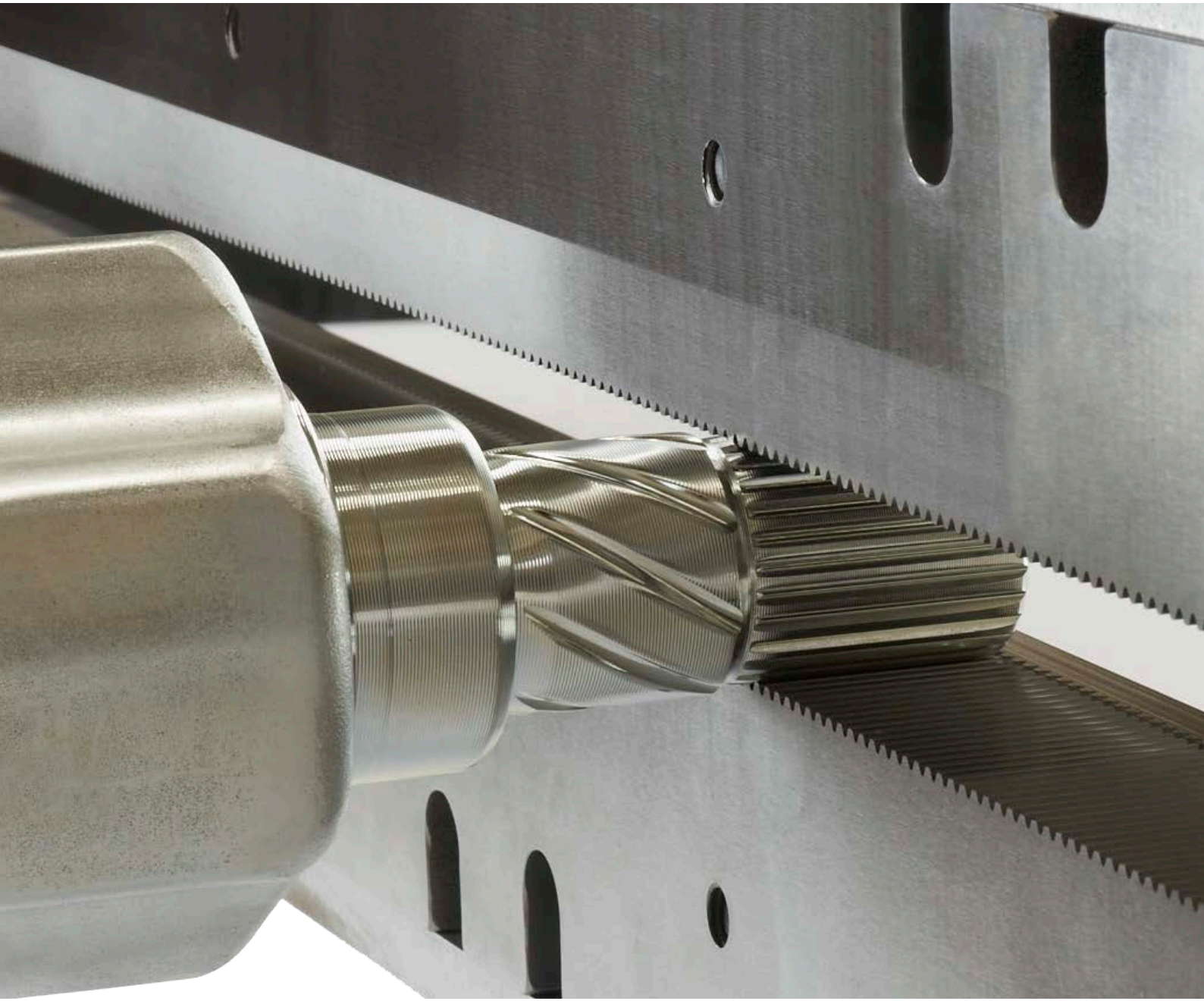




OSG EX-CELL-O

SPLINE ROLLING TECHNOLOGY



COLDFORMING OF INVOLUTE SPLINES,
OIL-GROOVES, KNURLS AND THREADS

Coldforming Technology – How it works

The chipless coldforming of profiles such as involute splines, spiral serrations, knurls, oil grooves and threads only takes a few seconds with the OSG EX-CELL-O Coldforming process. This is significantly faster than cutting processes. Additionally coldformed splines have higher load capacities, better surface qualities and higher accuracies. OSG's worldwide produced high precision rack dies form the required profiles into rotatory components during the CNC controlled rolling processes. In this process material flows into open spaces of the rack die teeth. During the workpiece rotates the manufacturing operation proceeds in a series of progressive forming steps. After reaching the final profile heights, the involute form gets optimized during the calibration zone.

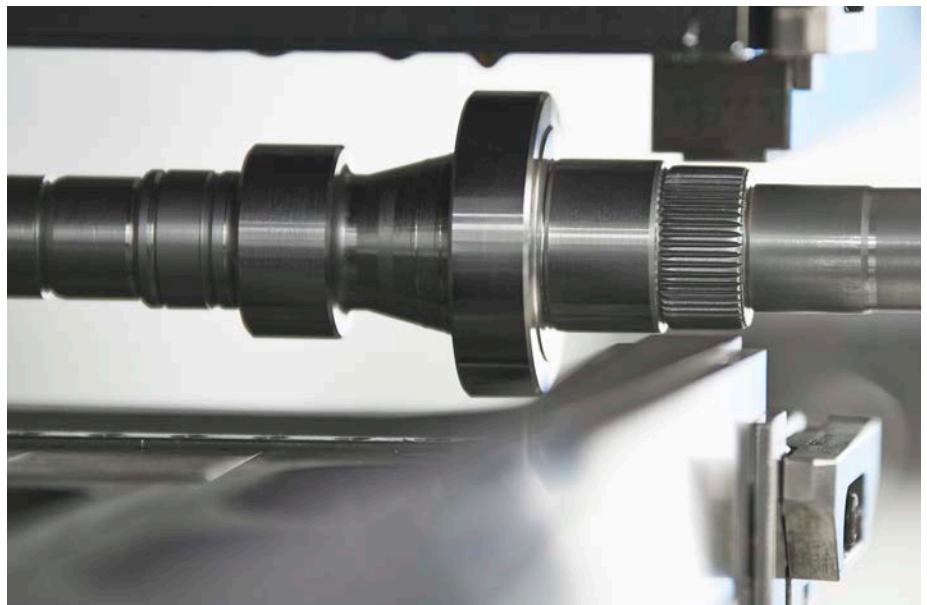
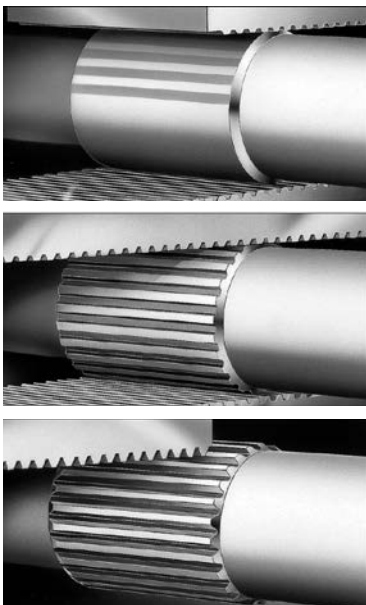
The advanced CNC spline rolling machine series XK from OSG EX-CELL-O are state of the art and meets the constantly increasing market demands with following key features:

- 2, 4, 6, 8 axes CNC spline rolling machine concepts
- Simplified, extended and most flexible tool fixtures
- Improvement of spline quality by multiple CNC functions
- Reduced work space and highest energy efficiency

All movements in the forming process are performed by CNC axes – without hydraulic driven axes.

This effects special advantages for the end user:

- Dimensional corrections by CNC
- Spacing error corrections by CNC
- Individually programmable rolling speeds
- Higher quality, lower scrap rate
- Minimal change over times
- Faster cycle times



PROCESS ADVANTAGES

Rolling Splines on Hollow Shafts

In modern component designing weight reduction is mandatory. More and more hollow shafts or partly hollow components are replacing solid components. Therefore OSG EX-CELL-O developed a new spline rolling process strategy to achieve excellent spline quality even at tube thicknesses of a few millimeters.

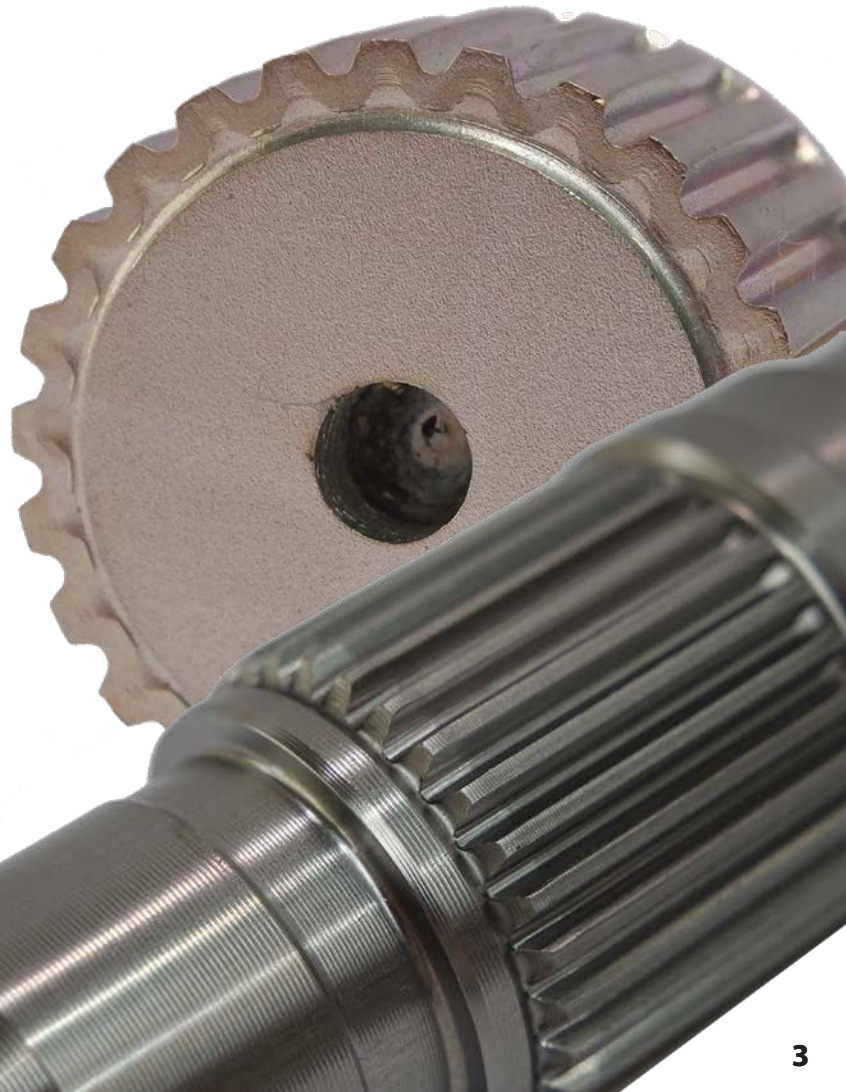


Advanced Spline Assembly Processes

At clearance fits, only a minimal backlash is allowed, which makes joining of assemblies challenging. For this purpose, we offer special tool technologies to prevent these problems or make manual or robot supported assembly processes more process-reliable.

Clearing on pre-machined Ring Grooves

To manufacture ring grooves in heat treated splines is expensive. With our patented technology, ring grooves could already been manufactured in soft turning process and can be kept free during spline rolling process. Our advanced manufacturing concept ensures process-reliable and chip-free results.



Chamfering Technology on Press Fits

In order to achieve radial backlash-free connections, splines are designed as press fits. Therefore the actual tooth thickness is wider than the tooth gaps at the hub, which makes manual joining almost impossible. Our Chamfering Technology improve variations within automated press fit processes significantly.

OSG Rack Dies – Decades of Tooling knowledge

Generally all involute splines with a pressure angle between 20 and 45° are possible to roll. OSG EX-CELL-O develop and produce rack dies for splines, threads, oil grooves, ring grooves, knurls or other special profiles. First tooling tests with quality approval processes OSG EX-CELL-O run on its internal prototyping machines. The rack dies are made of high quality, hardened and ground tools steel. Depending on part material and profile design up to 250.000 working cycles can be performed up to tool change over. Special carburizings allow additional tool life improvements. Rack dies can be reground a couple of times. Special rack die solutions are peaks at tooth entry, chamfers at tooth entry, clearance of ring grooves, spherical radius tooth end, helical splines.



Global Technology Network

OSG Group is the worlds largest manufacturer of rolling dies. More than 70,000 cold forming tools a year are moving through several OSG’s productions around the globe.

All technology centers cooperate intensively to analyze the best practices in tools technology to provide only the best technical solutions to customers. On rack dies and cylindrical dies technology there are operations in following countries: USA, Mexico, Germany, Japan, China, Taiwan, Thailand, Korea, India. This network ensures excellent and most professional global tooling services.

OSG Spline Gauges

Beside racks OSG is most famous for advanced gauging systems. One of OSG’s main competence is to develop and supply long leaded measuring equipments on gauging processes. After final approval check they get shipped out including quality certificates.



APPLICATIONS

Motor Components



Gearbox Components



Axle Components



XK 825, XK837, XK 851 (2E/4E/6E/8E)

The evolution for the next generation. The XK8Evolution series is ready to get optimally adapted to customer requirements and impresses with the latest technological features. It's specially developed for high economic processing on passenger car components like drive shafts, axle shafts, E-motor components or other similar components.



Highlights:

- Optionally as 2, 4, 6 or 8-axis machine available
- CNC-Taper-control-axes to manage spline tapers due to axial material flow deviations or heat treatment deviations
- Large workpart and tool variety through increased machine-opening-variance: 5.5" - 8.0" in one machine.
- Latest FANUC control with touch screen HMI.
- Optional machine control SIEMENS 840D SL
- Increased horizontal & vertical feed rates
- Reduced floor space

XK 837, XK851, XK875, XK1275

The XK8 series is prepared for all machining tasks on forming involute profiles or others. Since introduction of this CNC spline rolling machine concept in year 2002, many machines around the globe are producing reliable and excellent production quality. The machine concept and a lot of dedicated manufacturing processes have been continuously developed over the years. It impresses with its extremely stable properties and it's designed for heavy or complex forming processes. Especially shafts with very long splines or shafts with a couple of splines can be manufactured very economic in one process cycle.



Highlights:

- State-of-the-art cold forming technology with process control
- All movements are performed by numerically controlled axes
- Variation of workpiece tooth quantity without changing tools
- Vertical feed during rolling
- Rolling speeds can be programmed individually
- Hydraulic free machine – reduced footprint and noise level
- Simplified tool settings
- Increased flexibility
- Prepared for heavy coldforming operations

XK 8 Evolution – Series

Machine Type		XK 825				XK 837				XK 851			
		825-2E	825-4E	825-6E	825-8E	837-2E	837-4E	837-6E	837-8E	851-8E	851-2E	851-4E	851-6E
Basic machine lengths	mm	3.560				4.000				4.650			
Basic machine depths	mm	1.900				1.900				1.900			
Depths incl. Head- and Tailstock (ref.)	mm	3.500				3.500				3.500			
Height	mm	2.530				2.530				2.530			
Number of CNC Axis		2	4	6	8	2	4	6	8	2	4	6	8
Diameter adjustments		manual		CNC	CNC	manual		CNC	CNC	manual		CNC	CNC
Taper adjustments		manual			CNC	manual			CNC	manual			CNC
Slide stroke max.	mm	810				1.200				1.740			
Tool clamping width max.	mm	234				234				234			
Tool lengths max.	mm	24" (609,60mm)				39" (990,60mm)				57" (1447,80mm)			
Feed force max.	kN	30				30				30			
Feed rate max.	m/min	40				40				40			
Radial feed	mm	1		84		1		84		1		84	
Radial feed rate max.	mm/s	manual		4,5		manual		4,5		manual		4,5	
Process force max.	kN	200				200				200			
Profile lengths max. (ref.)*	mm	60				60				60			
Modul range (ref.)*	m	0,3 - 1,27				0,3 - 1,27				0,3 - 1,27			
Machine opening	Zoll	5.5" / 6.0" / 7.0" / 8.0"		5.5" - 8.0"		5.5" / 6.0" / 7.0" / 8.0"		5.5" - 8.0"		5.5" / 6.0" / 7.0" / 8.0"		5.5" - 8.0"	
Weight w/o automation	kg	8.000		9.000		8.000		9.000		10.000		11.000	

XK 8 High Power - Series

Machine Type		XK 837	XK 851	XK 875	XK 1275
Basic machine lengths	mm	4500	4850	5540	6540
Basic machine width	mm	1800	1800	1800	1800
Basic machine depths	mm	4200	4200	4200	4200
Height	mm	2490	2490	2490	2490
Number of CNC Axis		6	6	6	6
Diameter adjustments		CNC	CNC	CNC	CNC
Taper adjustments		Manuell	Manuell	Manuell	Manuell
Slide stroke max.	mm	1200	1500	2100	2100
Tool clamping width max.	mm	460	460	460	460
Tool lengths max.	mm	39" (990,60mm)	57" (1447,80mm)	81" (2057,40mm)	81" (2057,40mm)
Feed force max.	kN	30	30	30	30
Feed rate max.	m/min	30	30	30	20
Radial feed	mm	12	12	12	12
Radial feed rate max.	mm/s	1,5	1,5	1,5	1,5
Process force max.	kN	400	400	400	600
Profile lengths max. (ref.)*	mm	350	350	350	350
Modul range (ref.)*	m	0,3 - 3,0	0,3 - 3,0	0,3 - 3,0	0,3 - 3,0
Machine opening	Zoll	5.5" / 6.0" / 7.0" / 8.0"		5.5" / 6.0" / 7.0" / 8.0"	
Weight w/o automation	kg	18.000	19.000	20.000	23.000

* Values are individual guidelines

TECHNICAL SERVICE

The OSG EX-CELL-O team is your partner for comprehensive customer service on your cold rolling machines. We take care of your newer MAG CNC rolling machine, or your older EX-CELL-O XK or ROTOFLO machines. Also on machines from other OEM's we can support with our knowledge if requested.



Our Services

- Machine inspection
- Maintenance
- Setting up the machine geometry
- Spare parts
- Process startup support
- Production support

ONLINE SERVICE

Industry 4.0 solutions we implement in our products since many years. In addition to standardized 4.0 applications, many cold rolling machines already have been equipped with remote access software. Such an online service application enables a fast connection of the machine with our team of specialists – globally. After a few clicks, we can support and advise our customers promptly and cost-effectively in problem analysis and problem solving. We're able to update old machines with 4.0 solutions too.



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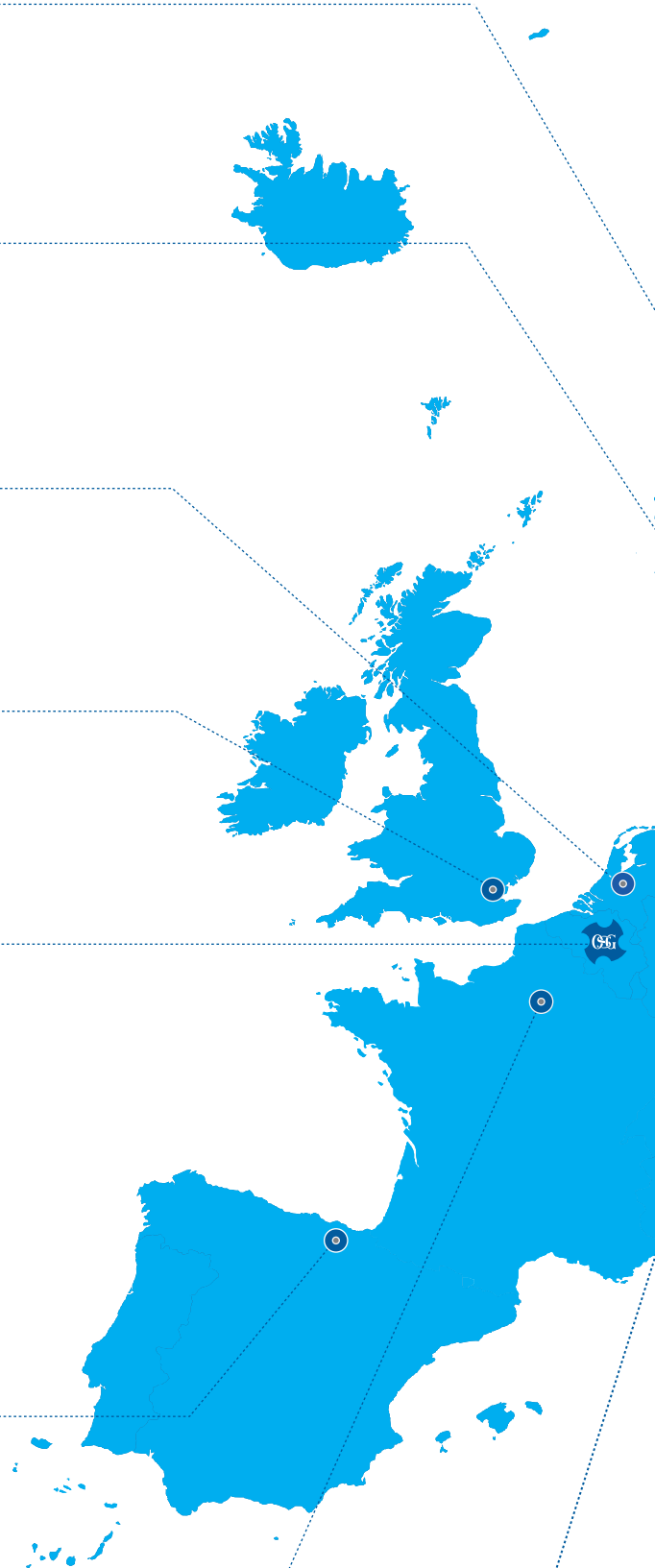
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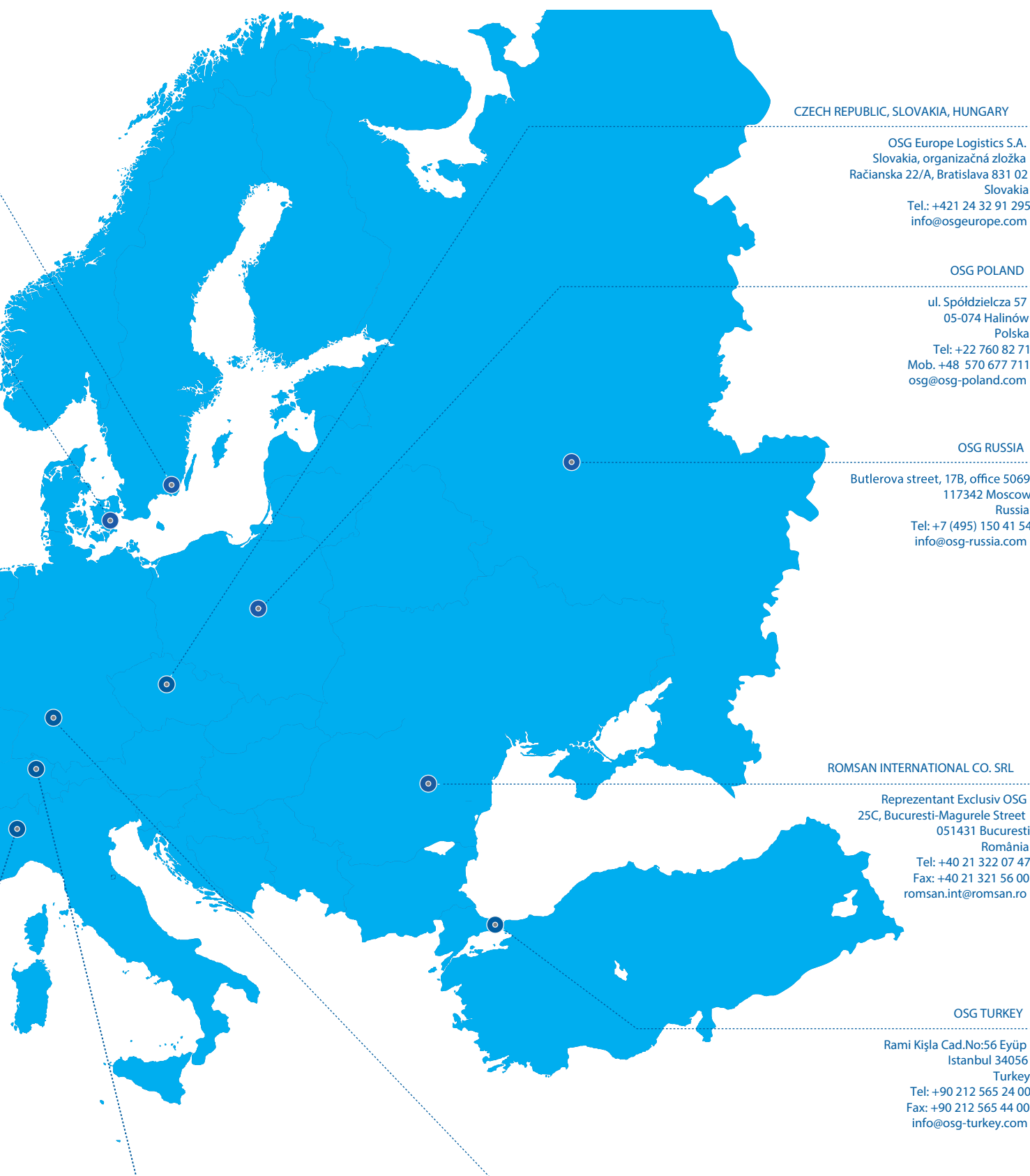
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shaping your dreams

OSG PRODUCT GROUP

OSG strives to support the growth of the manufacturing industry worldwide with highly accurate and efficient products through its advanced technological know-how. We provide specific solutions to our customers' problems by supplying highly competitive products manufactured to world-class quality standards.



TAPS



Taps are used to cut screw threads on the inside surfaces of holes, creating the "female" half (nut) of the screw. High precision is of vital importance, particularly in areas such as automobile engines, which require precision screws. We offer a lineup of taps with diameters ranging from small to large and with specifications suitable for a wide variety of uses. We have the top market share for taps not just in Japan but also in the world.



DRILLS



Drills are used to make holes in a wide range of surfaces. We have received high acclaim for our development of high-precision, high-value-added products for use in automotive and aircraft part manufacture, which demands advanced processing techniques and zero margin of error.



END MILLS



End mills are used to cut and contour molds for plastic parts, for instance for electric home appliances, as well as diecasting dies for automotive parts and stamping molds. To meet today's demanding requirements, such as smaller size, lower weight and reduced cost, we see growing demand for carbide end mills that are excellent in both processing accuracy and durability. In this area, we are currently focusing on developing new products that utilize our advanced proprietary coating technique.



ROLLING DIES



Thread rolling dies are used to copy threading onto "male" screws (bolts); the process consists of rolling a metal bar between two thread rolling dies tightly pressed to each side. OSG manufactures cylindrical and flat rolling dies for screws, worms and serrations, thread rolling planetary dies and counter-flow rolling dies, in accordance with their intended use.



INDEXABLE TOOLS



Indexable tools are used to shape metal molds and machine parts. While end mills are used for finishing, indexable tools are intended for rough cutting and contouring, and use disposable inserts attached to the tool body.



GAUGES



Gauges are used to check the final dimensions of screw threads and holes. OSG was an early adopter of changes in the Japan Industrial Standards (JIS), and today we offer a range of screw gauges based on ISO standards. Precision checking is an extremely important process because of the trends toward increasing product precision and compliance with international standards.

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