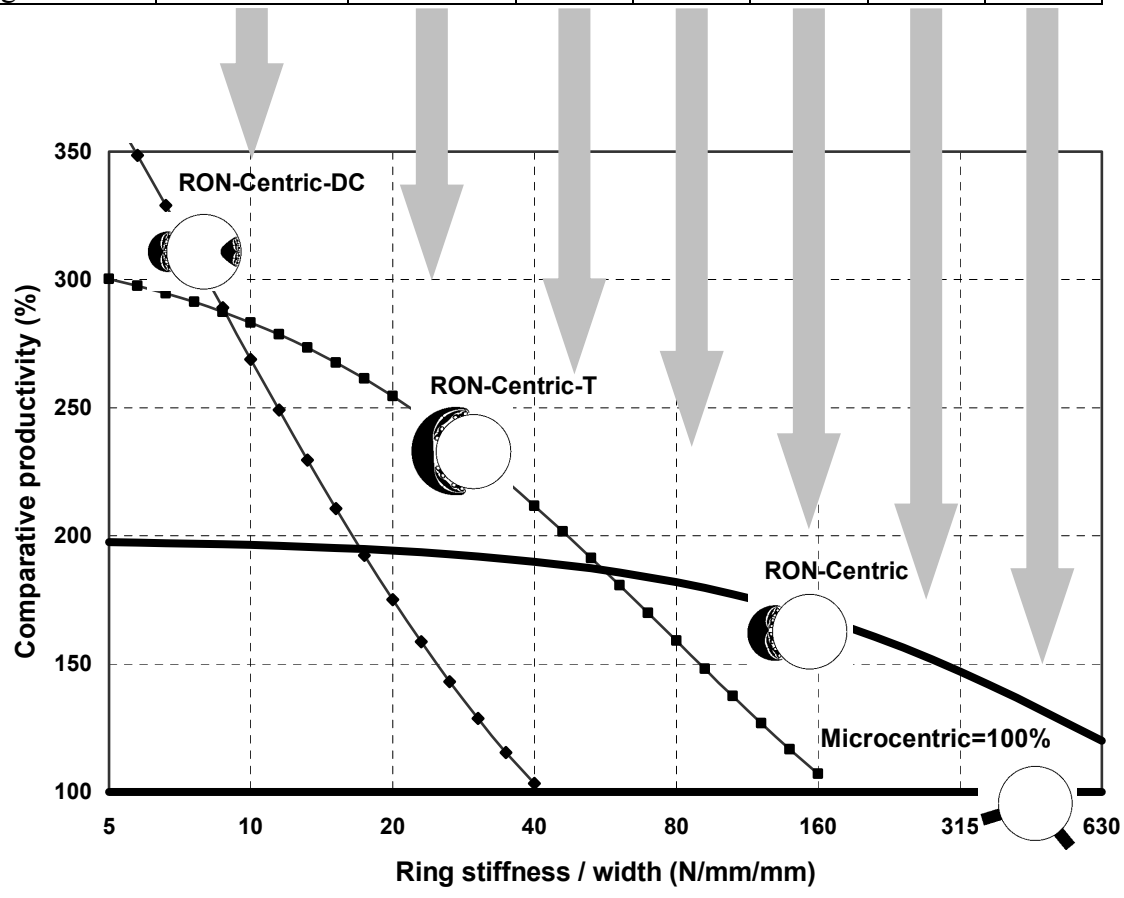
Roundness Technologies

RON-Centric™

The ultimate grinding productivity

(Outer ring, depending on the shoe and bearing types)

Bearing type							
Deep groove ball bearings	Constant section bearings	Aerospace & special bearings	618	619		160 60	62 63
Angular contact ball bearings				719 70	72	73	74
Cylindrical roller bearings			18 29	30 49		10 22	23 24 32 33 42
Taper roller bearings			329 T2DC	T4CB	320 330	331 302	303 323 322 323
Spherical roller bearings			239	230 240	222 E 231 241	222 223 E 232	213 223
Needle roller bearings				48		49	
Toroidal roller bearings			C 39	C 30	C 31 C 40	C 32	C 22



The OD grinding is a key for the total productivity.

- Grinding operations are the core for bearing industry. They constitute 30-40% of the total production expenses.
- The medium and large bearings are being manufactured in the production channels usually. The channel total productivity is limited by the slowest process.
- OD grinding of the rings is a typical bottleneck in the channel. The main reasons are the following:
  - OD grinding removes larger metal volume than ID grinding.
  - Mechanical stiffness is much lower in OD grinding than in ID grinding.
  - OD grinding process starts from the black reference surface. The big initial form errors could be removed gradually only.
  - Production channels employ the more flexible shoe-type microcentric grinding process, instead of the more productive through-feed centerless grinding.

- Microcentric OD grinding process has some barriers limiting productivity:
  - Machine set-up is sophisticated and sensitive. It takes a lot of time to adjust the proper angular positions of the shoes. Some portion of rings is wasted to verify set-up.
  - Microcentric provides low coefficient of kinematic filtering for some harmonics (roundness improvement per one ring revolution). The ring should make a lot of revolutions to achieve roundness tolerance. It increases cycle time. Some harmonics are not being improved at all. As result another portion of rings could be rejected.
  - Microcentric decreases the natural stiffness of the ring. Low stiffness determines low feed rate and long grinding cycle. It is especially important for thin-walled rings (light, extra light and thin section bearings).
  - The final accuracy is very sensitive to the initial form errors of the black rings. Microcentric is almost useless for highly deformed rings. The stock allowance is not enough to achieve the roundness tolerance. Highly deformed rings are rejected ususally. This portion could be very high among the thin-walled and precision rings.
  - Microcentric technology is very sensitive to the process variability. The final accuracy (roundness) varies widely from one ring to another. In the same time it provides the mean roundness nearby to the tolerance limit. Some portion of rings is out of tolerance statistically and should be rejected as well.
- **RON-Centric™** OD grinding technology decreases the main productivity losses – wasted machine time and wasted (rejected) rings. It provides faster set-up, faster grinding cycle and larger portion of the finished rings.

	Productivity factors for OD grinding	**Microcentric**	**RON-Centric**
1	Kinematic roundness improvement	Low/Medium	High
2	Integral stiffness of the mechanical system	Low	High
3	Speed of set-up	Low	High
4	Insensitivity to the initial form errors	Low	High
5	Insensitivity to the machine instability	Low	High
6	Average roundness reserve (6 sigma)	Low/Medium	High

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