

FACTS

From TiAlN to FerroCon®



MORE THAN 30 YEARS OF INNOVATION

XL PERFORMANCE FOR BEST RESULTS

CEMECON
AND JIZHUN
Pages 3-5

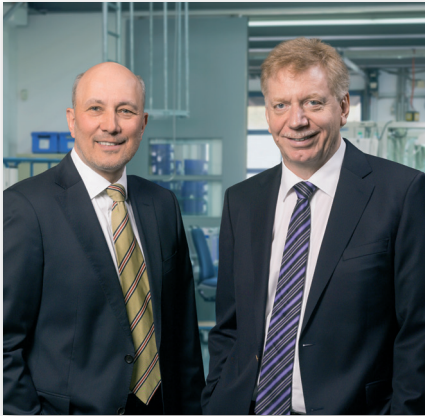
NEW TWIST TO TAP DRILLS

FANAR RELIES ON SMOOTH
SPUTTER COATINGS FROM CEMECON
Pages 8/9

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THE SECRET TO SUCCESS



Dr. Oliver Lemmer (left) and
Dr. Toni Leyendecker,
executive board of CemeCon AG

It was 30 years ago that we revolutionized the world of machining with the idea of finishing tools with TiAlN coatings. Many more new ideas followed. With the HiPIMS coatings FerroCon® and InoCon® we have once again succeeded in significantly increasing the performance of cutting tools. This strength in innovation makes CemeCon one of the world's top resources for premium coatings. The secret to our success? It takes a great deal of patience and persistence – along with courage and a passion for innovation.

Our anniversary is coming to a close and our focus on the future is full of motivation and new visions. We are proud of all that CemeCon has achieved in 30 years, and we look forward to the years ahead!

PREPARE TO BE INSPIRED!

Yours sincerely,

T. Leyendecker
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IN THIS ISSUE

- | | | | |
|-----|---|-----|--|
| 2 | Editorial | 7 | 5TH VDI SYMPOSIUM
FOR MACHINING STEEL
AND CAST MATERIALS |
| 3-5 | XL PERFORMANCE
FOR BEST RESULTS
CemeCon and Jizhun | 8/9 | NEW TWIST
TO TAP DRILLS
FANAR relies on
smooth sputter coatings
from CemeCon |
| 5 | INCREASE PRODUCTIVITY
AND SAVE MONEY
WITH HiPIMS | 10 | GOOD ADVICE
New employees
in field service |
| 6/7 | PURE PERFORMANCE
The HiPIMS coatings:
InoCon® and FerroCon® | 11 | ADVANTAGEOUS
CONNECTION
Close partnership
with the Herzogenrath
Vocational College |
| | | 12 | CemeCon worldwide/
Events 2017 |





For coating large numbers of pieces, the CemeCon CC800®/ 9 XL systems are the ideal solution. (Photo: Jizhun)

CEMECON AND JIZHUN

XL PERFORMANCE FOR BEST RESULTS

Our daily life is unthinkable without tablets, notebooks and smartphones. The Foxconn Technology Group is one of the leading suppliers worldwide for consumer electronics and computer and communications systems. The secret behind its success is that the company combines the latest technologies and maximum accuracy with efficient production processes. Premium coating from CemeCon plant technologies are a key component of this process.

High-performance precision tools are essential for the production of electronics and computer parts such as main boards, processor bases, connectors, cooling elements and PC cases. This is why Jizhun Precision Industry Co., Ltd. – the Foxconn subsidiary responsible for the production and sale of high-quality cutting tools – relies

on CemeCon's premium coating technology.

THE ADVANTAGE OF PREMIUM COATINGS

"Processing aluminum, stainless steel and titanium is part and parcel of the 3C (computer, communication, consumer electronics)

industry. Premium coatings from CemeCon, such as AluSpeed® for non-ferrous metals and HYPERLOX® for steel, give us a major advantage," states W. B. Wang of the Foxconn Technology Group.

AluSpeed® is a good example of the excellent qualities of sputter coatings: Due to the common sili-



non-ferrous metals. Their tribological qualities reduce friction, which causes the temperature in the chip removal process to fall and prevents problematic adhesions. Furthermore, AluSpeed® – like all CemeCon sputter coatings – is very smooth and free of drop-lets. This ensures an optimal chip evacuation and a longer tool life. Their consistent coating thickness makes these CemeCon premium coatings ideal for micro-tools, which is an absolute necessity when it comes to manufacturing intricate electronics.

CC800®/9 XL
FOR LARGE NUMBERS

The CC800®/9 ML HiPIMS deposits hard, tough, oxidation-resistant and highly adhesive coatings.

con content, aluminum alloys are highly abrasive, but tend to result in built-up edges and welded-on

layers. AluSpeed® provides optimal protection against this thanks to its extremely low affinity for

Jizhun produces 1,200,000 tailor-made carbide milling cutters per month alone. An in-house

JIZHUN PRECISION INDUSTRY (HUIZHOU) IN DETAIL

Jizhun Precision Industry (Huizhou) Co., Ltd. is part of the Foxconn Technology Group. Foxconn Technology Group was founded in 1988 in Shenzhen, China, by Terry Gou. Today, Foxconn is one of the largest producers worldwide in the 3C (computer, communication, consumer electronics) industry. As a contract manufacturer, the company produces for Hewlett-Packard, Apple, Huawei, IBM, Dell, Asus, Microsoft, Nokia, Amazon, BMW, Tesla, etc.



www.foxconn.com

The specialty of Jizhun Precision Industry (Huizhou) is precision tools such as carbide milling cutters, micro taps and MKD and PKD milling cutters for highly precise manufacturing in the telecommunication and automotive, aerospace and railway industries.



coating line is virtually required to coat this number of pieces economically. The experts found the best solution for their requirements in the form of multiple CemeCon CC800®/9 XL coating systems and one CC800®/9 ML HiPIMS: The large-format, yet flexible and compact systems allow for high coating volumes to be applied. One system can coat up to 4,500 drills or 16,400 cutting inserts in a single operation. It can coat nitride and boride coating materials simply and quickly.



The CC800®/9 ML HiPIMS is a combination of HiPIMS and DC technology.

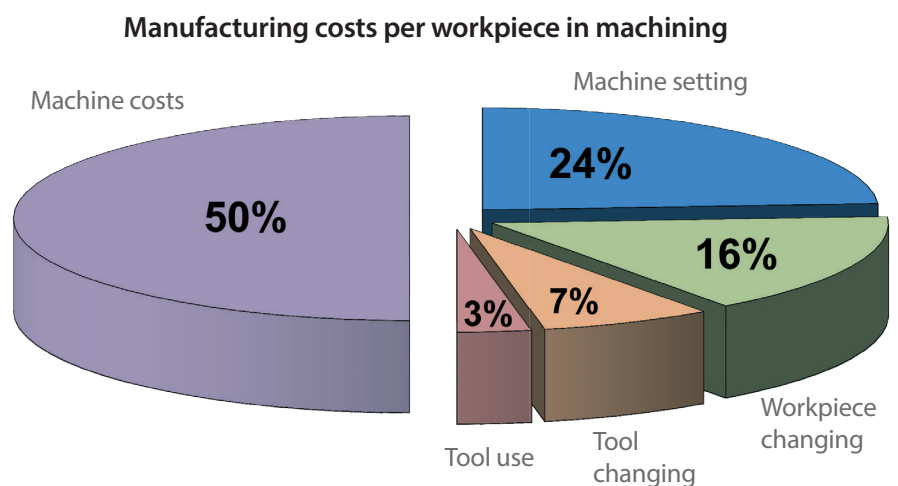
INCREASE PRODUCTIVITY AND SAVE MONEY WITH HiPIMS

Those who want to increase their productivity in the processing of new materials should do more than just try to reduce tool costs. Better performance, faster machining and higher process safety often lead to much more lasting success. A couple of examples: Excellent machining results with reduced use of cooling lubricants obviously saves money. If you can increase the cutting parameters without loss of tool life, then the effects are considerably more pronounced.

The premium HiPIMS coatings InoCon® and FerroCon® provide users and tool manufacturers with exactly these benefits: The smooth coatings ensure excellent chip removal while simultaneously

providing better surface quality when machining innovative materials. This reduces the quantity of cooling lubricants used. At the same time, the machining parameters can often be significantly elevated. In addition, tool life is

extended and setting-up times are reduced. A more economical tool offers (virtually) no advantages by comparison because the tool costs are only a fraction of the overall cost of the machining process.



PURE PERFORMANCE

Half a year after the market launch of FerroCon® and InoCon® at the AMB and IMTS 2016, the benefits of HiPIMS coatings versus conventional coating materials have already been established in many applications. In numerous comparisons, tool manufacturers and users have achieved excellent results.

FerroCon® is the first choice for high performance applications in unalloyed, alloyed and high-

speed steels. Thanks to production with the HiPIMS process, it offers ideal coating adhesion and the

smoothest surfaces, as well as high hardness and toughness for tools. Benchmark testing with other coatings shows amazing results:



Inserts coated with FerroCon® achieve excellent results when machining steels.

For dry drilling ($n = 8,500$ 1/min) of 3.7 mm deep holes in heat-treated steel (50CrMo4), tools with FerroCon® coating drilled 25,000 holes, while standard TiAlN-coated tools drilled only 10,000 holes. This is **2.5 times the tool life**.

The HiPIMS coating layer has advantages even when reaming machining steel: Compared to TiAlN, with FerroCon® the **number of machined workpieces was doubled**. Reaming tools with FerroCon® machined 5,000 workpieces ($n = 5,000$ 1/min, $f = 0.06$ mm/rev, oil-cooled), while with TiAlN only 2,500 workpieces were machined.

For drilling ($v_c = 60$ m/min, $f = 0.1$ mm/rev) in Inconel® 718, FerroCon® coated drills show **42 percent less wear** to the tool flank after a 4 m machining stroke (drill depth 22 mm each) than with competitors' coatings.

InoCon® was developed specifically for machining of stainless, hard and high-alloy steels as well as titanium.

The very high thermal stability makes the silicon-enhanced HiPIMS coating the first choice for high-end tools. Benchmark testing here also shows the superiority of InoCon® compared with conventional coatings:

For face milling with inserts, it comes down to a high chip volume. With InoCon®, 1,500 cm³ of the heat-treated steel (42CrMo4) could be removed with $v_c = 180$ m/min, $a_p = 2$ mm and $f_z = 0.25$ mm. AlTiN-coated inserts were only able to complete 1,000 cm³. That is an **increase in chip volume of 50 percent!**

For wet milling ($n = 1.831$ 1/min, $v_c = 80$ m/min, $v_f = 446$ mm/min, $f_z = 0.035$ mm, $a_p = 5$ mm, $a_e = 3$ mm) of stainless steel (1.4301), **wear was reduced by almost 80 percent** with InoCon®! An end mill with a diameter of 8 mm coated with InoCon® exhibits maximum wear of 23 µm af-



For drilling stainless steel, InoCon®-coated drills machine six times the number of workpieces compared with TiAlN-coated tools.

ter 34 minutes, while a comparable tool with AlTiN shows wear of 98 µm.

Drills coated with InoCon® show excellent tool life when machining stainless steel (1.4301): At $v_c =$

90 m/min and $v_f = 0.04$ mm/rev, the drills machined **six times as many workpieces** as tools coated with TiAlN – 13,200 workpieces with InoCon® compared to 2,200 workpieces with TiAlN.

5TH VDI SYMPOSIUM FOR MACHINING STEEL AND CAST MATERIALS

VDI

Wissensforum

The 5th VDI Symposium on Machining Steel and Cast Materials 2017, with numerous speakers from research, the tool and coating industry, and user companies will take place November 7th and 8th, 2017, in Kassel. For example, Manfred Weigand, Product Manager Round Tools at CemeCon AG, will give some interesting insights into the latest developments in coating technology. The focus of the event is on steel processing (mold construction, high-feed milling, processing of high-tensile stainless steel, hard machining and lightweight steels). In addition to tools for processing cast materials, the topic of 3D printing will be given a great deal of attention. The topics of metalworking fluids and modern metalworking fluid concepts will also be represented in a series of presentations.

Further information and registration at www.vdi.de/spanen

NEW TWIST TO TAP DRILLS

High-quality equipment, a motivated and well-trained team, as well as an international focus are the pivotal cornerstones of the growth strategy of Fabryka Narzędzi FANAR S.A. in the production of their tap drills. When the tool manufacturer wanted to incorporate coating technology into its production, it found the right solution with CemeCon's sputter technology.



The threading is particularly important as the last machining step because a flaw here can ruin all the previous work. Therefore, a stable, reliable process is crucial. "The most important element for this is high-quality tap drills with a coating that has low friction and good tribological properties," said Dariusz Ptaszkiewicz, Chief Technology Officer (CTO) at FANAR. "The smooth,

droplet-free sputter coatings from CemeCon are therefore our first choice for our tap drills."

FANAR and CemeCon worked closely together to develop a premium coating that was designed precisely to the tap drill requirements. The prerequisite was higher wear resistance and longer tool life as compared with a conventional TiN

coating. However, TiN's tribological properties and shiny golden appearance should be retained.

Based on TINALOX®, experts designed the FANAR TN coating, which was precisely tailored to the specific requirements of threading. For better wear resistance, a TiAlN layer was combined with a TiN top layer. The coating is absolutely smooth, because no droplets are produced during the sputtering process. The low friction of the sputter coating promote excellent chip evacuation and allows tapping with low and stable torque. This gives users a brand new experience in thread tapping.

"The key to a successful incorporation of coating technology into the workflow is training. In Würselen we operate one of the world's largest coating centers for cutting tools. More than 30 years of expertise and experience are concentrated here. This makes it the perfect place to provide our customers with the necessary knowledge," said Christoph



Fanar TN coating – a droplet-free sputter layer – offers users new possibilities in tapping. (Photo: FANAR)



„The smooth, droplet-free **SPUTTER COATINGS** from CemeCon are **OUR FIRST CHOICE** for our **TAP DRILLS**.”

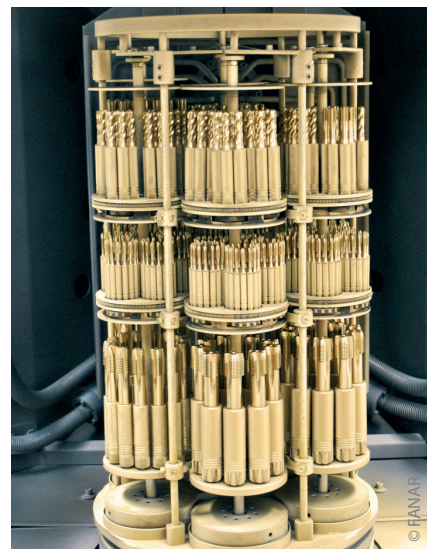
Dariusz Ptazkiewicz, CTO at FANAR.

Schiffers, Sales Manager Technology at CemeCon.

Materials for aerospace and the energy sector, such as titanium and Inconel®, are now the focus of high-performance machining tools. With sputter coatings, FANAR can shift the performance limits of thread tapping higher and higher. FANAR's coating expert, Arkadiusz Urbanowicz, emphasizes the flexibility of the process and the CemeCon technology: "Together with Prof. Witold Gulbinski and his

team from the Koszalin University of Technology, we use the almost unlimited possibilities to develop our own coating solutions, such as WC/C. We found that the CC800® is an ideal platform for creating our own recipes."

"The FANARTN sputter coating gives a new twist to our threading tools," said Marcin Kołodziej, President of FANAR. "We are looking forward to extending our collaboration with CemeCon with our growing product family of carbide end mills."



FANAR now uses a CemeCon coating system at its own plant.

FANAR S.A. IN DETAIL



Fabryka Narzędzi FANAR S.A. is a leading manufacturer of machining tools for metal processing, based in Ciechanów, Poland. State-of-the-art technology, qualified people and many years of experience make it possible for FANAR to offer a wide range of tools of the highest quality. Innovative solutions and continuous development are central priorities in the company's philosophy. Its global customers include companies from the automotive industry, aerospace, medical technology and other industries. FANAR tools are sold in more than 40 countries.



www.fanar.eu

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NEW EMPLOYEES IN FIELD SERVICE

GOOD ADVICE

CemeCon customers in the north and east of Germany have been pleased with the new expert consulting available to them since October 2016. Christine Hammer supports the coating service and technology sales in that region, and is happy to provide assistance and advice on innovative coating solutions to tool manufacturers as well as users.

With Christine Hammer, CemeCon has found an excellent new consultant for CemeCon customers in

northern and eastern Germany. "In order to be able to advise users to the best of my ability, I need very strong knowledge of the industry, the technologies and of course my customers – ultimately we want to help them advance with our innovative coatings and coating technologies," says Christine Hammer. "This assumes that we recognize the points where we can achieve improvements by optimizing or even changing the coatings."

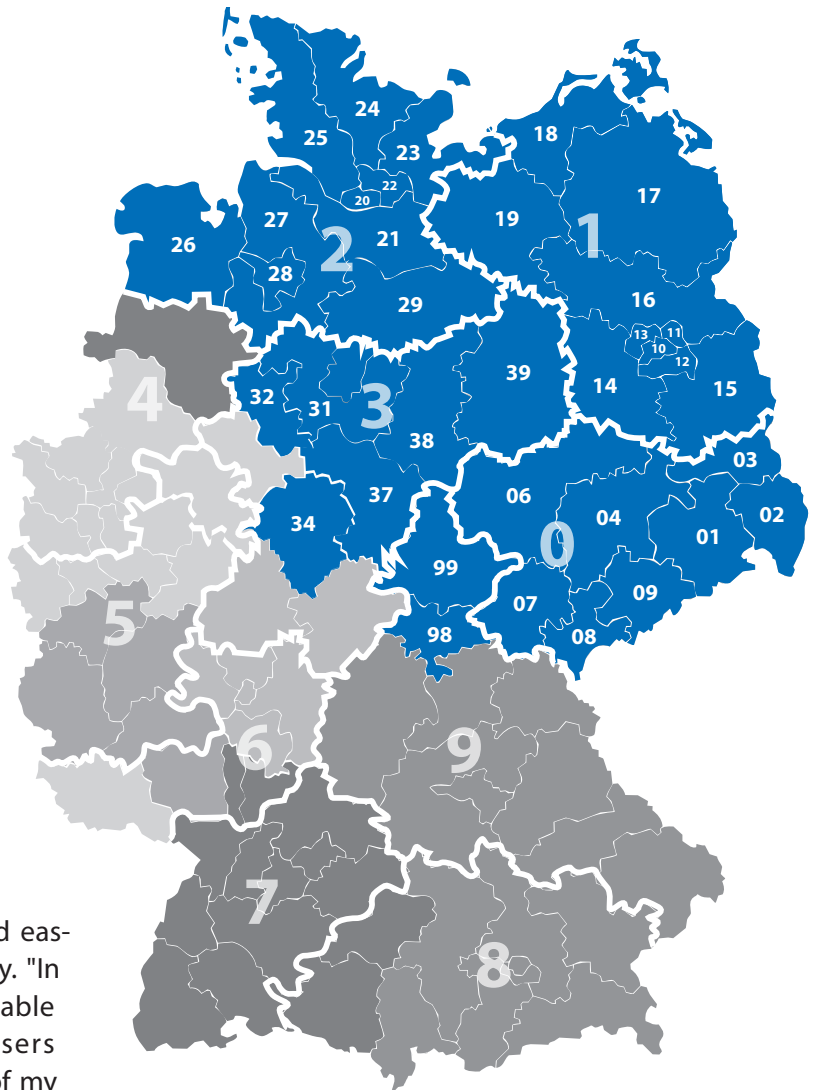
For this reason, Christine Hammer was trained for several weeks in CemeCon production as well as in innovative coating solutions and system technology.

Thanks to her technical training, she is already very knowledgeable about the tool industry. After completing training as an industrial clerk, she earned a degree in industrial engineering with a focus

on tool and process technology from the RWTH Aachen. During this time, she worked at the Fraunhofer Institute for Production Technology in the department for high-performance machining. After graduating with a BSc in 2014, she moved to a mid-sized company in the special machine construction business. Since October 2016, she works at CemeCon and advises customers as a sales engineer.

Christine Hammer
Sales Manager

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Christine Hammer received training at a coating unit.

ADVANTAGEOUS CONNECTION

The basis for the premium products from CemeCon is the highly qualified employees. This includes not only the university graduates but of course the trained technicians as well. In order to find suitable candidates, CemeCon works closely with schools in the Aachen region, such as the Herzogenrath Vocational College. FACTS spoke with Christiane Albrecht, teacher of economics, politics and literature at the Herzogenrath Vocational College, and Andrea Krifft, Head of Training for CemeCon AG.

How does the partnership between CemeCon and the Herzogenrath Vocational College work?

CHRISTIANE ALBRECHT: The Herzogenrath Vocational College exemplifies the dual educational system. This means that we work hand in hand with local companies like CemeCon. We give our students opportunities like factory tours, internships, and summer jobs so that they can get an idea of how companies in our area work and then better plan for their own careers.

ANDREA KRIFFT: This is not only beneficial for the students, it is also beneficial for CemeCon. We can get to know suitable candidates for future internships well ahead of time. We learn first hand whether someone is a good fit for CemeCon and meets our requirements.

What is special about the Herzogenrath Vocational College?

CHRISTIANE ALBRECHT: One of our educational opportunities is the commercial high school. The focus here is on subjects like business administration, accounting, busi-

ness informatics, economics and commercial law. Of course we offer "normal" subjects as well.

Why does CemeCon work so closely together with the commercial high school?

ANDREA KRIFFT: We are pursuing a long-term and sustainable personnel policy because this is the only way we can also meet our high

quality standards. To this end, we offer young people interesting and high-quality training, and of course we look for the best candidates. After successful graduation from the commercial high school, the students receive not only a general higher education entrance qualification, but they also get their first professional experience. This is the best possible prerequisite for an apprenticeship in our organization.



Christiane Albrecht (left) discusses potential trainees with Andrea Krifft (right).

HiPIMS

BEYOND PREMIUM

Experience how HiPIMS can enhance your business: cemecon.de/HiPIMS



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OUR NEXT EVENTS 2017

16TH - 18TH MAY 2017
**8th International Conference
on Power Electronics for
Plasma Engineering**
Zielonka (Poland)

27TH - 30TH MAY 2017
Metallobrabortka
Moskow (Russia)

13TH - 14TH JUNE 2017
HiPIMS-Conference
Braunschweig (Germany)

18TH - 23RD SEPTEMBER 2017
EMO
Hannover (Germany)

23RD - 26TH OCTOBER 2017
V2017 (EFDS)
Dresden (Germany)

7TH - 8TH NOVEMBER 2017
**5th VDI Symposium
for Machining Steel and
Cast Materials 2017**
Kassel (Germany)

7TH - 6TH DECEMBER 2017
RSD-Conference
Pilsen (Czech Republic)