

## High Accuracy Assembly Method for Small Sintered Parts

### Technical background

In planetary gears, which are made up of sintered gears and sintered oil-impregnated bearings, the need for improved accuracy in the bearing inner diameter is increasing due to the increased contact pressure resulting from the use of smaller bearings and the need to stabilize motor performance.

Conventionally, small sintered parts were assembled by press-fitting the bearings into the gears. A new production method which enables high accuracy, low cost production was developed by Hitachi Powdered Metals using the repressing press.

### Conventional technology

#### Manufacturing method of conventional technology

Parts were produced by a process in which bearings were press-fitted using an assembly device, followed by sizing of the inner diameter of the bearing.

#### Problems of conventional technology

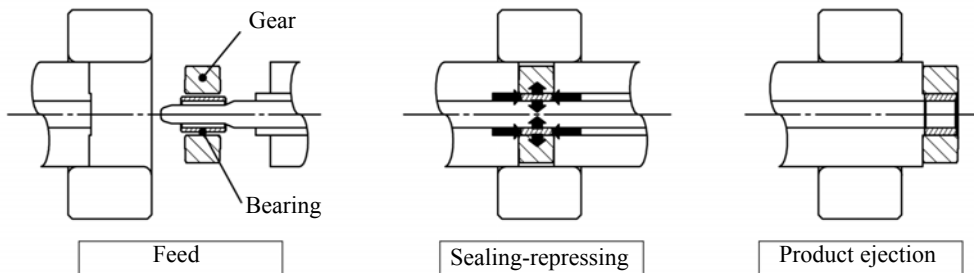
- 1) In order to prevent galling and burr when press-fitting bearings, it is necessary to form a press-fitting chamfer in the gear inner diameter.
- 2) The same accuracy (circularity, cylindricity) as in repressed parts is not achieved by using a sizing bar for inner diameter dimensional correction.
- 3) To secure the ejection force, strict control of the dimensional accuracy of the press-fitted part is necessary.

### New technology

During insertion of the bearing, the bearing is inserted by clearance-fitting, and a unitary structure is achieved by sealing-repressing the bearing. As a result, bearing inner diameter accuracy is greatly improved while maintaining an ejection load equal or superior to that in press-fitting.

By performing bearing insertion and repressing simultaneously, productivity is improved and the cost of assembly is reduced.

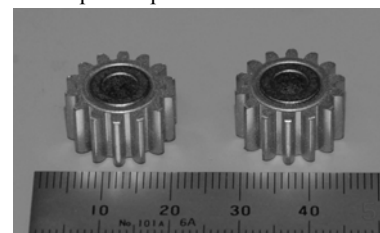
### Assembly process with new technology



Comparison of bearing inner diameter accuracy  
(Fe-based oil-impregnated sintered bearing, inner diameter:  $\phi$  5mm, total length: 9mm)

	Conventional technology	New technology
Dimensional accuracy $\pm 3\sigma$	17.5 $\mu$ m	8.9 $\mu$ m
Inner diameter circularity Mean +3 $\sigma$	4.7 $\mu$ m	2.5 $\mu$ m
Cylindricity Mean +3 $\sigma$	9.2 $\mu$ m	5.2 $\mu$ m

Examples of products



### Examples of applicable products

- Assembly of 2 parts when repressing is possible

### Applied products

- Planetary gear units for starters

### Cost comparison

Conventional technology = 100, new technology = 30