

SHAPE it

OSG GLOBAL TOOLING MAGAZINE | WINTER 2024

FEATURE: SMALL PARTS MACHINING

Enhancing productivity and
tool life in small part production



TECHNICAL INSIGHT

A-XPB Highly Efficient and
Multi-purpose Forming Tap

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EMPLOYEE INTERVIEW

in Turkey

Toward the Realization of a Sustainable Society – Creation of “Green Tap”

A Message from the President

OSG’s mission is to contribute to the world of manufacturing. In addition, we have entered an era in which it is essential to promote Green Transformation (GX) toward realizing a “decarbonized society.” Even after the coronavirus pandemic, times of uncertainty remain. The speed of change is not only rapid, but the fluctuations are also substantial, triggering great impact and anxiety in the world today. In order to overcome these difficult times, it is OSG’s duty as an industry leader to support innovation, research and development, facilitate growth, and to strengthen collaboration between industry groups. This includes a wide range of agendas, such as providing education and training programs, building international networks, and improving the regulatory environment. To fulfill our responsibilities to future generations, active efforts are required to achieve a sustainable society. It is crucial to work in unison with the global environment, improve energy efficiency, as well as to utilize our technical capabilities to promote environmentally friendly product development and process improvements.



At EMO 2023, which was held in Hannover, Germany from September 18 to 23, 2023, OSG announced the development of “Green Tap,” a new revolutionary forming tap innovation that contributes to the realization of a sustainable society, marking a new chapter in the history of taps. Green Tap is made by OSG’s new and original manufacturing method. Green Tap can minimize the amount of electricity consumed during tap manufacturing compared to conventional methods, reducing CO₂ emissions per tap by approximately 50 percent. Choosing Green Tap will lead to a reduction in CO₂ emissions related to thread processing. Selecting products manufactured with consideration for the environment contributes to reducing environmental impact. Additionally, opting for high-performance cutting tools will help minimize power consumption and lessen waste.

Through Green Tap, manufacturers can contribute to the realization of a sustainable society. In the future, environmentally friendly products will become increasingly sought after. I am confident that Green Tap will be a major first step for OSG. Moving forward, we will further strengthen our ESG management efforts and strive to become an essential player in the global manufacturing industry.

Nobuaki Osawa
President & COO of OSG Corporation

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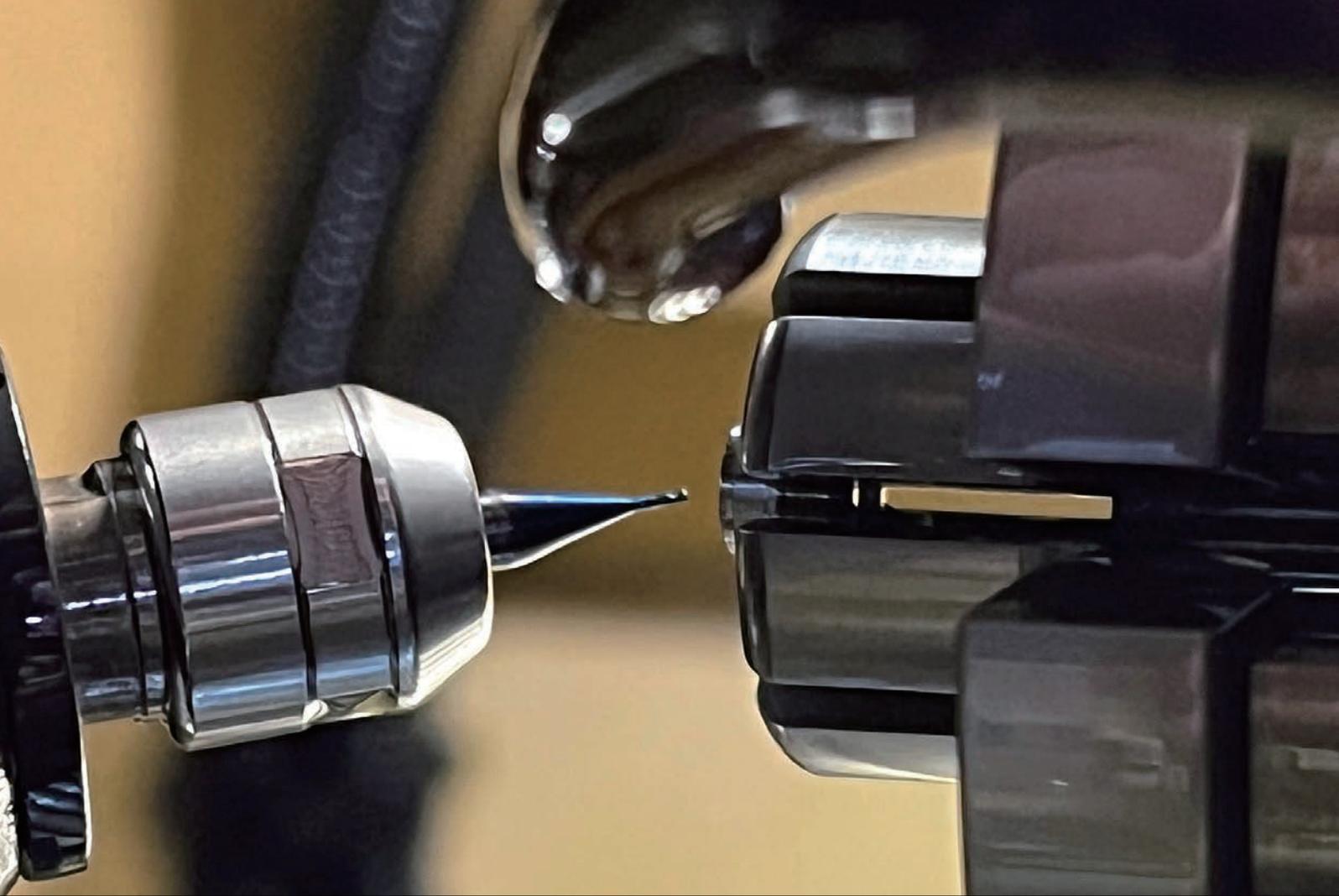
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OSG's ADF carbide flat drill and a valve seat.

Small Parts Machining

ADO-MICRO coolant-through carbide drill and ADF flat drill enhance productivity and tool life in small part production

Yoshi Saito
OSG Thai

The machining of small components is not new in the manufacturing industry, but the trend for lighter weight and further miniaturization continues to accelerate. Industries such as automotive, aerospace, electronics and medical require the machining of an array of small parts.

In general, any workpiece that is less than 25.4 mm in diameter can be considered as small. Application with

a part diameter less than 0.5 mm can be classified as micromachining. With reduced weight and material, holes required to be drilled have also become smaller. Tool breakage is a common concern in small part production, as the slightest variation can cause a tool to snap. Due to tight tolerances, cutting tools used in the machining of miniature components require sharpness, high surface quality, accuracy and performance stability.



From left, Global-Thaixon Production Engineer Saranphat Liangsakun, Global-Thaixon Engineering Director Kazushige Ishizawa and OSG Thai Sales Representative Tantip Luangthongsri pose for a photography at Global-Thaixon's facility in Chachoengsao, Thailand.

With advanced grinding know-how, OSG offers a spectrum of tooling solutions to fulfill increasing needs of small and micromachining. OSG's small diameter and micro tooling incorporate high precision shank, optimum tool geometry, grade, and a wide variety of coating options to enable stable and accurate machining of small and micro parts.

Recently, a leading manufacturer of precision parts in Thailand was able to leverage some of OSG's latest drilling innovations in the production of high-pressure pump part and automotive part to eliminate tool breakage and stabilize machining.

Found in 1990, Global-Thaixon Precision Industry Co., Ltd. (Global-Thaixon) is a leading manufacturer of precision components for a wide variety of industries worldwide, serving sectors such as automotive, electronics, medical, and more. Employing 900 staff, Global-Thaixon's manufacturing plants are located in Chachoengsao, Thailand, with an estimate production floor space of 32,700-square-meter.

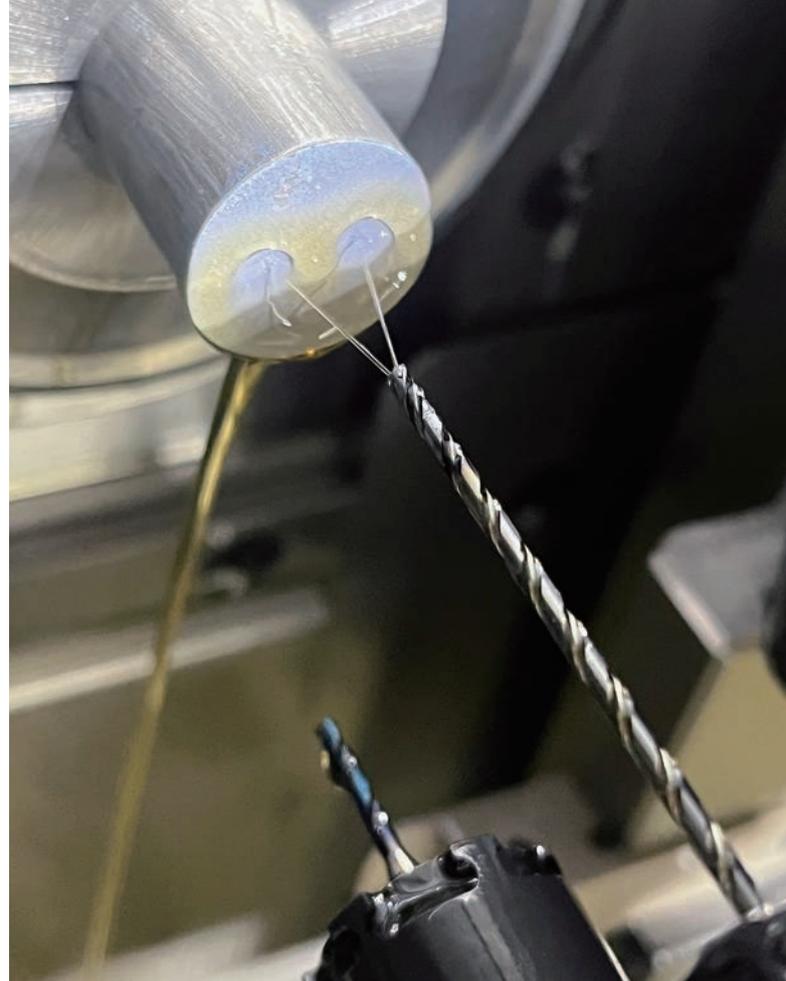
Global-Thaixon offers a complete range of machining and turning capabilities, including close to 400 sets of CNC machines operating around the clock. The company's tooling and milling department are equipped with advanced computerized production control system, which enables high precision and efficient production of complex parts. Aside from turning and milling, Global-Thaixon also has a variety of stamping machines ranging from 25 tons to 160 tons for making high precision progressive mold for metal stamping parts with short lead time.

Recently, Global-Thaixon was experiencing tool breakage and short tool life in its spool and valve seat applications. Seeking to improve productivity, tooling cost and profits, Global-Thaixon reached out to OSG for technical support.

Spool Application

Spool is a high-pressure pump part made of SCM415. This part is currently at the prototype stage and the production volume varies. One blind hole at a depth of 36 mm is required to be drilled per part. The accuracy of hole diameter needs to be within ± 0.05 mm. The parts are machined using CNC lathes. Global-Thaixon was originally using a competitor drill for the machining. However, the holes were not straight, had poor hole roundness and concentricity. Upon a detail evaluation of the application, OSG Thai Sales Representative Tantip Luangthongsri recommended OSG's ADO-MICRO.

The ADO-MICRO is OSG's first small diameter carbide drill with oil holes designed for stable and high efficiency drilling in deep-hole applications. Poor chip evacuation is a common complication in small diameter deep-hole drilling. Micro sludges can be easily accumulated around the outer periphery of the cutting tool, which is a key cause of abrupt tool breakage. The ADO-MICRO features a unique double margin geometry with an extended flute and shortened end margin to enhance chip evacuation capability. In addition to the outstanding chip ejection performance, the double margin configuration supports the straightness stability of the tool and reduces rifle marks on the inner surface of holes. Furthermore, the ADO-MICRO features a pair of large oil holes and employs a hollow shank design to allow large coolant flow volume for trouble-free chip evacuation. The ADO-MICRO is coated with OSG's original IchAda coating that provides excellent surface smoothness in conjunction with high abrasion resistance and heat resistance to enable small diameter tools to achieve long tool life. With the ADO-MICRO's unique tool geometry and IchAda coating, non-step drilling is made possible even for deep-hole applications, enabling high processing efficiency.



OSG's ADO-MICRO small diameter coolant-through carbide drill is used in the processing of Global-Thaixon's high-pressure pump part made of SCM415.

A 2 mm diameter ADO-MICRO-2D (EDP# 8732017) is first used as a pilot drill, followed by a 2 mm diameter ADO-MICRO-20D (EDP# 8732056) to complete the hole. The ADO-MICRO 20 x D is used under identical cutting condition as the initial competitor drill, at a cutting speed of 4,500 rpm and a feed rate of 0.075 mm/rev. Global-Thaixon's in-house Thaixon Pump is also used to enhance chip evacuation. With the previous tooling choice, 2-step processing was required. By switching to the ADO-MICRO, non-step drilling is made possible and an estimate of 4 seconds of machining time has been shortened per workpiece.



Spool - a high-pressure pump part made of SCM415.

Each part requires the drilling of one blind hole at a depth of 36 mm.

Valve Seat Application

Valve seat is a small precision automotive part made of EXEO-CR20 (high-strength and corrosion-resistant stainless steel). Global-Thaixon has been manufacturing this part for about eight years and has an annual production of approximately 160,800 pieces. Six blind holes at a depth of 0.4 mm are required to be processed per part using a 0.32 mm diameter flat drill. The accuracy of hole diameter needs to be within +/- 0.015 mm. The parts are machined using CNC lathes. Global-Thaixon was originally using a competitor tool and experienced inconsistent tool life and poor hole position accuracy.

After reviewing the cutting conditions, OSG Thai Sales Representative Tantip Luangthongsri recommended OSG's ADF carbide flat drill with a customized 0.32 mm diameter. The ADF was developed with an "all-purpose" concept for superior versatility, reliability and quality for flat-bottom holes. Machining a flat hole traditionally required the use of an end mill and a drill. For the processing of thin plate shaft parts, the ADF enables one-step drilling, thereby simplifying machining time and tool management. The drill's balanced point form improves precision and minimizes the shifting of the hole position. Its sharp cutting edge results in low cutting force to minimize burrs even in thin plates. With a wide chip room geometry, trouble-free chip evacuation can be achieved. Furthermore, with the addition of OSG's proprietary EgiAs coating, tool life can be prolonged with excellent heat and wear resistance. The ADF series is engineered for a wide variety of drilling applications including inclined surfaces, curved surfaces, counterboring, eccentric holes, thin plates, etc. It is suitable for materials such as carbon steel, alloy steel, hardened steel, cast iron and stainless steel.

Global-Thaixon's initial competitor tool was used at a cutting speed of 20,000 rpm and a feed rate of 0.0050 mm/rev. Performance was unstable, generally averaging between 250 to 600 parts per tool. OSG's 0.32 mm diameter ADF-2D was tested under identical cutting condition at a speed of 20,000 rpm and a feed of 0.0050 mm/rev. With the initial competitor tooling, the machining accuracy was not stable. Tool life also varied among the supplied lot, making tool management a great challenge. The ADF-2D, on the other hand, enables highly stable machining. Tool life averages around 1,500 pieces, which is more than double the previous tooling choice.

"After switching to OSG's ADO-MICRO and ADF drills, we are able to reduce downtime required for changing cutting tools, increase tool life for reduced tooling cost, and encounter less interruptions in machining due to significant improvement in part quality and accuracy," said Global-Thaixon Production Engineer Saranphat Liangsakun.

Global-Thaixon has close to 400 automatic lathes (sliding head lathes) and is actively testing newly developed products with a focus on small diameter tools recently proposed by OSG. By leveraging the latest cutting tool technology, manufacturing processes and product quality are enhanced, which ultimately delivers greater values to clients.

"As a company committed to quality and customer satisfaction, we look forward to the continued partnership with OSG," said Global-Thaixon Engineering Director Kazushige Ishizawa.



Valve Seat - a small precision automotive part made of EXEO-CR20 (high-strength and corrosion-resistant stainless steel).

Six blind holes at a depth of 0.4 mm are required to be processed per part using a 0.32 mm diameter flat drill.



About Global-Thaixon

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In addition to the production of precision components, Global-Thaixon also offers high performance pump solution with its original Thaixon Pump, which increases the pressure of cutting oil to improve cutting chip evacuation, thus prolonging the tool life of cutting tools.





1. Global-Thaixon's manufacturing plants are located in Chachoengsao, Thailand, with an estimate production floor space of 32,700-square-meter.
2. Global-Thaixon offers a complete range of machining and turning capabilities, including close to 400 sets of CNC machines operating around the clock.
3. From left, Global-Thaixon Production Engineer Saranphat Liangsakun and OSG Thai Sales Representative Tantip Luangthongsri pose for a photography inside Global-Thaixon's manufacturing facility in Chachoengsao, Thailand.
4. OSG's ADF carbide flat drill enables stable machining of valve seat – a small precision automotive part made of EXEO-CR20 (high-strength and corrosion-resistant stainless steel).

A-XPF

Staying Ahead of Change with the A-XPF Highly Efficient and Multi-purpose Forming Tap

Keita Ono
OSG Corporation Applications Engineer
(Tap Development Division)

The rise of environmental concern is increasing year by year. Along with this, a demand for environmentally friendly cutting tools has also become more prominent than ever before. OSG's latest A-XPF high-efficiency and multi-purpose forming tap is a product that can respond to today's evolving manufacturing needs. Compared to conventional products, the A-XPF enables higher processing efficiency, which reduces machining time. In addition, by achieving longer tool life, the number of tool changes required can be minimized. Moreover, by enabling stable and uninterrupted machining, power consumption can be reduced.



Common Tapping Troubles

Table 1 summarizes common tapping trouble consultations received at OSG's customer service center. The number one trouble is tool breakage and chipping (26 percent); ranked at number two is dimensional error (17 percent); galling is ranked at number three (14 percent). The top three troubles combined account for 57 percent of the total.

In all cases, the main cause of trouble is cutting chip related. During tapping, cutting chips often can become entangled with the tap as depicted in figure 1. If machining is continued under this state of condition, the chips will get caught and the tap will likely chip or break. In addition, as illustrated in figure 2, galling may occur in the internal thread.

TOP 3 Tapping Troubles		
No.1	Breakage and chipping	26%
No.2	Dimensional error	17%
No.3	Galling	14%
	Others	43%

Table 1. Top 3 tapping troubles (source: OSG Technical Consultation Division)



Figure 1. Chip packing – an example of cutting chip related trouble.



Figure 2. An example of galling.

How to Troubleshoot

To resolve chip troubles, OSG has developed the A-XPF forming tap that forms threads by plastic deformation of the work material. Therefore, no chips are generated during tapping. In other words, troubles caused by chips can be completely eliminated by leveraging the A-XPF to enable uninterrupted machining and maximize productivity.

Features of A-XPF

The first feature of the A-XPF is the adoption of a special chamfer specification, which contributes to achieving low thrust. The second feature is its special thread configuration. The rigidity of the tap is ensured by adopting a special thread geometry and a new relief shape. The third feature is the adoption of the VI coating. About 30 years after the company's V coating, OSG has developed a new special coating uniquely engineered for taps.

1. Special Chamfer Specification

With the A-XPF's special chamfer specification, the ridges at the tip of the tap are less likely to chip compared to the conventional style. With forming taps, when the tool enters the hole, chipping may occur on the ridge at the tip of the chamfer portion of the tap. The chipped section may lead to further chipping of the entire tap. The A-XPF incorporates a unique geometry that suppresses chipping during thrust. Figure 3 depicts a graph of the thrust measured during tapping. Compared to a conventional product, the A-XPF is able to reduce the thrust and the amplitude of the waveform. By stabilizing the thrust waveform, the tool can stably enter the workpiece.

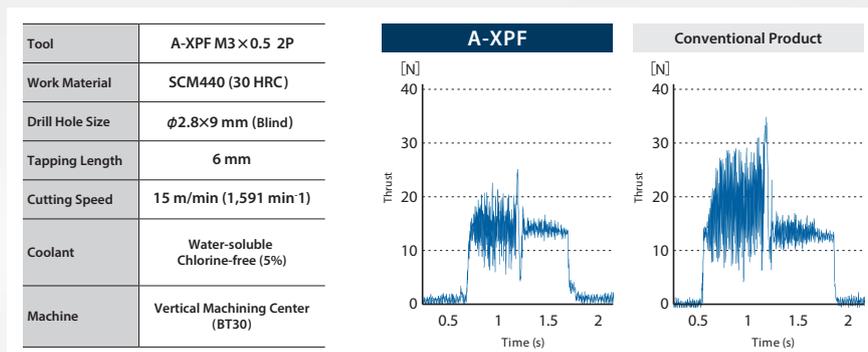


Figure 3. Comparison of thrust during machining

2. Special Thread Configuration

When using a forming tap, the crest of the tap thread may suddenly disappear. In general, the relief shape of the forming tap tends to emphasize sharpness and is marginless. The more emphasis is placed on sharpness, the lower the rigidity of the tap thread becomes. The A-XPf adopts a new relief shape to suppress sudden chipping of the crest of the thread. Figure 4 illustrates a comparison of relief shape between a conventional product and the A-XPf. In the new relief, the shape of the cutting edge has not been altered to maintain sharpness while the back side of the thread has been thickened to ensure rigidity. The enhanced thickness is depicted in black on the right diagram in figure 4.

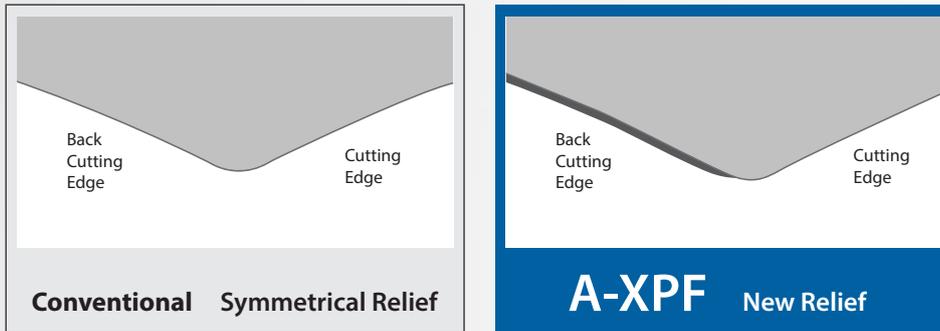


Figure 4. Comparison of relief shape

3. New VI Coating

The A-XPf employs a new VI coating developed exclusively for taps. The coating structure is a Cr-based composite multilayer film as illustrated in figure 5. Compared to the conventional V coating, the VI coating has improved hardness, oxidation initiation temperature, adhesion, wear resistance, and many other superior properties as shown in figure 6. Since the new VI coating can handle high-load machining, higher speed range can be achieved in comparison to conventional products.

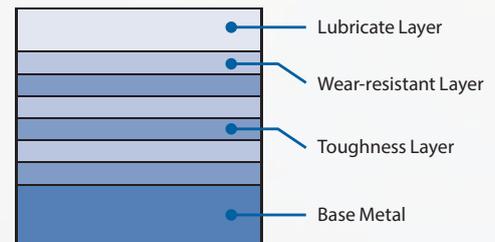


Figure 5. Structure of the new VI coating

Coating	Coating Color	Coating Structure	Hardness (GPa)	Oxidation Temperature (°C)	Adhesion Strength	Surface Roughness	Wear Resistance	Welding Resistance	Toughness
VI Coating	Black	Cr-based Composite Multilayer Film	45	1,100	◎	☆	◎	☆	◎
V Coating	Blue Gray	TiCN	35	400	○	☆	○	☆	◎

(Fair) ○ → ◎ → ☆ (Best)

Figure 6. Properties of the new VI coating

Performance of the New VI Coating

Figure 7 illustrates the result of machining a work material in SCM440 (30 HRC) using a M6 x 1 A-XPf under high-speed. With the conventional V coating, wear progressed after 7,000 holes. With the new VI coating, on the other hand, 11,000 to 12,000 holes can be machined. The new VI coating has demonstrated over 30 percent longer life than the V coating.

Tool	M6 x 1 2P
Work Material	SCM440 (30 HRC)
Drill Hole Size	φ 5.52 x 19 mm (Blind)
Tapping Length	12 mm
Cutting Speed	30 m/min
Coolant	Water-soluble Chlorine-free (5%)
Machine	Vertical Machining Center (BT30)

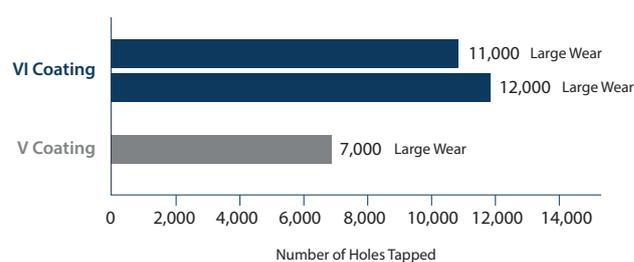


Figure 7. Performance of the new VI coating

Cutting Data

Figure 8 depicts the A-XPf's superior performance under high-speed machining condition at 30 m/min in alloy steel with a hardness of 30 HRC. The A-XPf was able to complete 13,000 holes even in this machining range with stable tool life.

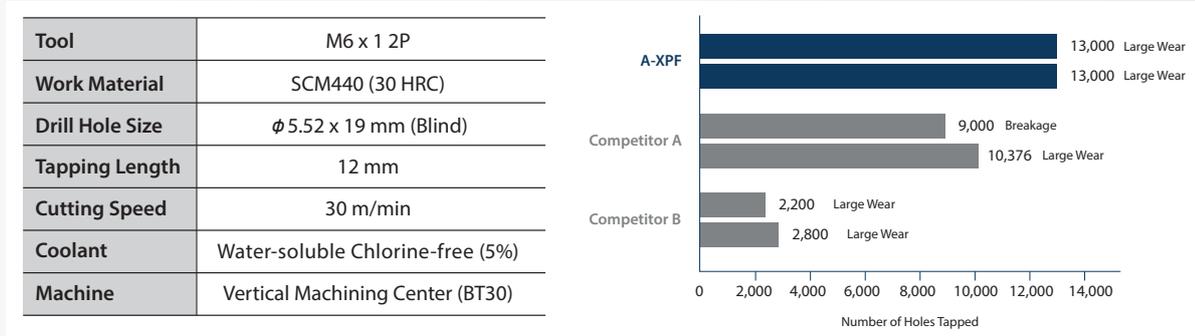


Figure 8. Cutting performance comparison in SCM440 (30 HRC)

Cutting Conditions

Table 2 shows the standard cutting conditions for the A-XPf. Compared to conventional products, the range of cutting speeds that can be used for mild steel, high carbon steel, alloy steel, and tempered steel has expanded significantly. Suitable from low-speed machining to high-speed machining, the A-XPf is a versatile solution that can accommodate a wide range of machining environment.

Work Material		Cutting Speed (m/min)	A-XPf	Work Material		Cutting Speed (m/min)	A-XPf
Mild Steel · Low Carbon Steel · Medium Carbon Steel	≤C0.4%	10 ~ 50	◎	Copper	Cu	10 ~ 30	◎
High Carbon Steel	≥C0.45%	10 ~ 40	◎	Brass · Brass Casting	Bs · BsC	10 ~ 30	◎
Alloy Steel	SCM	10 ~ 35	◎	Aluminum Rolled Steel	Al	20 ~ 50	◎
Hardened Steel	25~35HRC	5 ~ 30	◎	Aluminum Alloy Casting	AC·ADC	20 ~ 50	◎
Cast Steel	SC	10 ~ 40	○	Zinc Alloy Casting	ZDC	10 ~ 30	◎
Stainless Steel	SUS304 SUS420	5 ~ 15	◎*1				

Best ◎ Good ○

Note : The indicated speeds and feeds are for tapping with chlorine-free water-soluble coolant.
 * 1 : We recommend using non-water-soluble coolant or highly lubricated water-soluble coolant for stainless steels.

Table 2. A-XPf Cutting Conditions



Productivity can be notably improved by the elimination of cutting chips. Furthermore, with the A-XPf's unique chamfer specification and thread geometry, outstanding machining stability can be achieved. For manufacturers who are struggling with cutting chip troubles in tapping, look to the highly efficient and multi-purpose A-XPf forming tap to stay ahead of change.



Scan for details



OSG's 0.25-inch diameter WXL 2-flute ball nose end mill is used on the machining of Shadow Systems' gun barrel fluting. With a production volume of 12,000 guns per month, the WXL end mill demonstrated eight times the tool life versus two other competitor tools.

Aim for Leaner and More Efficient Manufacturing

WXL high performance carbide ball end mill reduces cycle time by half and demonstrates eight times the tool life in 416 stainless steel gun barrel production

Ed Cawley
OSG USA

Established in 2016, Shadow Systems Corp. is a privately held, Plano, Texas-based manufacturer of premium firearms. Shadow Systems' products are designed and manufactured in the United States by a team of veterans and former law enforcement officers. With years of experience using firearms firsthand, the team has carefully crafted a series of 9 mm handguns with features and reliability that they have always wanted in their own firearms. All of Shadow Systems' pistols are machined in-house at its 60,000-square-foot, state-of-the-art facility, which houses more than 40 vertical and horizontal CNC machines along with 140 employees.

Shadow Systems CEO Trevor Roe has put together a diverse management and production team that brings lean manufacturing experience from a myriad of industries. This allows the company to apply manufacturing best practices not commonly found in the firearm world, enabling Shadow Systems to be leaner and more efficient, which leads to competitive pricing. Shadow Systems' manufacturing approach focuses on the principles of "built-in quality" and

"mistake proofing," where every person who touches a product during production is an inspector. When a product comes off the line, it has already benefited from a thorough multi-point inspection before its official inspection even begins. With a high standard in quality and reliability, OSG tooling became a natural fit for Shadow Systems' manufacturing process.

DXP Enterprises, who is Shadow Systems' tool supplier, has installed numerous vending machines on-site. With the cooperation and support from DXP, OSG has successfully proposed, tested and implemented numerous high-performance tools that demonstrated significant cost savings in Shadow Systems' gun slide and barrel production.



Shadow Systems match-grade spiral fluted barrels machined from 416 stainless steel. According to Shadow Systems, the spiral fluting pattern improves the evacuation of dirt and debris and reduces barrel weight. Photo courtesy of Shadow Systems.



1. From left, Shadow Systems CEO Trevor Roe, machine shop manager Jason Pettyjohn and Programmer Manager Scotty Whitmarsh, who have been instrumental in allowing OSG the opportunity to test on some of their more challenging applications.



2

2. DXP Enterprises sales representative David Aly poses for a photograph at one of four vending systems at Shadow Systems. DXP Enterprises is Shadow Systems' tool supplier and has installed numerous vending machines on-site. With the cooperation and support from DXP, OSG has successfully proposed, tested and implemented numerous high-performance tools that demonstrated significant cost savings in Shadow Systems' gun slide and barrel production.



3

3. From right, before and after barrel fluting.

Shadow Systems' gun slides are made of heat treated 17-4 stainless steel. In addition to high mechanical strength, 17-4 stainless steel is corrosion resistant and can be heat treated to optimal hardness levels. The match-grade spiral fluted barrels are made of 416 stainless steel (JIS SUS416). According to Shadow Systems, the spiral fluting pattern improves the evacuation of dirt and debris and reduces barrel weight.

One application that particularly stood out was with OSG's EXOCARB® WXL 2-flute ball nose end mill used on the gun barrel fluting. The EXOCARB® WXL (list number 3610) is OSG's premium high performance carbide ball end mill. Everything about the WXL is designed for rigidity and performance in wide variety of materials and milling applications. Its substrates, geometry and proprietary WXL coating are all specifically tailored for nonferrous materials, mild steels, and steels up to 50 HRC.



The EXOCARB® WXL is OSG's premium high performance carbide ball end mill engineered to excel in pre-hardened and hardened steel applications.

Shadow Systems was originally using two other competitor 0.25-inch 2-flute ball nose end mills for the application. Shadow Systems knew of OSG from past experiences and was using other OSG tooling for other parts of the gun. Shadow Systems was eager to further reduce cycle time and cost in its production. With the support from the leaders of Shadow Systems and

DXP Enterprises sales representative David Aly, OSG was given the opportunity to test the WXL ball nose end mill.

A Haas VF-2SS vertical machining center with a 40 taper spindle was used for the machining. Water-soluble flood coolant was applied. A 0.25-inch diameter 2-flute EXOCARB® WXL-EB (EDP# 36100611, 3-inch OAL, 0.25-inch LOC) was brought in for the cutting trial to slot the fluting on the gun barrel. The WXL ran at 14,750 rpm (294 m/min) and 32 ipm (813 mm/min), cutting cycle time per part from 67 seconds to 34 seconds versus the competitor end mills. With a production volume of 12,000 guns per month, the time reduced is equivalent to a cost savings of \$99,540 USD annually. Moreover, the WXL end mill demonstrated eight times the tool life versus two other competitor tools. The WXL averaged 200 barrels while the competitors both averaged 25 barrels. Although the WXL end mill was twice the cost, it was able to demonstrate an annual cost savings of \$278,580 USD due to its exceptional tool life.

"I have always had great success running OSG tooling," said Shadow Systems programming manager Scotty Whitmarsh. "But the WXL end mill performance was absolutely unbelievable compared to the other competitor end mills we tried."

Shadow Systems is expanding rapidly, adding more CNC machines and employees. As the company continues its journey of growth, OSG will strive to provide new tooling proposals to contribute to Shadow Systems' lean and efficient manufacturing.



More than 30 holes in various sizes are required to be threaded per valve body.

The First Choice for Thread Milling

AT-1 thread mill enhances processing efficiency in hydraulic valve production

Hao Tian

OSG Shanghai

Thread milling often involves long cycle time and problems of deflection. In order to resolve these common obstacles, OSG has developed the AT-1 thread mill for high-quality threading, with two patented technologies registered in Japan for its tool geometry. The first patented technology is the AT-1's left-hand helix geometry. Conventional right-hand helix thread mill is vulnerable to deflection as the cutting process begins from the tip. In contrast, the AT-1's right-hand cut and left-hand helix geometry begins the cutting process from the shank side, thereby minimizes deflection. The second patented technology is the unequal spacing and variable lead flute geometry, which is commonly applied in end mills. The unequal spacing and variable lead flute geometry minimizes chatter. Applying the unequal spacing and variable lead flute geometry in thread mills involves a high degree of difficulty because the thread pitch has to be adjusted accordingly to the flute geometry, which requires special manufacturing techniques.

Recently, a manufacturer based in Nantong, Jiangsu Province, China, whose name cannot be disclosed due to confidentiality reasons, was able to leverage the AT-1's superior thread milling performance in its hydraulic valve production. Founded in 1996 and currently employing approximately 300 staff, this customer specializes in the manufacturing and sales of hydraulic control systems, electrical control systems, hydraulic components, hydraulic machinery, hydraulic accessories, pneumatic parts, and more.

This customer was seeking new tooling solutions to improve the processing efficiency of its valve body production, which the company has been manufacturing since 2020. These hydraulic valves are made of S45C and has an annual production volume of 50,000 pieces. More than 30 holes in various sizes are required to be threaded per valve body. Each bottom hole is a stepped through-hole. The depth of the threaded hole on the valve body part is very close to the bottom of the hole, so spiral taps cannot be used as there is not enough room for the chamfer. The machine



AT-1 Thread Mill

Thread milling often involves long cycle time and problems of deflection. In order to resolve these common obstacles, OSG has developed the AT-1 thread mill for high-quality threading, with two patented technologies registered in Japan for its tool geometry.



1. With the combination of the AT-1's superior performance and OSG's on-site technical support, processing time was halved in the hydraulic valve thread milling application.

2. The customer was seeking new tooling solutions to improve the processing efficiency of its valve body production, which the company has been manufacturing since 2020. These hydraulic valves are made of S45C and has an annual production volume of 50,000 pieces.

3. The machine used for processing is a Doosan vertical machining center BT50 with water-soluble coolant and hydraulic holder.

used for processing is a Doosan vertical machining center BT50. Water-soluble coolant is applied during machining and a hydraulic holder is used. The customer was originally using a domestic cutting tool brand for the application. With the existing thread mill, corrections needed to be made multiple times during processing, which affected the overall machining efficiency.

OSG's applications engineer learned of the situation during a regular customer visit. Considering that S45C is a relatively easy-to-cut material, OSG recommended the AT-1 M10 x 1.5 thread mill (EDP# 8331007) and arranged a trial opportunity through a distributor.

For the first cutting test, the AT-1 was used at a speed of 3,300 min⁻¹ and a feed rate of 0.03 mm/t. Several parts were processed, but performance was unstable, with the size of the threaded hole being

either too large or too small. Upon a detail evaluation of the cutting condition, OSG's applications engineer recommended adding an additional pass with a radius offset amount of 0.165 mm in the follow-up, which successfully stabilized the machining. The original thread mill required four cuts for each threaded hole. The AT-1, on the other hand, only needed two cuts, which halved processing time and improved the overall processing efficiency. With the cutting trial success, different sizes of the AT-1 thread mill are implemented in the application.

With the combination of the AT-1's superior performance and OSG's on-site technical support, this customer is about to significantly reduce processing time and hassle in its hydraulic valve thread milling application.



From left, OSG Royco sales coordinator Francisco Arteaga, American Axle & Manufacturing de México tool engineer Manuel Cruz Valerio and OSG Royco sales representative Oscar Morales pose for a photograph at AAM's production facility in Silao, Guanajuato, Mexico.

Guaranteed Performance

OSG rack dies extend tool life and maintain production stability in automotive high-volume parts with involute splines

Vanesa Aguilera, Francisco Arteaga and Oscar Morales

OSG Royco



From left, steel spline yoke before and after processing by rack dies. After machining, splines are formed on the shaft.

Incorporated in 2006, American Axle & Manufacturing de México, S. de R.L. de C.V. (AAM) is a part of the AAM corporate group headquartered in Detroit, United States, with nearly 80 facilities in 17 countries. AAM is a leading global tier 1 automotive and mobility supplier that designs, engineers and manufactures driveline and metal forming technologies to support electric, hybrid and internal combustion vehicles.

American Axle & Manufacturing de México is located in Silao, Guanajuato. Recently, AAM was troubled by undesirable rack dies life in its spline yoke production used in motor vehicles. The spline yoke is made of steel and has an annual production volume of 500,000 pieces. AAM has been manufacturing this part since 2019. Anderson-Cook spline rolling machines are used for the processing of these steel parts. The machines used are more than 10 years old. At the time, many adjustments were required to be made to the machine during processing, which took away productive time.

AAM originally used rack dies from two other cutting tool brands. The competitor brands were chosen due to pricing. However, with the competitor rack dies, AAM experienced a great deal of variability in the processing, which required numerous adjustments. AAM was also using one of the competitors' regrinding services for the rack dies. Shim plates were not attached to the reground rack dies, and AAM would have to install them separately. Often the shims would come off, which required AAM to stop the machine to readjust.

An opportunity to test OSG rack dies came about when OSG Royco sales coordinator Francisco Arteaga and sales representative Oscar Morales visited AAM for several coating applications in the factory. While Arteaga and Morales were at the facility, they realized that AAM was troubled by the rack dies application and wanted to assist. AAM appreciated the offer and gave OSG Royco used rack dies to regrind. The performance of the reground rack dies demonstrated significant improvement and led to the trial of OSG Royco rack dies.

OSG rack dies are made from the highest quality steel and the most modern engineering design to help manufacturers optimize cutting processes. OSG's rack dies are designed to eliminate the machine adjustment often required in die set up. Simple die set up installation guarantees the perfect work piece, reduces set up time and eliminates questionable parts. OSG rack dies excel in applications involving rolling splines, threads and grooves. Racks can be used individually or in combination to roll multiple features, such as spline and groove.

A new pair of OSG rack dies measured 48 inches in length and 4.25 inches in width were put to the test against the competitor rack dies. The competitor rack dies averaged 25,000 pieces in tool life. OSG's rack dies, on the other hand, are able to achieve 65,000 pieces, which is more than double the tool life of the competitor. In addition to offering high quality tooling solutions, OSG also helped AAM improve the condition of the machine to enable longer life in the rack dies.

"With OSG's rack dies, the processing is much more stable," said AAM tool engineer Manuel Cruz Valerio. "I don't have to make so many adjustments and the tool life of the rack dies has improved," Valerio adds.



OSG's rack dies are designed to eliminate the machine adjustment often required in die set up.



1. Anderso-Cook spline rolling machines are used for the processing of spline yoke made of steel.

2. The competitor rack dies averaged 25,000 pieces in tool life. OSG's rack dies, on the other hand, are able to achieve 65,000 pieces, which is more than double the tool life of the competitor.

OSG Royco offers die reconditioning services at its Guanajuato Tech Center (GTO Tech Center) in Guanajuato, Mexico. Utilization of this program can lead to significant cost savings over the cost of purchasing new tooling. Rack dies are reconditioned by removing the existing form profile and then regrinding a new profile. After grinding, a shim plate is attached to the rack to bring it into new rack dimensions.

OSG Royco's reground rack dies demonstrate consistent quality with no variation. Moreover, Valerio is especially pleased with OSG's technical support.

"When we need a solution, it's good to know that OSG has a team of experts behind them," said Valerio. "The close proximity of OSG's facility in Guanajuato also contributes to fast delivery time. It is a relief knowing that help is near to solve any urgency," said Valerio.



OSG Rack Dies

OSG rack dies are made from the highest quality steel and the most modern engineering design to help manufacturers optimize cutting processes. OSG rack dies excel in applications involving rolling splines, threads and grooves. Racks can be used individually or in combination to roll multiple features, such as spline and groove.



From left, OSG Sulamericana Regional Sales Leader Edson Veras, Imagem Automação Executive Director Paulo Krug, Imagem Automação CNC Programmer Igor Limeira, Imagem Automação Production Manager Leonardo Rocha, and OSG Sulamericana Technical Sales Representative Allan Siqueira pose for a photograph at Imagem Automação's manufacturing facility in São José dos Campos, São Paulo, Brazil.

Turbocharge Performance

A-SIGMA-SFT spiral fluted tap and SynchroMaster tap holder accelerate productivity with reliable performance in carbon steel hub production

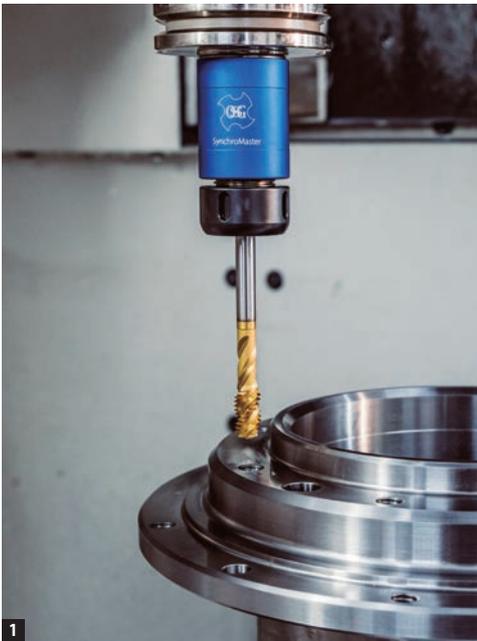
Lucas Sousa do Nascimento
OSG Sulamericana

Founded in 2018, Imagem Automação e Usinagem Ltda. (Imagem Automação) is a manufacturer of machinery parts, servicing markets such as aeronautics, defense, medical, machinery and equipment, among others. Employing 40 staff, Imagem Automação's facility is located in the city of São José dos Campos, São Paulo, Brazil, with an estimate production area of 2,000-square-meter. Imagem Automação is equipped with several 5-axis, 4-axis and 3-axis machining centers, CNC lathes, milling machines, cylindrical and flat grinders, as well as advanced inspection instruments to ensure quality and accuracy in its production.

Recently, Imagem Automação was looking to improve the tool performance on its hub production for a manufacturer of high precision and performance machines and equipment. The parts are made of SAE 1045 (JIS S45C) carbon steel and has an annual production volume of 120 pieces. Fifteen 3/8-16 UNC-2B blind holes at a depth of 18 mm are required to be threaded per part. The threads on the part are aligned in several positions. All of the threading processes were initially performed manually using hand taps introduced by a distributor. A hand tap set consists of three taps – taper tap,

plug tap and bottoming tap. The taper tap is used as a starter tap, followed by the plug tap, and the blind hole is completed by the bottoming tap. Occasionally, a tapping arm was used for the first tap. However, for much of the time, all three processes were performed by hand. Long cycle time of 225 minutes was needed to process one part with 15 threads, which included setup time and tool change. Seeking to enhance productivity, Imagem Automação reached out to OSG Sulamericana via a professional network service provider.

Shortly after, OSG Sulamericana Regional Sales Leader Edson Veras and OSG Sulamericana Technical Sales Representative Allan Siqueira visited Imagem Automação to investigate the machining environment. Upon a detail evaluation of the application, the duo recommended switching from manual processing to leveraging the company's existing Mikron MILL E700U 5-axis machining center. In terms of tooling, instead of hand taps, OSG recommended the A-SIGMA-SFT spiral fluted tap (EDP# 49264124 - DIN 2183 3/8-16 UNC TiN) from the A-Tab Σ (sigma) series along with the SynchroMaster tap holder (EDP# 79913 - HSK63A-SMH-16-90), which is designed to turbocharge tapping performance on CNC machines with



1. The A-Tap Σ (sigma) series includes the A-SIGMA-SFT spiral fluted tap for blind holes and the A-SIGMA-POT spiral pointed tap for through holes. The A-Tap Σ features a sharp cutting edge to stabilize chip shape and a variable lead flute geometry to accelerate chip evacuation. Made of HSS-E (JIS SKH53 equivalent) and coated with TiN, the A-Tap Σ is designed to excel in a wide range of work materials and cutting conditions with excellent durability and wear resistance.

2. Right, OSG Sulamericana Technical Sales Representative Allan Siqueira explains the features of the A-Tap Σ (sigma) spiral fluted tap and the SynchroMaster tap holder.

3. All of the threading processes were initially performed manually using hand taps introduced by a distributor. Long cycle time of 225 minutes was needed to process one part with 15 threads, which included setup time and tool change.

4. Imagem Automação is equipped with several 5-axis, 4-axis and 3-axis machining centers, CNC lathes, milling machines, cylindrical and flat grinders, as well as advanced inspection instruments to ensure quality and accuracy in its production.

synchronous spindles by compensating for synchronization errors during the threading process.

The A-Tap Σ (sigma) is a part of OSG's well-known A-Tap multi-purpose tap series. Developed in line with the core concept of the A-Tap series with superior chip evacuation capability, the A-Tap Σ is the new excellence for cost-effective threading applications. The A-Tap Σ (sigma) series includes the A-SIGMA-SFT spiral fluted tap for blind holes and the A-SIGMA-POT spiral pointed tap for through holes. The A-Tap Σ features a sharp cutting edge to stabilize chip shape and a variable lead flute geometry to accelerate chip evacuation. Made of HSS-E (JIS SKH53 equivalent) and coated with TiN, the A-Tap Σ is designed to excel in a wide range of work materials and cutting conditions with excellent durability and wear resistance. The A-Tap Σ not only excels in mid and high carbon steel and alloy steels, but is also suitable for mild steel, stainless steel and aluminum alloy – materials that conventional general taps often struggle with.

The SynchroMaster is a tap holder constructed to allow a slight amount of axial movement to compensate for axial deviations that are unavoidable in rigid tapping. Its micro tension-compression float eliminates the extra axial forces on the tap, leading to longer tool life, consistent tapping

depth and improved thread quality. The SynchroMaster tap holder is especially recommended to manufacturers who are struggling with unstable tool life, poor thread quality, low productivity and large variations in depth length on rigid tapped holes.

The 3/8-16 UNC A-SIGMA-SFT spiral fluted tap is used at a cutting speed of 20 m/min and 668 rpm with soluble oil coolant (8%). With the new machining arrangement and tooling combination, cycle time has been reduced from 225 minutes to 1 minute per part (15 threads), including time required for setup and positioning.

In addition to the dramatic reduction in cycle time, Imagem Automação estimated that overall manufacturing time is reduced by 32 percent per part. Moreover, tool breakage has been minimized while thread quality has improved.

Imagem Automação is committed to the continuous improvement of production processes, products and services. By leveraging OSG's A-SIGMA-SFT spiral fluted tap and SynchroMaster tap holder, Imagem Automação is able to accelerate productivity with reliable performance in its hub production to guarantee the satisfaction of its clients.



AE-CPR-N

DLC Coated Long Neck Corner Radius End Mill for Copper Electrodes

The AE-CPR-N is a long neck corner radius carbide end mill designed for high-efficiency finishing of copper electrodes. Its 3-flute specification contributes to high-efficiency machining and long tool life. Moreover, the AE-CPR-N's unique flat cutting edge geometry, superior corner R precision and cutting edge diameter accuracy allow high precision machined surface quality. With the addition of OSG's DLC-IGUSS coating, long tool life and good machining accuracy can be achieved in non-ferrous metals such as copper alloys, which require welding resistance and lubricity.

The AE-CPR-N is available from diameter 0.2 mm to 6 mm with a wide variety of neck lengths. Sizes up to diameter 1 mm employ a 2-flute specification. All sizes above diameter 1 mm are engineered with a 3-flute specification.

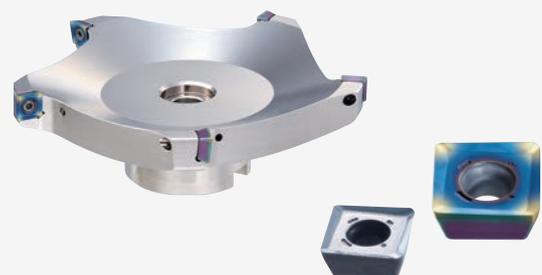


PFDC

Facemill Disc Cutter for Small Machining Centers

The OSG Phoenix PFDC is a large-diameter disc cutter engineered to excel in small machining centers. It is constructed with a thin steel body that is lightweight and has high tool rigidity. Even at diameter of 125 mm, the weight of the facemill arbor and tool total to only 1.9 kg. With an exceptional weight balance design, the PFDC can be used on BT30 small machining centers for high-speed rotary machining. Due to its wide cutting width, the PFDC is able to achieve uniform machined surface with no seams in 1-pass, which is difficult to achieve with conventional small machining centers.

The PFDC employs economical 4-corner insert with 90-degree cutting edge and chip breaker shape with sharp cutting edge engineered to excel in non-ferrous metal and resin applications.





ADO-TRS

3-flute Coolant-through Carbide Drill

The ADO-TRS is one of OSG's latest drilling innovations for ultra-machining efficiency in a wide range of materials. Its unique R gash geometry enables high thrust resistance and exceptional chip control, which are common challenges of 3-flute drills. With its low cutting resistance capability comparable to 2-flute drills, the ADO-TRS is able to create short and compact chips stably. Furthermore, its wide chip pocket configuration allows trouble-free

chip evacuation even at high speeds and feeds. With the addition of OSG's original EgiAS coating, superior wear resistance and long tool life can be achieved.



AT-2

Helical Drilling and Threading Combo Tool for High-hardness Steels

OSG's AT-2 carbide thread mill is developed specifically to combine the drilling of a pre-drilled hole and threading into a single procedure even in difficult-to-machine materials such as high-hardness steel. The AT-2 features a unique high strength cutting edge shape to control the bending of tool. It is engineered with a left-hand cut configuration for down milling to prolong tool life by

reducing tool deflection and the generation of heat. Roughing teeth are also added to distribute tool load. Furthermore, the AT-2 is coated with OSG's original DUREY coating to suppress chipping in high-hardness steel applications.



OSG Participates at CIMT 2023



OSG staff pose for a group photograph at CIMT 2023 at the China International Exhibition Center in Beijing. Uniformly dressed in a blue 20th anniversary jacket and a white polo shirt, sales and engineering staff from offices throughout China met with customers at CIMT to provide face-to-face support.

OSG (Shanghai) Co., Ltd. (OSG China), OSG Corporation's subsidiary in China, participated at the 18th China International Machine Tool Show (CIMT) from April 10 to 15, 2023 at the China International Exhibition Center in Beijing. Held every odd year, CIMT is the largest and most influential machine tool exhibition in China. It is also one of the four largest international trade fairs for machine tools in the world, with similar popularity as EMO of Europe, IMTS of the United States, and JIMTOF of Japan. According to official data, more than 150,000 visitors participated at CIMT 2023, an increase of nearly 27 percent versus the previous show.

At the show, OSG announced the release of the A-XPF forming tap in the Chinese market and showcased its latest A Brand product lineup in combination with workpieces related to micro-precision processing, automotive, aerospace, die and mold, and more.



The A-XPF, OSG's latest highly efficient and multi-purpose forming tap series, was displayed at the center stage of the A Brand product stand.

The A Brand series was positioned at the center of the OSG booth, an eye-catcher for every visitor entering the area. The A-XPF, OSG's latest highly efficient and multi-purpose forming tap series, was revealed to the public in China for the first time at CIMT 2023. The A-XPF was displayed at the center stage of the A Brand product stand and many customers expressed interest to test the new tool.



1. Yukai Zhang, OSG Engineering Manager in Midwest China, introduces A Brand products to visitors at the OSG booth at CIMT 2023.

2. From left, OSG China Marketing Manager Vis Huang, Metal Processing Magazine Vice President Xuelei Cao and OSG China Marketing Specialist Yifan Zhang pose for a photograph at the OSG booth at CIMT 2023 after an interview.

Establishment of Special Subsidiary OSG Active



1. From left, OSG Active President Hidenori Tanaka, Toyokawa City Mayor Yukio Takemoto and OSG Corporation President Nobuaki Osawa pose for a photograph at the Toyokawa City Hall in Aichi, Japan.

2. An OSG Active employee cleans tools at the Shinshiro Factory in Shinshiro City, Aichi Prefecture.

On December 13, 2022, OSG Corporation has announced the establishment of OSG Active Co., Ltd. as a special subsidiary that promotes employment opportunity for people with disabilities. As a subsidiary that is independent from the parent company, a work environment with consideration of special needs can be fostered. OSG is the only company to establish a special subsidiary in Toyokawa City, Aichi Prefecture, and the first in the cutting tool industry in Japan.

OSG will continue to promote the creation of a society that respects diversity regardless of one's ability or disability to enable every individual to play an active role and shine in their respective work sites.

*A special subsidiary is a company established to promote and stabilize the employment of people with disabilities.

OSG announces new sustainable forming tap innovation "Green Tap"

At EMO 2023, held in Hannover, Germany from September 18 to 23, 2023, OSG announced the development of "Green Tap," a new revolutionary forming tap innovation that contributes to the realization of a sustainable society.

Green Tap is made by OSG's new and original manufacturing method. Green Tap can minimize the amount of electricity consumed during tap manufacturing compared to conventional methods, reducing CO₂ emissions per tap by approximately 50 percent. In addition, the tool's performance has been improved due to its special tool geometry, enabling both eco-friendliness and efficient tapping.

OSG is making extensive efforts to attain its environmental goals and is dedicated to creating a sustainable future. Through the development of Green Tap, OSG strives to contribute to the realization of a sustainable society by providing environmentally friendly products and making a positive impact on the planet.



OSG members from Japan and Europe pose for a group photo at the OSG Booth on September 18, 2023 after a press event at EMO 2023.

GREEN TAP



OSG Around the World

Employee Interview with **Hakan Erdogan**

Tell us about your background.

From the beginning of my career, I have always been involved in the cutting tool market. My father has been working in the cutting tool industry since 1975. When I turned 13 years old, I started working at our family cutting tool business during the summer holidays. The first OSG product that I encountered was chaser dies. At the time, it was one of the most famous products of OSG in the Turkish market. After graduating from Yıldız Technical University with a degree in mechanical engineering in 2000, I began my journey in business. Between year 2000 to 2012, I worked at my family company Teknik Hırdavat Evi as a sales engineer and later as a sales manager in 2008.



Profile

Location: Turkey

Position: General Manager at OSG Turkey

Joined OSG: 2012

Motto: "Success is the result of your efforts. It's never a coincidence."

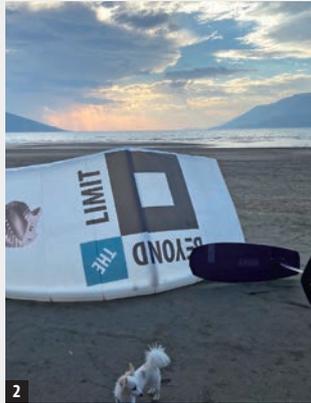
Tell us about your experience at OSG and your daily routine.

In 2012, I joined OSG through the company's acquisition of my family business. With the formation of OSG Turkey, I became general manager and a member of the OSG Family, which I am proud of.

As the company's general manager, I am responsible for all facets of operations. My weekly routine usually begins with a Monday meeting with our sales manager, customer service manager and accounting manager. My weekly agenda would be scheduled based on their feedback. If there is no special event, I am usually in the office to follow up on projects and reports revolving finance and production to ensure strategic goals are met. For the remainder of the week, I would usually make customer visits with my sales engineers that have scheduled meetings for me. It could be any industrial area of Turkey. These customers are mostly key account customers, dealers, or can be end users with major potential. In addition, OSG Turkey would host at least one training session (technical, sales, etc.) every month at our office, our dealers, or at customers. I always try to attend these training sessions and meet with people face-to-face.



Erdogan poses for a photograph at the 52nd International Paris Air Show that took place at the Le Bourget Parc des Expositions from June 19 to 25, 2017. During the Paris Air Show, OSG exhibited the latest cutting tool solutions for the aerospace industry. In addition to the exhibition hall, VIP customers were invited to OSG's chalet to enjoy aircraft demonstrations.



1. Outside of work, Erdogan likes to spend time with his two daughters. They especially enjoy horse riding.
2 & 3. Erdogan suits up in his OSG kitesurfing gear, which he enjoys doing in the summer.

What is most challenging about your work?

Acquiring a large new customer account that we have never met before is always a challenge. It is a lengthy process that requires many meetings, getting to know the customer, studying the parts that the client works with, choosing the optimal OSG product, convincing the customer to try, conducting cutting trials, succeed in test trials and demonstrating to the customer that OSG is better at cost per part, persuading the customer some more, and finally issuing the invoice. The easiest part always comes after the first invoice is issued.



What is unique about OSG Turkey?

Dynamic teamwork is what makes OSG Turkey unique. We have a young team, but we also have been working together for many years. The most important characteristic of our company is never giving up under any condition. It is what contributes to OSG Turkey's success today.

OSG Turkey's sales team poses for a photograph at the Maktek Eurasia 2022 show at Tüyap Fair Convention and Congress Center in Istanbul, Turkey. Maktek Eurasia is an international fair that highlights the latest machine tools, tool holders, cutting tools, measurement systems, software, manufacturing technologies, and more.

What is your favorite OSG tool?

I was most impressed by OSG's FTO-GDXL, which is a revolutionary FX coated carbide long drill with coolant holes that enables high-speed processing of 10 to 30 x D without pecking. Developed in 2003, this tool demonstrated significantly greater efficiency and tool life than gun drills and HSS drills at the time. In 2007, we tried a 6 mm diameter 20 x D FTO-GDXL with a customer that manufactures crankshafts. This trial was the first deep hole drilling in Turkey and the FTO-GDXL drill was a new innovative product for all over the world. After several tests, we succeeded and have greatly enhanced the customer's production line, which was changed from transfer lines and HSS drills to CNC machining centers and carbide long drills for deep holes. It was and still is the most productive drill effort I have ever made. I would like to once again thank Mr. Gunnar Gumbach, who was responsible for Turkey at the time at OSG Europe, for providing immense support to me on this project.



Developed in 2003, OSG's FTO-GDXL is a coolant-through carbide long drill that enables high-speed processing of 10 to 30 x D without pecking.

How do you spend time on your day off?

I have two daughters, Melis, who is seven years old, and Lila, who is five years old. I like to spend time with them playing, drawing, and watching movies. Our favorite activity is horse riding. I also enjoy kitesurfing in the summer and snowboarding during the winter. I usually organize my vacations based on the best kitesurfing and snowboarding spots from around the world.



shaping your dreams

Highly efficient and multi-purpose

A-XPF

Forming Tap



scan for details

