Precision finish demands

OTEC

NEW!

New application:

Deburring and burnishing of ring and pinions (drive shafts and bevel gear wheel) of differentials. The roughness can be decreased from Ra 0.4 to Ra 0.1!

The function of a differential:

In most cases a differential is used in automobiles as axle differential. It is designed to drive two wheels in a way that they can spin with a different speed, but with the same drive force while driving curves.

For the same purpose it is used as centre differential in four-wheel drive vehicles where the performance is spread on two or more axles.

Task:

The bevel gear and drive shaft need to be mounted without back lash to provide smooth driving without jerk. The problem is that both parts, ring and pinion, have a high surface roughness after production.
If they would be installed like this, there would be an excessive wear, due to small percentage contact areas. As a consequence the gear would have too much back lash after a short time.

The effort to increase the percentage contact area is up to now very high. For example, both parts need to be mounted on a special device, covered with alumina polishing agents, while being run against each other (meshed) with a high speed. With this process the two parts fit into each other much better and the contact area is increased.

This is a really expensive process, as both parts have to be mounted in pairs. Therefore there are good reasons for the automobile and truck industry to find a more economical way to solve this problem.

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Drive shaft and bevel gear

Problem key facts:

- Costs
- Effort
- Durability

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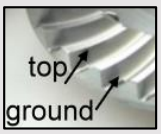
OTEC's solution:

In the past OTEC has done numerous tests with these kind of parts, with DF as well as SF machines, with the same result: The tooth flanks have been processed too differently. The removal was too big on the top and too small on the ground.



The solution was found in the pulse-finishing process.

The parts are mounted on a holder and getting pulse-finished in a fine-grained media like KXMA16. They are permanently accelerated up to 2000 rpm, slowed down and accelerated again during a wet process. The processing time is between 1 and 10 minutes depending on the surface roughness of the parts before processing. Starting with a roughness of Ra 1.0 µm, e.g. we were able to reach a roughness of Ra 0.4 µm. Starting with Ra 0.4 µm we already reached a roughness less than Ra 0.1 µm.

OTEC will soon be able to do profile measurements of the teeth with an Alicona roughness measurement system. This will help us to optimize the quality of the surface even more.

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