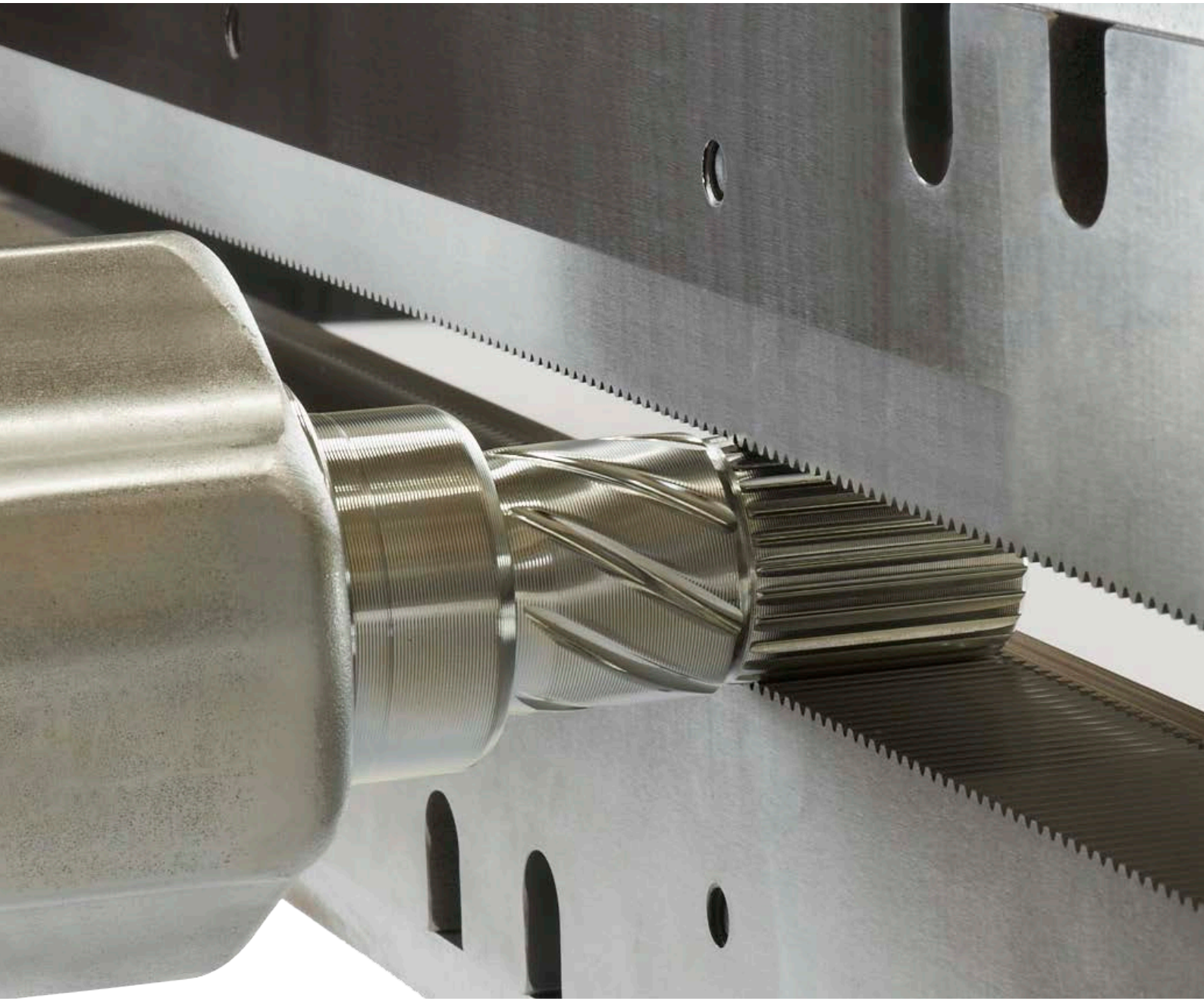




# OSG EX-CELL-O

## 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.

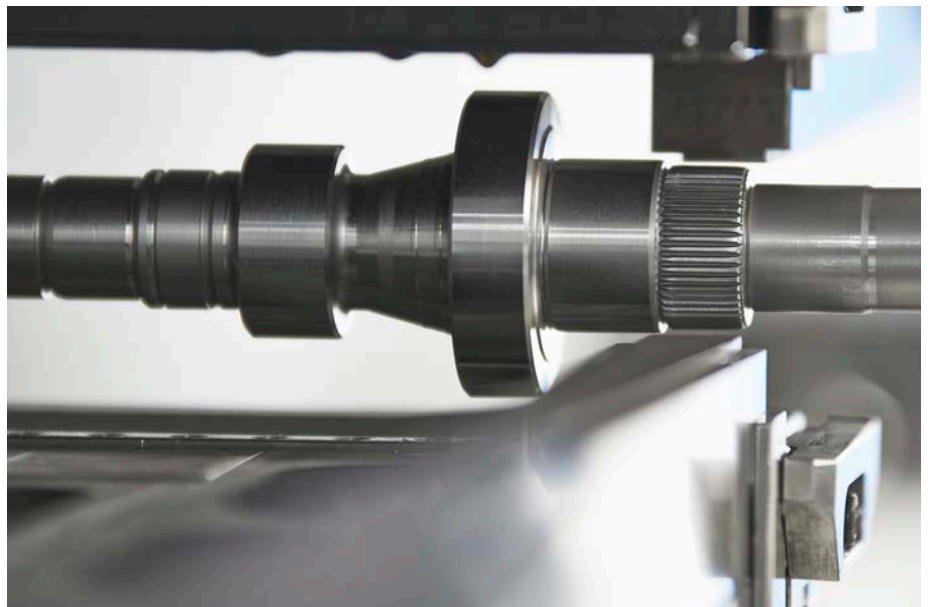
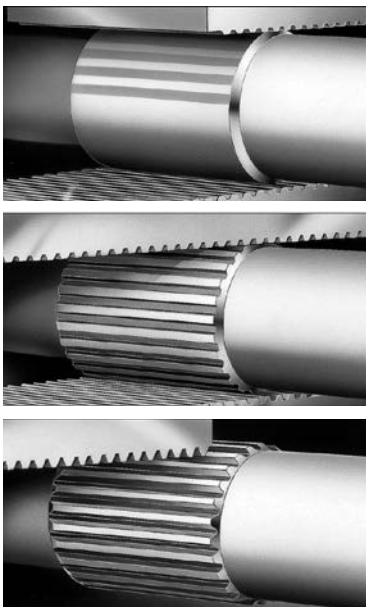
The advanced CNC spline rolling machine series XK from OSG EX-CELL-O are state of the art and meets the constantly increasing market demands with following key features:

- 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

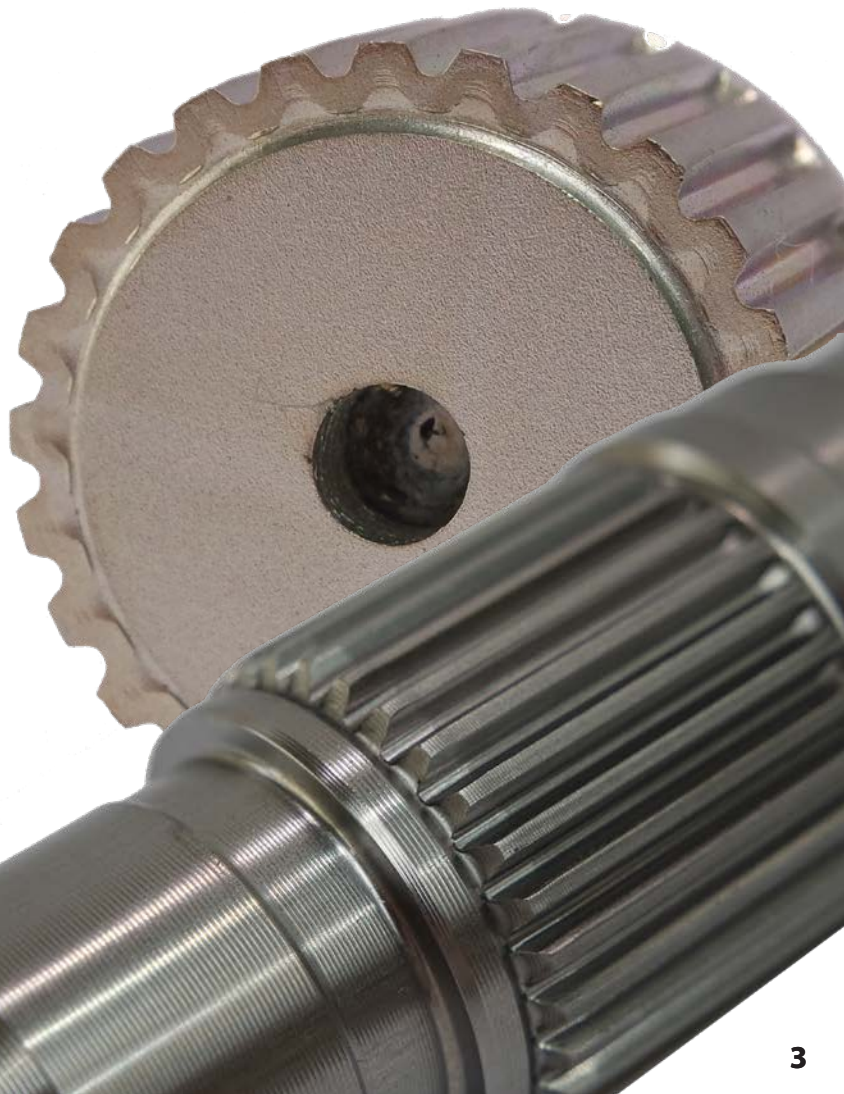
At clearance fits, only a minimal backlash is allowed, which makes joining of assemblies-challenging. For this purpose, we offer special tool technologies to prevent these problems or make manual or robot supported assembly processes more process-reliable.

## 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 like 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.





## 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<sup>Evolution</sup> – Series

| Machine Type                             |       | XK<br>825-2E              | XK<br>825-4E | XK<br>825-6E | XK<br>825-8E | XK<br>837-2E              | XK<br>837-4E | XK<br>837-6E | XK<br>837-8E | XK<br>851-8E              | XK<br>851-2E | XK<br>851-4E | XK<br>851-6E |
|--|-------|---------------------------|--------------|--------------|--------------|---------------------------|--------------|--------------|--------------|---------------------------|--------------|--------------|--------------|
| Basic machine lenghts                    | 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 lenghts max.                        | mm    | 24" (610mm)               |              |              |              | 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 lenghts 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" | 5.5" / 6.0" / 7.0" / 8.0" | 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. 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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*shaping your dreams*

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