic clearance and problems with the fit."

FIRST STEP: FIT AND SELF-LOCKING EFFECT IMPROVED

The entire line is designed for high output, explains Bärsauter regarding the system. The lamellae are marked on two System TM saws with data from a Microtec strength scanner. A Ledinek Kontizink cuts the finger joints, followed by an Oest glueing station, before the wood coming from the Ledinek press proceeds

to a multi-level storage system that feeds the single-ply panel production. LEUCO made suggestions as to what could be improved with, states Bärsauter:

"At first, simple things. For instance, changing the angle of the cutters. Next, we had cutters with different flank angles produced." We tested these new cutters for a few weeks and proceeded slowly to a joint that had a small gap but also good self-locking that satisfied both our requirements and the requirements in standards for such a joint. In addition to this optimization, "that is, regrinding the flanks, which is very time-consuming, we also adjusted the geometry at the same time", explains Markus Schindhelm. "Normally, we use a 15/16.5 finger; we have now essentially increased to a 15/17 mm size. The longer finger improves the options available for adjusting the basic clearance." The clearance angle was also considered: "In this way, we can



Clean fingers with a better fit were the result of the optimizations



The geometry of the fingers was redesigned to provide more options for adjustment

influence the wood quality and the cutting quality."

FINAL STEP: IMPROVING THE SERVICE LIFE

"Once we were sure that the cutter geometry functioned well and both the quality of the fingers and the throughput of the system had been improved noticeably, there was one further step", summarized Schindhelm:

"We said okay, the 'Schneider geometry' – which is what we called it on our drawings – functions, but the service life is not yet at our usual level." Which apparently did not appear to be a big problem for LEUCO:

"We then decided to apply a coating to the tool, which allowed us to improve the service life." Quite considerably, recalls Schindhelm:

"Originally, the cutters needed to be changed twice a week. Now we are at several weeks; I believe that currently the cutters only need to be changed every nine weeks."

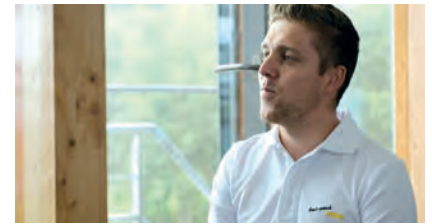
RELIABLE PARTNERS ARE IMPORTANT

Tools are a very important subject, interjects Ferdinand Schneider, Managing Director:

"It is extremely important to have reliable partners who treat us fairly and supply innovative products." From his team, he only hears good things about LEUCO:

"I can thus say with a good conscience that we have a good relationship with LEUCO and can recommend them."

These statements appeared in Holzkurier, Issue 45/2020



Lukas Bärsauter (best wood Schneider)

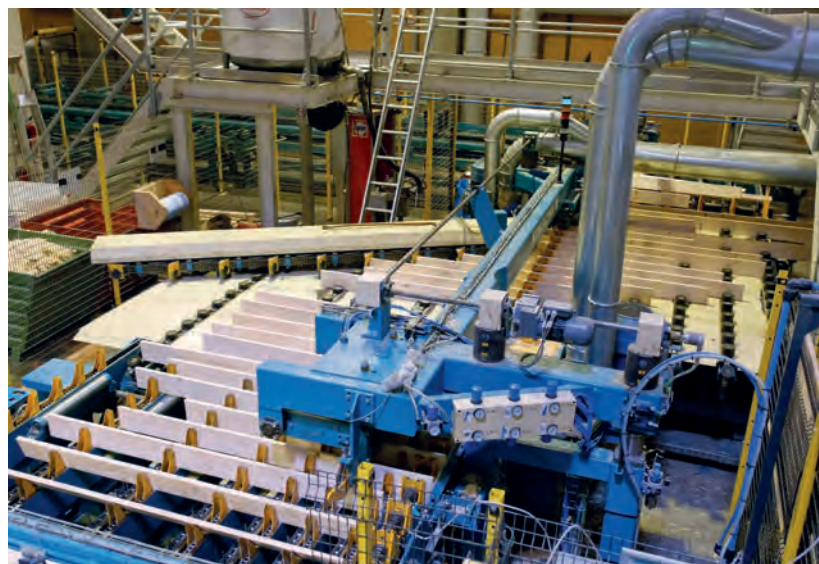


Markus Schindhelm (LEUCO)



Ferdinand Schneider, Managing Director, is satisfied

In the through-feed equipment, the fingers are cut at high speed



New geometry for the finger joint cutters



LEUCO G5 SAW BLADE INCLUDED AS ORIGINAL EQUIPMENT AT KRÜSI MASCHINENBAU AG ONLY ADVANTAGES FROM OUR STANDPOINT

The Swiss machine manufacturer Krüsi equips its joinery machines with the G5 saw blade from LEUCO. This is because it allows such excellent quality to be achieved that users can dispense with post-processing – even for ripping and cross cuts.

"It is the perfect saw blade for our machines – it offers maximum edge life combined with exceptionally good cutting quality," says Urs Iseli, Managing Director of Krüsi Maschinenbau AG. The renowned company sees it as a challenge for itself to always be at the forefront in terms of both its machine technology and output quality. This is another reason why Krüsi supplies the LEUCO G5 as original equipment for its three joinery machines. "Like our equipment, this saw blade is versatile. We use it to carry out processing such as chop cuts and parting cuts, angle and valley cuts, or notches." In this way, Krüsi's machines make complex and unusual timber construction possible.

The G5 can even perform ripping and cross cuts alternately. "This feature is very important to us," emphasizes Marcel Duong, member of the company's management and technical sales manager at Krüsi. "Some of our machines do not require a tool changer. This makes the G5 saw blade ideal, because we only need one tool for all machining operations." Each automatic change would otherwise take 30 to 45 seconds. This time is eliminated with machines from Krüsi and the versatile G5 from LEUCO. "Changeover on our equipment is reduced to a minimum. The processing tools only have to be changed for grinding. If you extrapolate that to a large project, you save a lot of time," confirms Urs Iseli.

The essential feature of the G5 is the sequence of four teeth with alternate top bevels and one flat tooth. This geometry has proven itself, because it reduces the cutting forces. As

a result, the saw blade achieves an exceptionally high cutting quality and very long edge life. Furthermore, it runs with less vibration and is quieter than other common joinery saw blades.

"Our customers regularly give us feedback and are very satisfied with the LEUCO saw blade. From our point of view, it also has only advantages over other saw blades used," adds Marcel Duong.

The G5 saw blade is versatile, powerful and precise. Krüsi therefore uses it as original equipment to the complete satisfaction of its customers in the Krüsimatic joinery center, in the Lignamatic CNC joinery system and in the MC-15 "Powercut" machine center.



Krüsi machines and LEUCO tools have been used to create some renowned architectural works around the world, such as the Centre Pompidou-Metz, France.



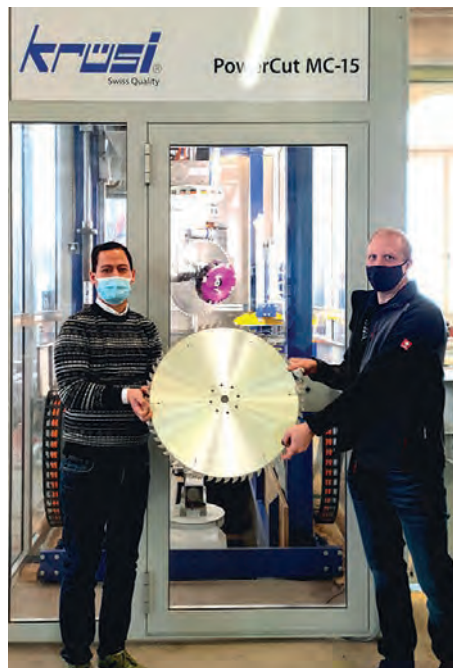
Krüsi joinery systems stand for millimeter-precise timber production. The "Yeoju Nine Bridges" clubhouse, for example, was created in South Korea with LEUCO precision tools.



The Tamedia media building in Zurich is the first seven-story wooden building in Switzerland. Blumer Lehmann Holzbau manufactured the components on Krüsi machines and with LEUCO tools.

AT A GLANCE

- | Krüsi Maschinenbau AG is a Swiss family business rich in tradition and is located in Schönengrund, near St. Gallen.
- | The company develops and produces manual and fully automatic wood-working machines, among others for bar processing, engineered timber construction or chalet construction.
- | All machines are manufactured in the company's own factory.
- | The G5 joinery saw blade from LEUCO is used on the following machines: the compact Krüsimatic, the PowerCut MC-15 machine center and the Lignamatic.
- | Krüsi has been working with LEUCO for 25 years.
- | Overall, Krüsi obtains about 80 percent of its machining tools from LEUCO.



Marcel Duong, member of the company's management and technical sales manager of Krüsi (left) and sales manager Andreas Brunner of LEUCO in Switzerland know the timber construction business very well due to their professional background and now bring their years of experience to customer projects.

FLEXIBLE USE WITH HIGH PERFORMANCE

ONE INSTEAD OF TWO: NEW FINGER JOINT CUTTERS FOR ALL PU GLUE TYPES

With a new finger geometry, LEUCO is adding an innovative cutter to its program that can be used with both fiber-containing and fiberless PU glue. The cutter is ideal for companies that make joints with both PU glues, but also provides many advantages for all other companies.

Due to the universal application possibilities, the machine operator will no longer have to change the cutter in the future, i.e. machine downtimes will be reduced. On the other hand, there is no longer any danger of mixing up the previously different cutters, which reduces the reject rate.

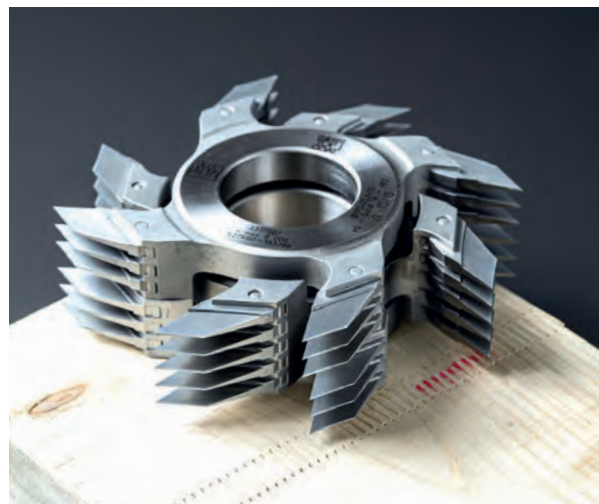
In addition, the optimized geometry increases the stability of the fingers and significantly minimizes edge splits, increasing the output quality.

GREAT COST-EFFECTIVENESS

Compared to traditional HS finger joint cutters, the edge life of the new finger cutters is up to 5 times as long. LEUCO achieves this through the combination of the cutting material Solid 34 and the LEUCO topcoat coating. The high bending strength of the cutting ma-

terial reduces the risk of tooth breakage while maintaining the same finger jointing quality compared to standard designs. This is true even at high feed rates thanks to double the number of teeth compared to the standard design. The benefits of the LEUCO topcoat coating are retained in full after resharpening.

The new version ZL 15/15 actually Z4 is available from stock. Other versions are available on request. To achieve optimum strength in finger joints, all influencing factors such as material, glue, machine or tool must be optimally matched. LEUCO tool experts always advise finger jointing operations after taking into account all influencing variables.



One cutter instead of two as previously: The new finger geometry is used for cutting joints for fiber-containing and fiberless PU glue in knotty softwood. The new cutting material of the cutters together with a coating as well provides up to 5 times the edge life.

TURNOVER INSERT TOOLS RE-IMAGINED

LEUCO t3-SYSTEM CUTTERS WITH TRIANGULAR TURNOVER KNIFE INSERTS

The newest member of the LEUCO cutterhead program, the "t3-System cutter" enables joining, rabbeting and sizing of solid wood and wood-based materials even when space is limited. The cutters produce shoulder- and chip-free joining and rabbet surfaces coupled with a simultaneously high cutting performance.

The t3-System cutterhead for CNC machines has a variety of uses. With its special arrangement of cutting edges, absolutely chip-free joining and rabbet surfaces can be produced when compared with other spiral cutterheads. For use in door and furniture manufacturing, for instance, this means less rework. This is beneficial, for instance, when producing door rabbets. Spiral plunge-cutting also allows production of small cutouts. This, in turn, allows tenon and special joints to be created. With its compact, slim design, the tool is ideal for cutting of free forms such as round curves or string wreaths in stair construction.

In long-time tests, the "t3-System" not only confirmed quality expectations, it clearly exceeded them. The t3-System finds its field of use on CNC machines for solid wood processing and on joinery machinery in applications ranging from demanding craftsmanship to industrial applications with high output requirements. In addition to the catalog program, other dimensions are available on request.

The new t3-System shank-type cutter is used on CNC machines and joinery machinery.

Application examples: Chip-free spiral plunge-cutting, rabbeting and chamfering

LEUCO PATENT PENDING FOR CUTTING EDGE ARRANGEMENT

The triangular turnover knife with rounded edges allows the shear angle for the draw cut be set perfectly, thereby preventing formation of offsets at the overcuts. In addition, thanks to the triangular shape the shear angle can be set so that outstanding surface and edge processing can be achieved when joining and rabbeting; furthermore, the rear side of the cutter does not protrude. It is precisely this feature that distinguishes the t3-System from other spiral cutterheads. With square turnover knives, the outermost cutting edge always

pulls towards the edge. This cutting direction results in poorly cut edges. This problem does not occur with the t3-System. The triangular turnover knife inserts are positioned such that the shear angle always pulls in the correct direction. The optimized axis angle of the t3 cutting edge results in low cutting pressure. This not only enables high cutting performance, but also leads to low wear of the carbide turnover knife insert.





PCD MILLING TOOLS FROM LEUCO

OPPORTUNITIES THROUGH USE OF DIAMOND-TIPPED CUTTERS

In the automotive industry, polycrystalline diamond (PCD) is still a rarely used cutting material when machining fiber-reinforced plastics. However, for those who need long edge life and the best surface quality, LEUCO offers the right solution with its PCD cutters.

When milling fiber-reinforced plastics (FRP), most cutting materials quickly reach their limits. The cutting edges of carbide cutters can be so worn after only a few running meters of material that they no longer cut cleanly or the dimensional accuracy of the component can no longer be maintained. Even the most modern CVD diamond coatings offer only a limited remedy here.

In the automotive industry in particular, very thin-walled and geometrically complex components, which are produced in medium to large series using the RTM process, usually have to be processed. The classic PCD cutters, which are otherwise used on a large scale in engine block production, for example, are unsuitable for this purpose because they do not meet the requirement for smooth running. Negative consequences include vibrations, tool failure as well as poor cutting quality and, at the same time, insufficient edge life.

In contrast, LEUCO offers PCD cutters that are adapted to the special requirements of machining FRP in the automotive industry. Through use of cutters with many teeth and sophisticated tool geometries, it is also possible to cut unstable and thin components without vibration and with minimal cutting forces. Only in this way can the advantages of the extremely wear-resistant PCD cutting edges be used fully.

In other fields of application as well, PCD cutters from LEUCO are always adapted to the individual requirements so that the diamond-tipped blades can be utilized to their full potential. As a result, LEUCO has an economical solution for companies that require long edge lives in conjunction with high quality when processing FRP.

LEUCO is a leader when it comes to manufacturing machine tools for woodworking – with decades of experience. Since both wood and FRP are inhomogeneous composite materials that behave in an amazingly similar way in terms of machining, LEUCO can offer almost unrivaled possibilities with its PCD cutters optimized for FRP.

An important advantage here is LEUCO's process consulting. This is because there are many basic conditions to be observed when economically finishing or roughing with milling tools: What is the application?

Do you want to cut, trim, groove or is copy milling the main task? What is the primary material to be processed? Which machine and which clamping devices will be used? Cycle time requirements, workpiece clamping and much more. LEUCO offers various types of milling cutters, some of which can be used universally while others are designed for special applications, such as machining aramid fiber-reinforced plastics (AFK).

Further information:

www.leuco.com/composite-processing

For qualified advice, please contact

Marvin Knoll, Sales Manager

marvin.knoll@leuco.com

COMPOSITES MEET WOOD

PRODUCING FIBER COMPOSITE PARTS ECONOMICALLY AND PRECISELY WITH WOODWORKING TECHNOLOGY



Cut aramid (e.g. Kevlar®) cleanly with LEUCO p-System tools

The Simon Keller company, based in the Bavarian-Swabian town of Thierhaupten, is an innovative processor of state-of-the-art fiber composite materials and at the same time a classic joinery workshop. The joinery's many years of experience in working with wood-based materials containing fibers is the decisive advantage when it comes to the processing of carbon-fiber-reinforced plastic (CFRP), for example. Keller is a supplier of precision parts for medical and mobility technology, among others.

Keller's processing machines are suitable for both wood and fiber-reinforced material. For example, for milling, they rely on a state-of-the-art 5-axis machining center that was originally designed for woodworking. The advantage of this machine compared to conventional fiber-reinforced material processing machines is that it can work at very high speeds above 20,000 rpm and with high feed rates.



TOOL SOLUTIONS FROM LEUCO

When it's a matter of tools, Keller has relied on LEUCO's advice and tools for many years. For example, diamond-tipped (PCD) LEUCO p-System grooving and compression milling cutters are used in the machining of aramid (AFRP) components for medical technology. The extremely elastic aramid fiber in the components requires the very high shear angle and constantly sharp cutting edge of the p-System tools for clean cutting with no protruding fibers. Furthermore, p-System compression milling cutters are also used in workpieces made of CFRP, where, in addition to delamination-free cutting quality,

Multi-piece CFRP part for medical technology with precise drilled and milled holes

PILOT COUNTERBORE WITH DIAMOND CUTTING EDGES


**150x TOOL LIFE SAVES
149 CUTTER CHANGES**

At a caravan manufacturer, the journal countersinks made of HSS previously used for machining glass-fiber-reinforced plastic (GFRP) were wearing out excessively quickly. This is because they are no match for the abrasive material. The solution is tools with diamond cutting edges from LEUCO. They increase the tool life by a factor of 150.



Diamond-tipped pilot counter-sink with the clamping length suitable for the customer

The problem so far: GFRP fibers are much more abrasive than steel. The journal countersinks were therefore dull extremely quickly. The workers used them

to countersink the screws of hail protection roofs made of glass-fiber-reinforced plastic (GFRP) on caravan roofs. In favorable cases, the HSS countersinks could be regrinded once. But in most cases, they were so damaged after machining just one caravan roof that the workers could only throw them in the garbage can.

The turnaround comes with a pilot counterbore with diamond cutting edges from LEUCO. With the new tool, the workers now process more than 150 caravan roofs. The tool life thus increases by a factor of 150. In addition to the economic calculation, 149 times are saved in changing the milling cutter. Thanks to the suitably designed cutter length, the caravan manufacturer saves the time previously spent on shortening the excessively long shanks of the standard HSS cutters. Another advantage: The cutting edges with the particularly wear-resistant diamond can be resharpened. And after sharpening, the next 150 roofs are waiting for the cutter.

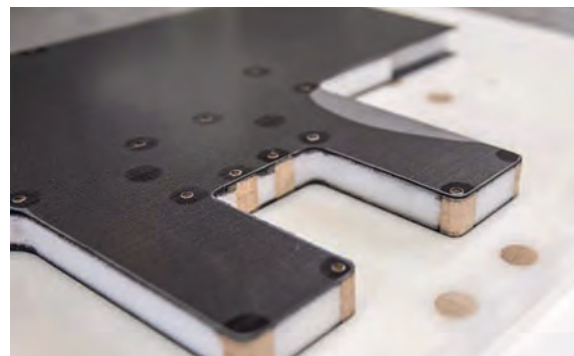


Original pilot counterbore for countersinking fiberglass roofs made of HSS.

a long tool life is required in order to carry out the jobs economically. Straight cuts in AFRP (aramid-fiber reinforced plastic) are made with diamond-tipped nn-System DP Flex circular saw blades from LEUCO.

As a supplier, the joinery offers its customers almost the entire range of composite materials and processing options: Aramid-, glass- or carbon-fiber-reinforced plastics, sandwich and honeycomb panels are milled, drilled or sawn. Keller faces new challenges with enthusiasm. The company itself offers innovative machinery, great experience and high personal commitment. When it comes to machining issues, they rely on LEUCO. As one of the leading tool manufacturers for the machining of fibrous wood, LEUCO, with its machining know-how, is also able to meet the future requirements for fiber-reinforced composite materials.

Sandwich panel with inserted sturdy wooden parts and holes



Cutting CFRP with the diamond-tipped LEUCO nn-System DP Flex saw blade

1971 - 2021

50 YEARS LEUCO BELGIUM

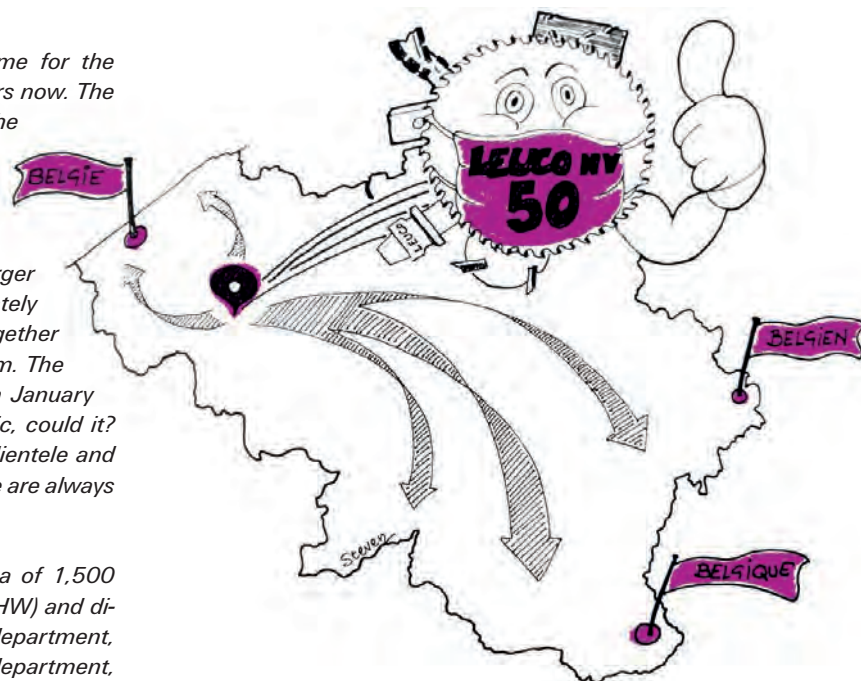
1971 - 2021 

Dear customers, employees and partners,
LEUCO tools have been a household name for the woodworking industry in Belgium for 50 years now. The history of LEUCO in Belgium began when the former dealer, Ormac, took on representation of the tools and shortly thereafter became LEUCO Belgium N.V. Initially, the company operated from Wommelgem (Antwerp) and later merged with Altec. This merger heralded a major reorganization that ultimately brought all the sharpening service centers together in a new building at the new site in Waregem. The business operations in Waregem started on January 1, 2001. A date could not be more symbolic, could it? The building is located in the heart of our clientele and very close to the highway. This means that we are always quickly on-site at our customers.

In addition to the offices, we have an area of 1,500 square meters in Waregem for the carbide (HW) and diamond (DP) sharpening service. In the HW department, we can sharpen almost all tools. In the DP department, an air conditioning system ensures a constant ambient temperature so that the latest EDM machines and measuring machine can work perfectly without external influences. We are proud of this efficient and state-of-the-art ServiceCenter.

With our competent team of sales personnel and by means of a daily transport service, we serve and supply all of Belgium with our tools.

Among our loyal clientele is the entire range of woodworking companies, from carpenters to kitchen manufacturers and flooring producers. All of them know that they can rely on the technical competence of the employees at all times. The LEUCO N.V. team is known for this throughout Belgium!



The wood and furniture industry in Belgium knows that it can rely on the technical competence of LEUCO's employees at all times. The LEUCO N.V. team is known for this throughout Belgium!

I would like to sincerely thank all customers, partners and especially the employees of LEUCO N.V. in Belgium for their loyalty over the years! Without the people behind the tools, LEUCO in Belgium would not be where we are today! We look forward to the next 50 years!

Steven D'Hondt
Managing Director LEUCO N.V.

LEUCO UKRAINE

OPENING OF A NEW SERVICE BRANCH IN LVIV

In August 2020, LEUCO opened a new service center in Lviv in western Ukraine. In Lviv, LEUCO Ukraine offers onsite sharpening service for both carbide (TC) and diamond-tipped (DP) tools.

LEUCO Ukraine is thus available to the numerous companies in the furniture region of Western Ukraine at customer-friendly service hours. The onsite presence shortens the logistics times and optimizes logistics costs.

Equipment installation and training of the new staff for the new ServiceCenter took place in a more difficult COVID-19 environment in the spring and summer of 2020. Nevertheless, it was possible to open the ServiceCenter at the end of August with a HW sharpening service. Shortly afterwards, the DP sharpening service was added.

LEUCO UA was founded in 2007 in Kiev. The central administration and a ServiceCenter are also located there.

1981 - 2021

40 YEARS LEUCO SOUTH AFRICA

1981 - 2021 

*Dear customers, employees and partners,
LEUCO became familiar within the South African wood-working industry during the 70's through the successful work of Plastim, which was the exclusive dealer for LEUCO tools. LEUCO founded LEUCO Tool Industries together with co-owner Hartmut Koestner. It's head office was based in Johannesburg, as well as sales and service centres in Durban and East London. In 1993 LEUCO Durban began to manufacture carbide brazed cutters and routers offering a local solution for custom made tooling. In 1997 LEUCO opened a new sales office in Cape Town and in 2001 the production facility was expanded and moved to Cape Town into larger premises. LEUCO then had the capability to manufacture insert-knife tooling, inserts as well as brazed cutters and routers. In 2007 LEUCO South Africa was the first wood working tool company in Africa to manufacture and service diamond tooling. Thank you to a leading product and to our loyal staff*

and customers. We are exceptionally proud to be the market leader for 40 years in South Africa and Southern Africa.

Yours Oliver Koestner, Managing Director
Yours Christine Koestner, Marketing Manager
LEUCO Tool Ind. (Pty)(Ltd)

| LEUCO in Durban



| LEUCO in Cape Town



| LEUCO in Bedfordview



| LEUCO employee providing HW service for saw blades.



| The newest LEUCO ServiceCenter in Lviv, Western Ukraine.

LEUCO MALAYSIA

NEW MANAGEMENT BOARD

Tool manufacturer LEUCO Malaysia announced a new Management Board in November 2020. The longstanding and highly experienced executives Ellen Teh and Mark Lim now lead LEUCO Malaysia Sdn. Bhd. with headquarter in Melaka.

Mark Lim started his career at LEUCO as an Application Engineer in April 2000. After 6 months of intensive training with LEUCO in Horb (Germany) and the production site LPF in France, he returned to head the Application Engineering Department and managed the service center then after.

In 2008, Mark started to support the sales team and handled some key accounts and the dealers in Indonesia and Vietnam. He gained much experience during his 10 years of travelling within South East Asia before being promoted as Sales Director in March 2018. He is 45 years old, married and has 2 children.

Ellen Teh joined LEUCO Malaysia as a Controller in Finance Department in Dec 2002. She was then promoted to Finance Manager of LEUCO Malaysia in Apr 2004. After few years' financial management experiences in LEUCO Malaysia, she was then assigned more responsibilities to take care of financial management of LEUCO Singapore started Apr 2005 and subsequently LEUCO Thailand in 2007. She is 45 years old, married

and has 2 children.

With the collaboration of LEUCO Asia, the growth in South East Asia region has extended to Vietnam in the beginning of year 2020. Both of them at the same time, are responsible for the operations and financial matters of LEUCO Vietnam.

In November 2020, both of them reached another milestone in their career when they were entrusted with the position as Managing Directors by the Management in Horb.

"We are humbled by the trust and confidence shown to us and we will give our full commitment to this new role. With support from the Management and all colleagues, we look forward to bringing growth and advancement to the company in the years to come", endorse Ellen and Mark.

LEUCO Malaysia Sdn. Bhd. was founded in 1998 and is an important manufacturer and supplier for machine tooling solutions for the woodworking, furniture and flooring industry in South East Asia.

LEUCO Malaysia announced a new Management Board in November 2020. The long-standing and highly experienced executives Ellen Teh and Mark Lim now lead LEUCO Malaysia Sdn. Bhd.



The new 1,600 square meter ServiceCenter at the main plant in Horb/Germany impresses with its elegance and functionality.



INVESTMENTS IN THE FUTURE AT TWO PRODUCTION SITES

NEW SERVICECENTER BUILDING IN HORB (GERMANY)

With the new 2,000 square meter building at the main plant in Horb (Baden-Württemberg), LEUCO has created an efficient and highly modern ServiceCenter in record time.

The functional building was skillfully embedded in the landscape with a great deal of architectural sensitivity and elegantly attached to the existing production hall. The basic structure, consisting of 270 tons of steel, 800 cubic meters of concrete, and over 20 km of cables and lines, is complemented by the most innovative building services engineering. Using state-of-the-art ventilation and air-conditioning technology, we can reduce energy requirements by up to 40% compared with existing buildings. The energy efficiency of the new

exhaust system is also complemented by an improvement in workplace conditions. Last but not least, the photovoltaic system can produce approx. 90,000 kWh of electricity/year, eliminating approx. 36,000 kg of CO₂/year.

A key plus point is the spatial situation - because in the past, the ServiceCenter and production were separated in terms of location. With the new direct connection to the existing production facility, LEUCO has generated synergies that will ultimately enable even better efficiency and customer service.

With its connection to the existing production hall, even better efficiency and customer service are made possible.

HORB/D



EXPANSION OF SAW PRODUCTION AT BEINHEIM SITE (FRANCE)

At the same time as the construction project in Horb, a new hall for saw production was built in Beinheim. For more than 45 years, LEUCO has produced saw blades at Beinheim in France. Among other items, more than 1 million high-quality saw blades are produced here annually.

This year, we seized the opportunity to significantly expand our production capacities on site on our own premises. With movement of over 3,350 cubic meters of soil and 186 truckloads of concrete, you can imagine how much effort was involved. With the new production hall, an expansion has also been successfully completed in record time. With 2,200 square meters of floor space, it has not only eliminated the existing cramped conditions, but has also enabled the entire

processes and workflows to be redesigned. For example, the material flow was completely redesigned and almost every machine was relocated to achieve optimum throughput and maximum resource efficiency. On this occasion, the logistics concept for access by cars and trucks was examined and revised completely. In addition to maximum functionality, special attention was also placed on responsible use of resources and energy; this is demonstrated, for example, by the installation of innovative, energy-efficient heating and ventilation technology.

In summary, it can be said that clever organization of construction site management and perfect communication between all parties involved made it possible to complete this construction project on schedule and to a high

BEINHEIM/FR



The new building expansion in Beinheim/France covers 2,200 square meters of floor space with a clear height of 6 meters.

standard of quality. The professionalism, routine and efficiency in the logistics departments of the companies involved in supplying such major construction sites also contributed to this.

A LOOK AT LEUCO

LEUCO ranks among the leading international suppliers of complex tools solutions and intelligent services for the wood-working industry.

Our goal is to improve the opportunities for our customers and partners through forward-looking innovations and to open up the potential of wood and related materials as a recyclable raw material to benefit people.

In close contact with our industry, we design and develop tungsten carbide and diamond-tipped circular saw blades, hoppers, boring and shank-type tools, drill bits, turnover knives and clamping devices. Our goal is to streamline the processes of our customers in the construction, furniture and panel industry, in lumber mills and interior design companies while also opening up new opportunities in working with the growing variety of materials.

Comprehensive consulting services, our sharpening service at manufacturer quality and future tool management solutions have made LEUCO a one-stop tool shop for our customers.

Today, around 1,200 employees work for LEUCO worldwide. With sales subsidiaries in Australia, Belarus, Belgium, England, Japan, Poland, Thailand, Ukraine and Belarus, as well as sales and production locations in China, France, Malaysia, Russia, Switzerland, South Africa, the USA and Vietnam, our company is represented on all five continents.

LEUCO
Magentify Wood Processing



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FOR YOU!**



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