

CNC4you

The Shopfloor Magazine

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SIEMENS

Sinumerik MDynamics used for manufacture
of dental implants

Series Production of Individual Parts



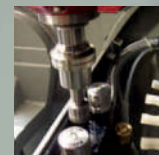
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From Planning
to Product

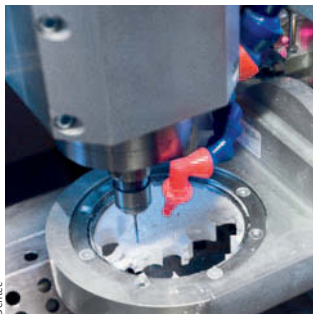


Super-Smooth
Surface



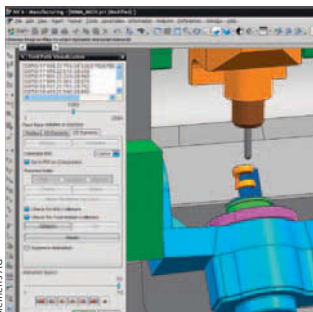
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Dear Readers:



Siemens will take the opportunity presented by the METAV trade fair to unveil a whole host of innovations relating to the Sinumerik CNC system platform for users of machine tools. This time, **medical technology** – a sector that is developing into an increasingly important market for the machine tool industry – will take center stage.

Siemens offers **solutions covering the entire process** chain in this area, from “classic” applications such as manufacturing complex hip, knee, and dental implants to workshop applications such as manufacturing large numbers of surgical instruments.

Our **Sinumerik 828D and 840D sl CNCs** provide an ideal platform for manufacturing demanding medical products in a process that combines high precision and efficiency. Optimum production planning with our **tailored NX CAD/CAM system**, along with the expertise of our always-accessible support team, also help ensure successful production processes.

However, optimum production depends not only on having the right control system; you also need the right machine, the right tool, and the right measuring technology for the job. Together with partners from the sector, we will demonstrate our joint manufacturing expertise in medical device production at the **special “Metal Meets Medical” booth at METAV.**

Take a look through this magazine to find out more about our wide range of solutions in medical technology, with interesting real-life examples.

Enjoy the read!

A handwritten signature in black ink, which appears to read 'Karsten Schwarz'. The signature is stylized with a large, sweeping 'K' and a long, horizontal stroke at the end.

Karsten Schwarz,
Head of Application Engineering, TAC Erlangen

Sinumerik MDynamics used for manufacture of dental implants

Series Production of Individual Parts

Manufacturing for dental applications requires a very high degree of precision and process reliability. Using high-precision ultrasonic technology from DMG, the innovative Sinumerik 840D sl, and a specially developed CAD/CAM system, Italy-based denttec has established itself as an innovative leader in the market for dental prosthesis products.

> Beautiful gleaming teeth are a dream for many people. Previously, implants and bridges were largely made from metal; however, super-strength plastics and ceramics such as zirconium are becoming increasingly popular today. Pure ceramic zirconium crowns are aesthetic, stable, and highly compatible, and are therefore seen as the best solution. However, products made from this material demand highly sophisticated machining.

Prepared for future dental technology

This was a challenge that Andreas Geier was happy to face. When the dental technician established denttec KG in the South Tyrol town of Gargazon in 1991, he used pressed ceramics and manual dental technology – as was the norm at that time. However, he was already inspired by new materials and procedures and had a vision of industrial dental

technology production that would enable zirconium crowns to be produced quickly, flexibly, more accurately, and therefore more cost-effectively. “With all due respect to the manual skills of qualified dental technicians, the trend toward mechanical production can no longer be halted,” says Geier.

All that he lacked was the appropriate CAD/CAM technology, which did not yet exist for the dental technology field. The company owner found a solution in

The road to perfect dental prostheses starts on the computer: Andreas Geier trusts his special CAD/CAM system



the form of a process chain developed together with the Fraunhofer Institute in Darmstadt, Germany, into which he poured his entire dental technology expertise, and the hyperDent CAM system from OpenMind. The latter is a perfectly tailored design application that enables him to process the input of a high number of dental practices quickly and with a high degree of quality. According to Geier, the process of taking an impression of the jawbone, creating a model from this, and then scanning it in will become outdated in dental treatment. Instead, the individual patient data scanned in via an oral scanner will be transferred directly to the machine tool via the CAD/CAM chain. With his process chain, the dental technician is prepared for this trend and – with the right equipment – sees no limits in terms of individual production of teeth.

Modern machine with a compatible controller ...

In order to create the individual tooth molds with the required quality and speed, the entrepreneur has acquired an ULTRASONIC 20 linear five-axis simultaneous milling machine from DMG with Sinumerik 840D sl. The ultrasonic technology enables high-performance

materials that are difficult to cut to be machined cost-effectively and to the highest quality through kinematic overlapping of rotation and oscillation on the diamond tool. This means that surface qualities with an average roughness of less than 0.2 micrometers can be achieved.

“The process of taking an impression of the jawbone, creating a model from this, and then scanning it in will become outdated in dental treatment.”

Andreas Geier

The Sinumerik 840D sl provides the perfect complement to this technology and, with its user-friendly features, is fully adapted to the production of dental implants. It boasts superb flexibility along with maximum dynamics and precision, and is quick and easy to use thanks to its intuitive Sinumerik Oper- >>

The ultramodern ultrasonic milling machine and the latest Sinumerik control technology enable production of highly precise implants for all requirements



For more information > www.siemens.com/cnc4you

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>> ate user interface. This allows the dental technician to quickly and coherently merge his skill with the CNC technology.

... for perfect results

Prior to machining, the data must be transferred to the controller. In this respect the Sinumerik 840D sl with Sinumerik MDynamics offers the convenience of a modern PC, with features such as a USB stick, networking, processing of the integrated hard drive, a memory card, and Internet capability. In addition, the internal data management, with its directory structure, is similar to that on a standard PC and thus helps the dental technician with the first steps. Setting up the workpiece is facilitated by a wide variety of measuring functions and is represented clearly with animated elements by means of graphical support.

Optimum milling results with perfect surface quality, precision, and high speeds are particularly important in the medical and dental technology sector. This must be accompanied by ease of use and an integrated process chain. Sinumerik MDynamics guarantees perfect surface quality with its innovative Advanced Surface motion guidance and an optimized NC data compressor, along with rapid adaptation to the workpiece, tool, and program handling.

It also offers the useful option of storing important workpiece-related data and calling them up again easily at a later stage. This means that a special workpiece can be produced again by quickly implementing any patient or practice changes following machining in the CAD/CAM system on the machine.

Future market for subcontracting

As a company involved in cutting-edge technology, denttec has recognized the signs of the times and, in addition to orders from its own core clientele, processes orders from other dental laboratories in the form of commission work. Its service portfolio goes far beyond the actual milling of dental prostheses and covers the entire process chain, including logistical and accounting services. Clients are therefore able to concentrate on their core competencies, that is, consultation and modeling and finishing of dental prostheses.

Demand for these services is so great that the ULTRASONIC 20 linear has now

reached the limits of its capacity. denttec has recently acquired an ULTRASONIC 10 from DMG – a machine that is specially tailored to the requirements of the dental market. The extremely

compact five-axis precision machine is especially suitable for use in smaller dental laboratories, as it has a footprint of just 2 square meters and will fit through the door of any room. <

Technology in detail

Sinumerik Operate

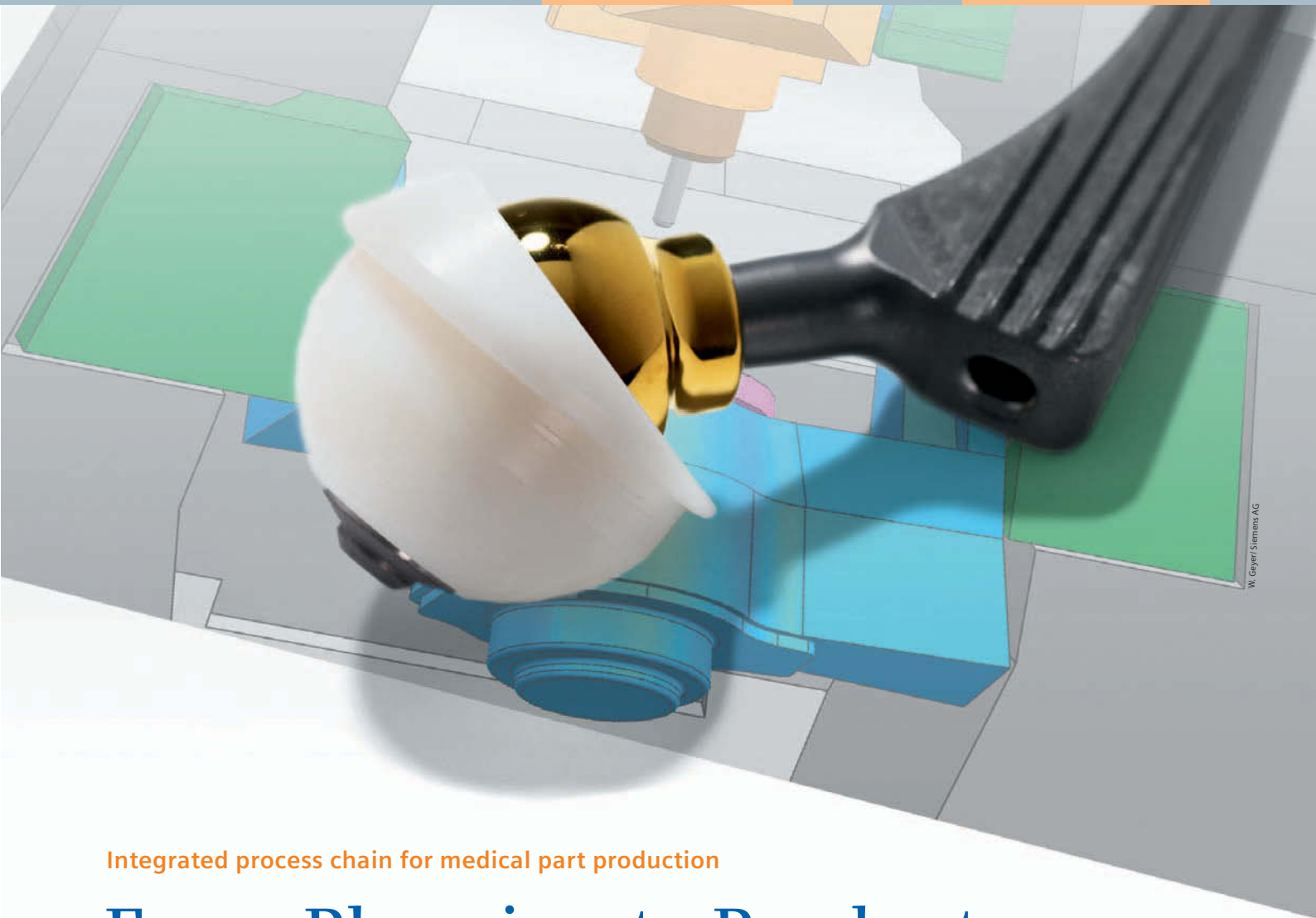
The new Sinumerik Operate user interface is clear in its layout, intuitive in its operation, and equipped with a host of new and powerful functions. This allows work-step and high-level language programming to be combined under a single system interface to provide very fast, efficient, and intuitive NC programming and work preparation. Intelligent functions assist operators in their day-to-day work. The interface also features a modern, user-friendly Windows-style layout. In terms of graphical support, the new user interface is setting standards in usability: the Animated Elements function depicts each machining step in advance as a graphically animated simulation.

hyperDent CAD/CAM system

The open and highly automated hyperDent programming system from OpenMind is geared to the procedures in dental laboratories and enables highly precise digital production of dental prostheses. Three-dimensional machining strategies, strategies for indexed milling, and five-axis simultaneous machining enable the production of high-quality full anatomical crowns and bridges. The process starts after the machine and bracket have been secured, the blank loaded, and the object placed in position with a click. The object can be tilted to minimize the required height of the blank. Following automatic recognition of the preparation limits, the machining strategy can be assigned with a click of the mouse. Connectors can be set either automatically or manually, and the sintering pins positioned with a click of the mouse. The tool paths are then calculated automatically. hyperDent integrates the machining strategies of the internationally successful hyperMill CAM software, which is employed in innovative industries such as aviation and aerospace, Formula 1 motor racing, and medical technology.

Ultrasonic technology

The ultrasound frequency is transferred from the spindle to the tool holder in a noncontact process via induction. Additional oscillating motion kinematics are generated at the tool, which overlap the actual rotation. The diamond tool pulsates at between 20,000 and 50,000 times a second, depending on the HSK actuator variant, with the diamond tip penetrating the material and drawing tiny particles out of the workpiece. The reduction in the process forces enables the production of thin ridges and a longer tool service life, while reducing micro-cracks in the material. By integrating the ultrasonic HSK actuator system, ultrasonic hard machining and HSC milling can be combined on a single machine, which means that a large range of materials – from soft to advanced materials – can be machined on one machine.

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Integrated process chain for medical part production

From Planning to Product

Medical part manufacturing is one of today's growth industries, not least due to the increasing demand for hip and knee replacements, spinal implants, shoulder and elbow joints, and dental bridges. To ensure that manufacturers are able to meet the high productivity and quality requirements for medical devices, Siemens offers solutions across the entire process chain.



Although the medical devices and products market is showing positive development, there is a certain amount of cost pressure too. As a result, processes need to be optimized, and the largely high-quality materials such as ceramics, titanium, and stainless steel need to be machined efficiently. Manufacturers of

medical devices are also obliged to fulfill certain regulations laid down by legislators (see interview on p. 9) and therefore depend on flexible technology that allows them to respond to new requirements quickly. To meet this need, Siemens offers an integrated and ultramodern process chain. Optimum integration of all components in the

chain ensures flexibility in the production of implants and instruments across the entire manufacturing process.

Optimum preparation for perfect results

Efficient production processes begin with good preparation. Data capture using imaging processes such as com- >>

>> puted tomography (CT) provides the initial information for modeling the implants. These data can then be transferred to the NX CAD system from Siemens PLM and used as a basis for subsequent processes. This means the workpiece modeling process does not require any intricate, resource-intensive construction. The model is then transferred to NX CAM, and the CAM designer adds the relevant production parameters. Next, the CAM system creates the CNC program and the tool list. A key benefit of NX CAM is the machining simulation function, which simulates the behavior of the controller and ensures the highest level of process reliability. The validated program is then sent to the machine via a network connection or the tool information and DNC system from Siemens.

The right controller for every situation

In addition to large series production, there is also high demand for small se-



Sinumerik CNCs are used not only for manufacturing implants but also medical devices such as reamers

ries and individual medical part production. Sinumerik is the ideal numerical control for manufacturing both individual parts and large batches. The premium-class Sinumerik 840D sl CNC is perfect for the cost-effective production of complex implants, as it can be used in a wide range of machining processes and offers outstanding high-speed cutting (HSC) performance in the five-axis range. The new Sinumerik 828D compact controller is ideal for medium-performance applications. With its compact dimensions, wealth of functions for turning and milling, and simple operation and commissioning that do not require extensive training, it is particularly well suited to workshop applications.

Maximum user-friendliness is important to ensure that the system remains cost-effective even for the smallest batch sizes. The new standardized Sinumerik Operate user interface, with its modern Windows-style design, gives the Sinumerik CNCs an HMI that en-

Protecting patients and users

Before manufacturers of medical devices are allowed to launch their products on the market in Germany, they need to meet certain regulations under the German Medical Products Act (MPG), which is based on European Directive 93/42/EEC. We discussed this subject with German attorney Dr. Volker Lückner, a specialist in medical law.

What purpose do the regulations for medical devices serve?

Dr. Volker Lückner: First, the regulations for medical devices are intended to ensure the free traffic of goods within the single European market. The CE mark shows that the products comply with basic requirements and that they are eligible for sale throughout the European market. Second, the MPG protects patients and users by stipulating certain performance and safety requirements for medical devices and standardizing mandatory certification.

Which medical devices are subject to the regulations?

Dr. Volker Lückner: The term “medical devices” comprises all equipment, instruments, products, and other objects intended for medical use and whose main effect in or on the human body is not achieved through active pharmaceutical ingredients. In other words, almost all products used in treatment regimes in hospitals, by physicians, and by therapists that are not drugs. There are also many domestic medical devices that are primarily used to prevent and treat illnesses or as aids for people with disabilities.

What do suppliers of medical devices need to do to comply with these regulations?

Dr. Volker Lückner: First, the medical device must be classified according to its risk class (I, IIa, IIb, or III). Then the manufacturer must complete a conformity assessment process, which differs based on the risk class in question. The process must be documented throughout, and manufacturers are required to submit certificates to appointed bodies.

ables convenient graphic programming and simulation – from ShopMill/ShopTurn work-step programming and Sinumerik high-level language with programGUIDE right through to DIN/ISO programming. And, last but not least, animated input with the Animated Elements function provides users with an accurate picture of the motion path.

Innovative functions for flexibility and quality

Sinumerik MDynamics offers a wide range of practical functions to help meet the high levels of flexibility required in medical implant production. These features include the new tool and program management system and the innovative measuring functions in JOG mode for simple machine and workpiece setup and perfect milling results. The new Cycle800 swivel cycle allows even complex workpieces to be machined quickly and easily in a single clamp – both in JOG mode and in auto-

matic mode for complete machining. The package also includes HSC functions, which play a key role in implant manufacture. Of particular note is the Cycle832 high-speed setting, which allows machining strategies to be adapted more quickly. Other functions, such as the remaining-time display and visualization of large mold-making programs, support users during the machining process. Sinumerik MDynamics also saves time with its simple data and program handling and additional CompactFlash card memory. Spline interpolation and workpiece simulation for multilateral machining complete the package.

Optimum milling results with perfect surface quality, precision, and high speeds are particularly important in medical part production. Sinumerik MDynamics ensures perfect surface quality with its innovative Advanced Surface motion-control feature. An optimized “look ahead” function also helps ensure perfect surface quality by

working together with the new motion-control feature to provide accuracy, increased speeds, and results that are reproducible in adjacent milling paths.

Experience the process chain live

Anyone looking to experience the comprehensive Siemens solution for medical equipment production firsthand can do just that at METAV. Together with its partners DMG, Star, Index, Schütte, Zoller, Renishaw, and Iscar, Siemens will be presenting the entire process chain in a virtual factory at the special “Metal Meets Medical” booth. The presentation will cover all aspects – from planning and executing the key production stages and efficient use of resources to process standardization and improvement. There will also be live demonstrations of medical products being manufactured on various machine tools using different technologies in the technology arena. <

»The manufacturer has to complete a conformity assessment process.«



Dr. Lückner

How long does it take to become certified?

Dr. Volker Lückner: The duration of the conformity assessment process depends primarily on the extent to which the manufacturer has addressed legal requirements prior to certification. With the best preparation, the process can take at least 3 months. However, in the case of new certificates without the relevant precertification, suppliers should reckon with anything up to 18 months.

Where can suppliers of medical devices get support?

Dr. Volker Lückner: Support is available from a variety of different sources. First, we help our clients with legal matters during the entire conformity assessment process. In particular, we offer support with legal issues relating to marketing and advertising, and also in the event of conflicts with the appointed body, the authorities, or with the competition. Second, almost every appointed body will offer preassessment discussions before the actual certification process for a fee. However, these bodies are only allowed to certify – that is, check – the product and are not able to advise the customer in terms of content. As such, these initial consultations tend to be rather general.

Dr. Lückner, thank you for your time.

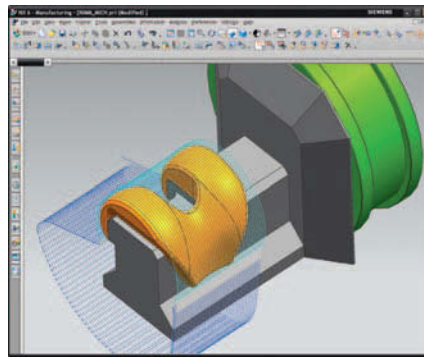
Milling a knee implant in one step

Super-Smooth Surface

The demand for knee implants is huge. Every year in Germany, around 145,000 patients receive knee replacements. Owing to the sophisticated materials, manufacturing the implants is a real challenge. Siemens showed what its technology is capable of by milling a knee implant at the DMG exhibition in Pfronten, Germany.



A knee joint must be able to bear a person's entire weight. Due to the high level of strain placed on the joint, many older people suffer from degenerative diseases of the knee such as arthrosis and arthritis. Knee joint implants are a proven way to restore the function of the damaged joint and relieve pain. "Tailored" implants are technically possible but remain very costly, so the majority of patients receive a standard im-



Milling strategies defined in NX CAM and workpiece simulation help achieve a perfectly milled implant

plant corresponding to their age, gender, and/or bone quality

The right strategy is key

Utmost precision is required during implant manufacture to ensure perfect function and compatibility. This presents a challenge for man, machine, and tool, as the most frequently used material for standard implants is a cobalt-chromium cast alloy (CoCr29Mo).



This material has a particularly hard surface, leading to fast cutter wear. To optimize tool life, milling strategies such as pitch, lead angle, horizontal angle, synchronization, and so on must be strictly observed. With this workpiece, suitable strategies were first defined in NX CAM and then transferred to the Sinumerik 840D sl via a postprocessor.

High-quality surface is the measure of all things

To ensure a perfect result with excellent surface quality, the controller must be able to process the data from the CAM program at high speeds. The Sinumerik MDynamics technology package is setting standards in this area. The five-axis geometry of the machine is first measured in Cycle996 and adjusted if necessary. The G-code groups for rough machining, smoothing, and prefinishing are then defined in the integrated Cycle832 high-speed setting, and the mandatory tolerance is specified. This cycle ensures maximum and consistent speeds along the contour and allows the entire knee implant to be manufactured in just under 30 minutes.

The artificial knee joint combines an ultrasmooth metal surface with a perfectly harmonized plastic insert. This is where the Advanced Surface function within the Sinumerik MDynamics package proves its worth (see "Technology in Detail" box) – it ensures that the surfaces are highly polished rather than just ground, and all at higher machining speeds than ever before. The innovative new five-axis functions within Sinumerik MDynamics also ensure

more uniform speeds during machining and reorientation, resulting in faultless surfaces and shorter machining times.

Highly dynamic machines

Of course, these technical innovations are only possible with a suitable machine. Siemens selected the HSC20 linear from DMG, which is ideal for manufacturing small medical implants thanks to its highly dynamic five-axis simultaneous machining and linear drives for accelerations of over 2 g. The machine requires extremely high dynamics, even when milling in synchronization – a strategy that ensures maximum tool life. All empty runs resulting from the synchronization (rapid feed movements) are executed by the machine in five-axis mode. This is only possible if the machine is able to position quickly and interacts perfectly with the controller.

Special machining tools play a key role in producing perfectly milled knee implants. Iscar tools are designed for this purpose and feature special cutting

geometries that ensure maximum service life even at high machining speeds.

Milling, not grinding

To date, artificial knee joints have first been milled on a machine and then ground on a second machine to produce a gloss finish. Siemens demonstrated at the DMG exhibition that its innovative technology can be used to mill an implant with a highly polished surface in just one clamp. The results are outstanding and machining is faster and more flexible than ever before.

As an all-round provider of solutions across the entire process chain, Siemens is the perfect partner to ensure efficient and cost-effective production of individual knee implants in the future. In the new process, the magnetic resonance data of the affected knee is transferred to NX CAD, and a 3-D model is produced. The milling strategy is then transferred to the new model in NX CAM, and the generated NC program is sent straight to the controller. The advantages are clear: by removing less bone, the operation is less intrusive and recovery time is significantly shorter. <



Siemens AG

Technology in detail

Advanced Surface

The intelligent Advanced Surface motion guidance really comes into its own during high-speed complete machining of complex parts. With the new, improved online compressor, contour deviation is minimized to such an extent that the set contour tolerances are always observed, ensuring total contour accuracy even at the highest machining speeds. The highly dynamic machines also include an intelligent jerk-limitation feature for smooth acceleration and braking and therefore reduced wear. To achieve the ultrasmooth surfaces required, Advanced Surface uses an optimized look-ahead function to reproduce the speed profile on adjacent milling paths. An improved speed profile ensures shorter machining times.

Subcontractor relies on Sinumerik for long-turning needs

Dedicated to Medical Part Production

Jürgen Servay's family-run business, based in Neulingen in Germany's Black Forest, has made its name primarily as a subcontractor to the jewelry and medical technology industries. The company relies on proven Sinumerik CNC technology for all its applications, ranging from laser technology and milling machines to the new long-turning automatic screw machine.



> Servay is ideally located in Neulingen on the edge of the Black Forest, not far from Pforzheim, the capital of the German jewelry industry. When the business began operating independently some 14 years ago with a MAHO FP turning machine and a laser machine, most of its customers were from the jewelry industry. Laser technology enabled Servay to meet its customers' special requirements while giving it an advantage over competitors in the fierce-

ly contested turning and milling market. From the outset, Servay favored Sinumerik as its control system of choice – initially with the Sinumerik 810D, and now with the 840D.

The route to medical part production

The business's first foray into the world of medical part production began with the construction of a foot-care machine for use in health resorts in the Black Forest region. As orders increased in

this field, the company's range of machines was expanded to include several short-turning automatic screw machines from Benzinger. Servay gained a proper foothold in the sector when the international medical technology company Stryker was looking for a supplier of surgical instruments for hip joint operations. During the production of these instruments, flexible spindles must be connected to operating tools – a task that can only be performed using laser and turning machines. In order to produce the high volumes and the special range of parts, Servay once again added more long-turning automatic screw machines to its product line. Because of its proximity, good support, and the Sinumerik CNC equipment, Servay opted for three ECAS20s from the Star-Micronics company in Neuenburg – a series of machines that meet its requirements perfectly. The company needed to be certified in connection with this order, and it met this challenge with ease. It now meets not only ISO9001 standards, but also the strict standards of the US Food and Drug Administration (FDA).

With the Star long-turning automatic screw machines and the Sinumerik 840D, Jürgen Servay and his daughter are well equipped for producing special medical technology parts



Perfect for multichannel machines

The long-turning automatic screw machines are largely programmed on an external programming station using a



Peps-CAMTECH system. Fine-tuning then takes place directly on the machines in G-code or through parameterization of the Sinumerik standard cycles. What Jürgen Servay likes about the Sinumerik 840D is not just its reliability, but also the high level of functionality that allows it to meet all his requirements: "In addition to the 'normal' G-code features, the Sinumerik offers a large number of high-level language commands that make life easier, particularly with the multichannel programming of the long-turning automatic screw machines." The three-channel display on the ECAS20 Sinumerik panel is also helpful because it shows at a glance which slide is currently being used for which job. This means that three tools can be used simultaneously on the main and counter spindles, and all movements can be synchronized.

A broad base to beat the crisis

With the long-turning automatic screw machines, Servay can turn workpieces between 2 and 4 millimeters in diameter. Across its machine range, the company has specialized in long instruments and small parts that consist of various components. The production of biopsy needles for the removal of tumor tissue was a particularly challenging task, as it also involved connecting flexible spindles to an instrument. Only Ser-

vay was able to deliver the 5,000 units per week with the necessary quality required by the client, Barth-Angiomed.

Approximately half of the orders now received by the Black Forest-based company are for its medical technology


Technology in detail

Long turning with Sinumerik

Sinumerik supports simultaneous machining of multiple workpieces on main and counter spindles with up to 10 channels and actuation of up to 31 axes per NCU. Programming can be carried out either on the controller using G-codes and cycles, or in production planning. Whichever method is used, CNC offers a wide range of useful overlapping functions, for example, machining a tool in a channel on a workpiece that is moved by a different channel (z-axis on the moved headstock). The programmer and the operator do not need to concern themselves unduly with the resulting movements of the parallel actions; instead, they can program and track the jobs of each channel independently, as though the movements were being performed independently of each other. In terms of Servay's long-turning application, this means that machining the tool on the workpiece would follow the same procedure as on a standard turning machine with a fixed headstock. To optimize the system, the dynamics for superimpositions can also be impressed on the axes and spindles involved, based on the application – a genuine advantage over the competition.

Sinumerik offers further unique selling points for this technology segment. For the commonly used programming systems with table output, examples include the following:

- > Unlimited length of the axis, spindle, and auxiliary function profiles (several megabytes of available tables online that can be downloaded in parallel to the processing and converted in the IPO cycle)
- > Comprehensive realtime modifiers also for active table applications, e.g., to accommodate for tool wear
- > Faster processing of process statuses: subsequent jobs (tables or G-code sequences) can be processed immediately upon receipt of feedback
- > The ability to flexibly call up job sequences from tables or G-code sequences with high-quality guide value synchronization

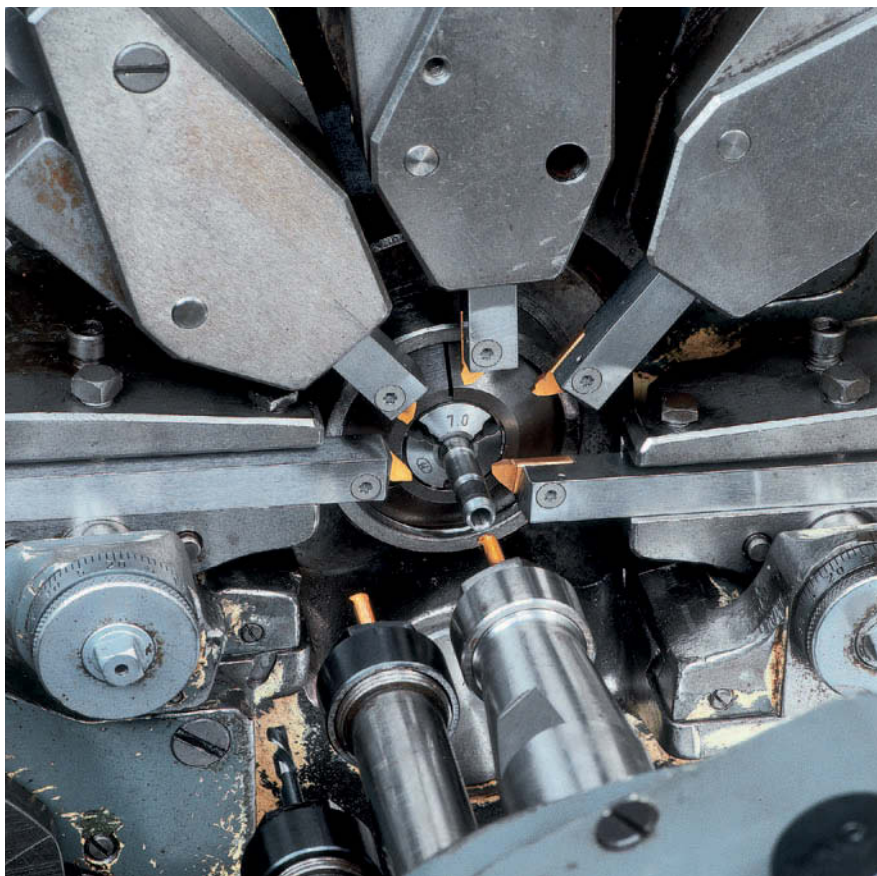
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 Kanal aktiv			Programm wartend			CH1 Display OFF		
Warten auf anderen Kanal				ROV / SBL1				
CH1:		CH2:				CH2 Display OFF		
M132		T1700 : DRILLING		G455				
M131		M3S:3000		G00 -0.5		CH3 Display OFF		
T200 : TURNING		G000		G2020				
M51		G02 -0.5		T2300 : DRILLING				
G0X11.02-0.5M3S:3000		G127.5F0.03		M3S:3000		Pos Display OFF		
G1X4.4F0.2		G455		WCS:132				
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[mm]	Absolute	Machine	[mm]	Absolute	Machine	[mm]	Absolute	Machine
X1	60.000	60.000	X3	70.000	60.000	X2	0.000	330.000
Y1	0.000	-55.300	Y3	0.000	-232.000	Z2	-0.500	39.522
Z1	-0.500	99.500	Z3	0.000	0.000	C2	325.692	325.692
C1	0	0	C3	0	0	T2200	F:0.000	
T200	F:0.000		T1800	F:0.000		S1: 3000	S12: 0	
S1: 3000	S11: 0		S1: 3000	S13: 0		T2200	S12: 0	
POSITION		PROGRAM		OFFSET		SETTING		OPEN CNC
ALARM		MAINTENANCE		MAINTENANCE		MAINTENANCE		MAINTENANCE

products, with the rest coming from the mechanical engineering, automotive, model construction, toy, and jewelry industries. Jürgen Servay believes that this broad base puts him in an ideal position to see out the current crisis. <

For more information >

www.iscar.com

Contact >

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With tool systems such as SwissCut, even the smallest parts can be produced on long-turning automatic screw machines

Machine tools for high-quality implants

Quality Is Key

Generally speaking, the manufacture of medical implants calls for sophisticated materials that require a high degree of accuracy in the production process. To meet these requirements, Iscar – a leading machine tool manufacturer based in Ettlingen, Germany – is constantly developing its products for applications in the field of medical technology.

> In order to cater to the high quality requirements of medical technology, Iscar Germany GmbH has produced a highly innovative range of machine tools employing directed geometry. Carbide milling cutters are used to mill knee and hip joint implants made from a cobalt-chromium alloy (Co-Cr) or titanium. These components are rough-worked using FeedMill high-feed milling cutters or Multi-Master (an interchangeable head milling system) ball-nose milling cutters. The same milling cutters, employing chatter-free geometry, are used for smoothing, as they provide excellent vibration damping thanks to the uneven tooth pitch. Particularly on low-end machines, these milling cutters achieve a comparatively high material removal rate.

Iscar tools for producing implants excel due to their particularly fine-grain hard-metal base substrate with a very wear-resistant coating. In combination with the adjusted geometry, they set new standards in dimensional precision and surface quality.

Precision down to the smallest component

Iscar tools also offer significant advantages when machining rotationally symmetrical components such as bone pins and screws made from titanium or surgical steel, and also dental implants. On these tools, the chip breakers have been changed, along with the base substrates and coatings. Special tool systems such as SwissCut that are particularly suited to producing very small components on long-turning automatic screw machines are also available. The entire range of tools (for turning, boring, thread-cutting, tapping, plunge-cutting, and milling) features products that enable even more productive and high-quality implant manufacturing. <

Measuring tools under real conditions

Noncontacting Tool Measurement

The exact and effective length of the milling tool is an important factor when machining demanding workpieces. Renishaw measuring systems are used directly on the machine and prevent unwanted interruptions and measuring errors.



The compact NC4 laser tool monitoring system is ideally suited to smaller machining centers



Deviations caused by dynamic and thermal spindle growth, tool change accuracy, and the actual fly circle diameter of the blades can only be recorded by measuring the tool parameters in the spindle at machining speed. Renishaw laser light barriers can also reliably measure sensitive cutting edges and tool geometries.

Unique technology for reliable measurement

Whether a focused or parallel beam is used depends first and foremost on the conditions of use in the machine tool. The parallel beam of the Renishaw lasers enables high sealing-air pressure at low consumption, courtesy of the small laser openings (0.1 to 0.2 millimeter in diameter).

Thanks to the patented geometry of the openings, the sealing air escapes at very high speeds at an angle to the round laser beam. This ensures that the accuracy of the measurement is not adversely affected by air swirling around in the beam and prevents a buildup of chips at the openings. The drop in pressure across the very small openings of the Renishaw NC4 laser is quite sufficient to activate the integrated seal directly. In the absence of a sealing-air supply, all the openings are therefore immediately hermetically sealed.

Avoiding errors – saving costs

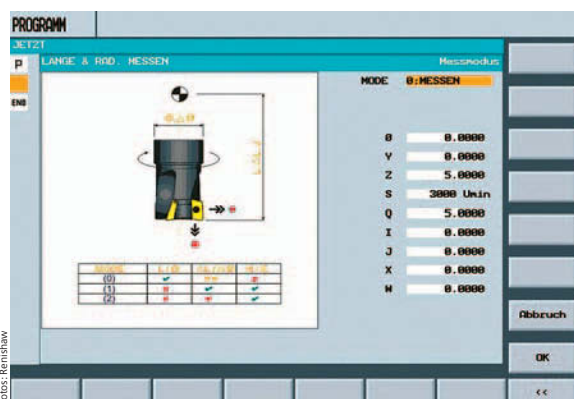
Another important factor in accurate measurements is tool cleaning. Noncontacting measuring systems also record a film of centrifuged cooling lubri-

cant on the blades, which can easily lead to errors of the magnitude of hundredths of a millimeter. Using an optimized blowing process, even tools with an internal coolant supply and dripping cooling lubricant can be reliably measured. To avoid false measurements caused by cooling lubricant residue or air swirling around, sophisticated actuation of the blowing process is required. The current measuring cycles for the noncontacting tool monitoring system use the practical experience gained from extensive trials.

As a Sinumerik solution partner, Renishaw offers its tool measuring cycles for the Sinumerik controller as a certified additional function. This means that optimum functionality and integration into Sinumerik user interfaces are guaranteed.

Use of the NC4 noncontacting tool monitoring system from Renishaw saves users money as it identifies errors at an early stage and allows them to be corrected before scrap is generated.

Using Renishaw's one-stop systems for checking machine accuracy, high-precision workpiece and tool measurement, and interactive programming, users can increase process stability and reliability in the production of complex workpieces without having to put up with long tuning times.



Maximum functionality and operability: the tool measuring cycles from Renishaw can be easily transferred to the Sinumerik controller

SinuTrain anniversary with smiling winners

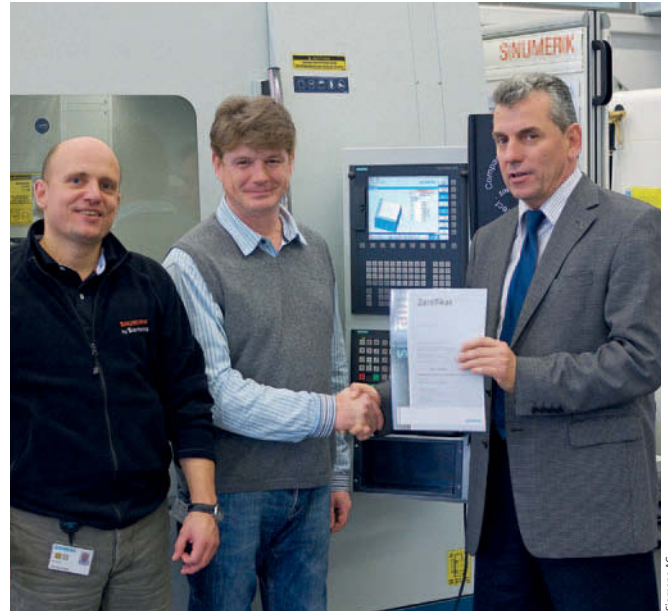
SinuTrain, the training software for Sinumerik controllers, celebrated a special anniversary with delivery of the 20,000th full license. Since the first version appeared in 1995, the training software has developed from simple control simulation to a full-fledged programming and simulation package. To mark the anniversary, CNC4You organized a competition, with three full versions of SinuTrain as prizes.

One of the three lucky winners is Thomas Hans from the IHK training workshop in Solingen, Germany. His training company also uses a turning machine with ShopTurn, so the SinuTrain version is a welcome addition for writing and testing CNC programs on the PC.

Applications engineer and self-confessed Sinumerik fan Kolja Schwab from Brunswick in Germany was another delighted winner. He opted for the latest version with ShopTurn 7.5 on account of the new features offered by this version. In particular, he is looking forward to putting the many new cycles through their paces.

The third winner is Dutchman Olaf Koch, who works on a Hardinge turning machine with ShopTurn 6.4 and the compatible SinuTrain version. The extra license is a welcome addition for him, as it means he can now also program at home. <

Thomas Hans (left) thanks Sinumerik applications support manager Klaus Schemken for his prize



Karsten Schwarz (right) from Siemens hands Peter Schweyer (center) the certificate for Sinumerik 828D and Sinumerik Operate

Certified trainer for Sinumerik 828D

The Sinumerik 828D recently unveiled by Siemens has received a warm welcome in the CNC world – a number of machine manufacturers are already delivering the first turning and milling machines with the compact controller. Customized individual and group training courses are being offered to help operators familiarize themselves with the new machine and controller so that they can work productively as soon as possible. The courses are frequently conducted by freelance trainers who have been trained at the Siemens Technology and Applications Center (TAC) in Erlangen in an intensive program covering both theoretical and practical aspects of the controller and software.

Peter Schweyer was the first trainer to undergo the certification process for Sinumerik 828D and Sinumerik Operate. He will now receive full support for the duration of the certificate's validity in the form of documentation, personal technical contacts, and regular refresher training.

With many years of experience behind him, familiarizing himself with the new user interface and controller did not cause him any problems. Quite the opposite, in fact: Schweyer was soon "enthused by the integrated operating concept and the programming." He was also impressed by the new features, such as the revised measuring and swiveling cycles and further useful functions that considerably simplify work processes.

Equipped with his certificate for operating and programming training courses in turning and milling with Sinumerik 828D and Sinumerik Operate, Schweyer – who is already certified for Sinumerik 840D and 802D sl – is now able to offer training at home and abroad on the latest Siemens systems. <

Training partnership sealed with Siemens

The DMG Training Academy offers operating and programming training for customers of DMG turning machines and machining centers at its training centers in the German cities of Bielefeld, Leonberg, Pfronten, and Geretsried. It also offers opportunities to gain qualifications in CNC technology. Jan Möllenhoff, managing director of the DMG Training Academy, recently decided to enter into a training partnership with Siemens. The reasons for his decision were twofold: first, because the Siemens Technology and Applications Center (TAC) in Erlangen provides comprehensive training documents – including for the new Sinumerik Operate user interface – and second, because DMG uses the innovative Sinumerik solutions for turning and milling on almost all of its machine series.

Siemens offers “train-the-trainer” workshops, which form an ideal base for the training partnership.

These workshops explain the latest training documents, and participants are given the opportunity to exchange ideas on teaching methods. The first train-the-trainer workshop was held in November at TAC Erlangen for the DMG milling training locations in Pfronten, Geretsried, and Leonberg. This was followed in early December by a turning technology workshop for the Bielefeld and Leonberg locations.

The participants were trained by Sinumerik expert Karl-Heinz Engels, who continues to provide them with support after the



Exchanging knowledge: the train-the-trainer workshop at the DMG Training Academy (TAC Erlangen)

training and will invite them to the annual refresher courses at TAC Erlangen.

Florian Arnold, head of the milling division at the DMG Training Academy, says: “I was impressed by the fact that the training documents are also available in languages other than German, such as Russian. Even as an ‘old hand’ in CNC training, I was able to take some teaching tips and tricks with me from the workshop in Erlangen.”

VDW trainee foundation aids qualification

Highly qualified employees are the key to the international success of the machine tool industry. In early 2009, the Association of German Machine Tool Factories (VDW) initiated the creation of the VDW trainee foundation to ensure the entry of new blood into the sector in the future.

Looking forward to helping trainees become qualified in machine tool manufacture: participants at a VDW training course for teachers



Since its foundation, 350 trainers and teachers in the German states of North Rhine-Westphalia and Baden-Württemberg have attended advanced training events in computer-assisted production organized by the VDW trainee foundation in collaboration with various partners. The events have focused on CNC milling and turning technology, practical training on machines, and the CAD/CAM process chain.

The VDW trainee foundation also develops training documents for advanced training courses for trainers and teachers. Based on these documents, practical teaching materials are then developed for use in classes.

A total of seven advanced training courses for teachers, each with 12 participants, were held at the Siemens Technology and Applications Center (TAC) in Erlangen in 2009.

Each course lasted four and a half days, during which time the participants learned how to operate and program with ShopMill or ShopTurn, and also program in accordance with DIN 66025.

Together with the VDW trainee foundation, Siemens will be represented at the Metav trade fair special youth exhibition, a key platform for young people to find out about courses and occupations in the machine tool manufacturing industry.

Less downtime – higher output

Easy Message

> Machine downtime sometimes results in significant costs; however, particularly in smaller workshops, it is often not possible to find additional personnel to monitor processes. The Sinumerik 828D's Easy Message function can help.

The compact Sinumerik 828D is the ideal workshop CNC and is also suitable for simple medical part manufacturing. Its versatile turning and milling functions enable subcontractors to produce medical devices efficiently, whether working with large batches or individual parts.

However, efficient production processes depend on machine downtime being kept to a minimum. Operators must have access to information on machine availability at all times. This is no simple task in a small workshop where the machine operator is also responsible for logistics and distribution.

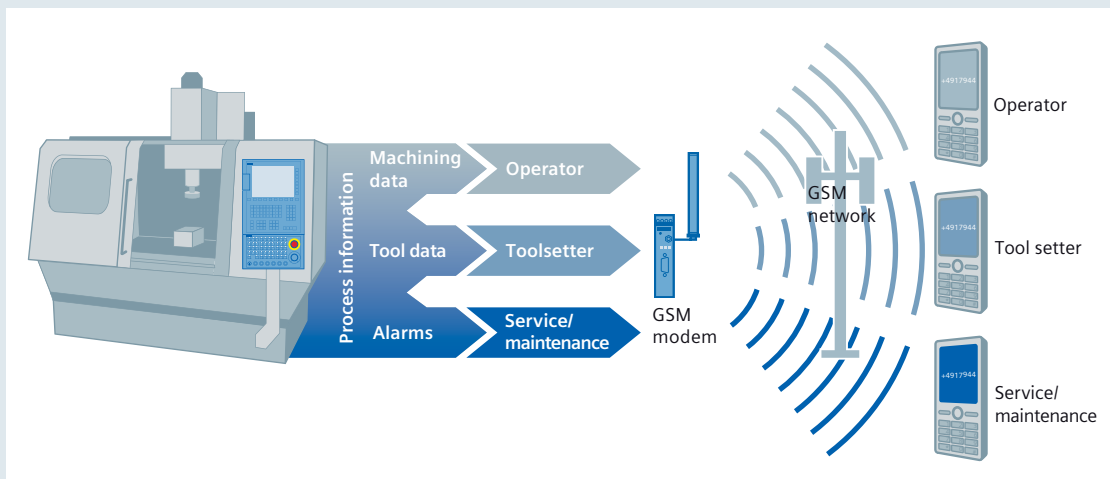
Always well informed

Easy Message on the Sinumerik 828D is an integrated process-monitoring function that automatically sends machine availability information to the

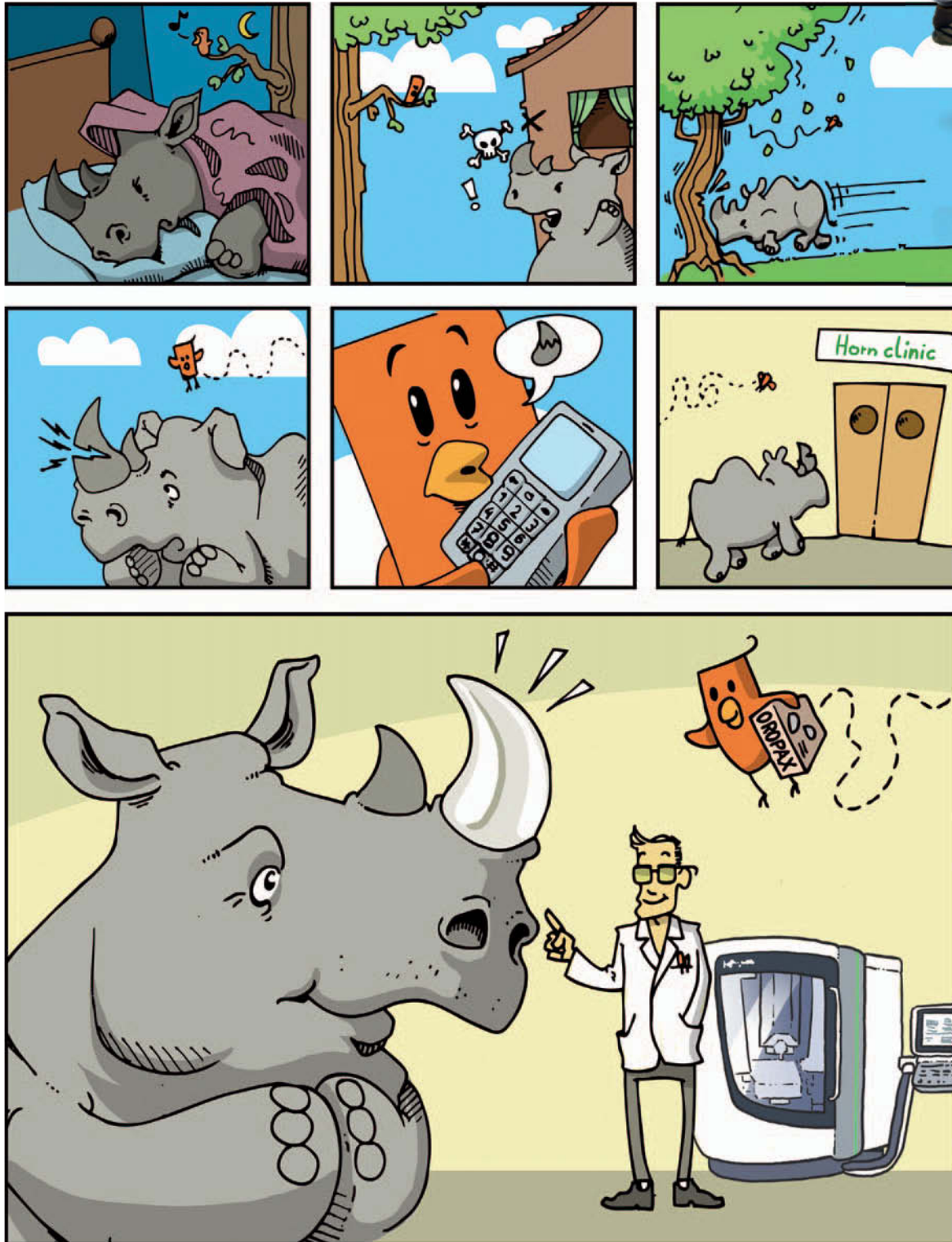
cell phone of the machine operator, machine engineer, or maintenance technician. To ensure that each employee receives the relevant information, Easy Message allows operators to manage as many user profiles as they like. The required process information can be assigned individually to each person or cell phone number.

Easy Message displays a simple, job-related selection of process information to give users a quick overview of the various process messages. These include the status of the workpiece counter and the program, information about tool life, messages about measuring cycles in automatic production, and maintenance intervals in the integrated service planner. Selecting the relevant check boxes in the user profile ensures that each person receives only the information relevant to him or her.

To use Easy Message, users simply need a GSM quad-band modem that is available as an option and any SIM card that allows the cheapest tariff to be selected. The modem and its antenna guarantee high transfer rates even in harsh workshop environments.



Tough Luck



Source: CIMTEC, for more info see: www.cimtec.de



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