

MINEBEA

**New FDBs for HDD Spindle Motors
“ROF Type”**

May 20, 2004



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1. Basic Development Concept

1. High Suitability for Mass-Production

2. Unparalleled Cost-Competitiveness

3. High Performance

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2. Characteristics

By using Minebea's

Ball Bearing Manufacturing Technology,

Production Lines, and

Production Method,

which monthly turn out 170 million pieces of

ball bearings (or 340 million pieces in terms of

number of rings), and by applying

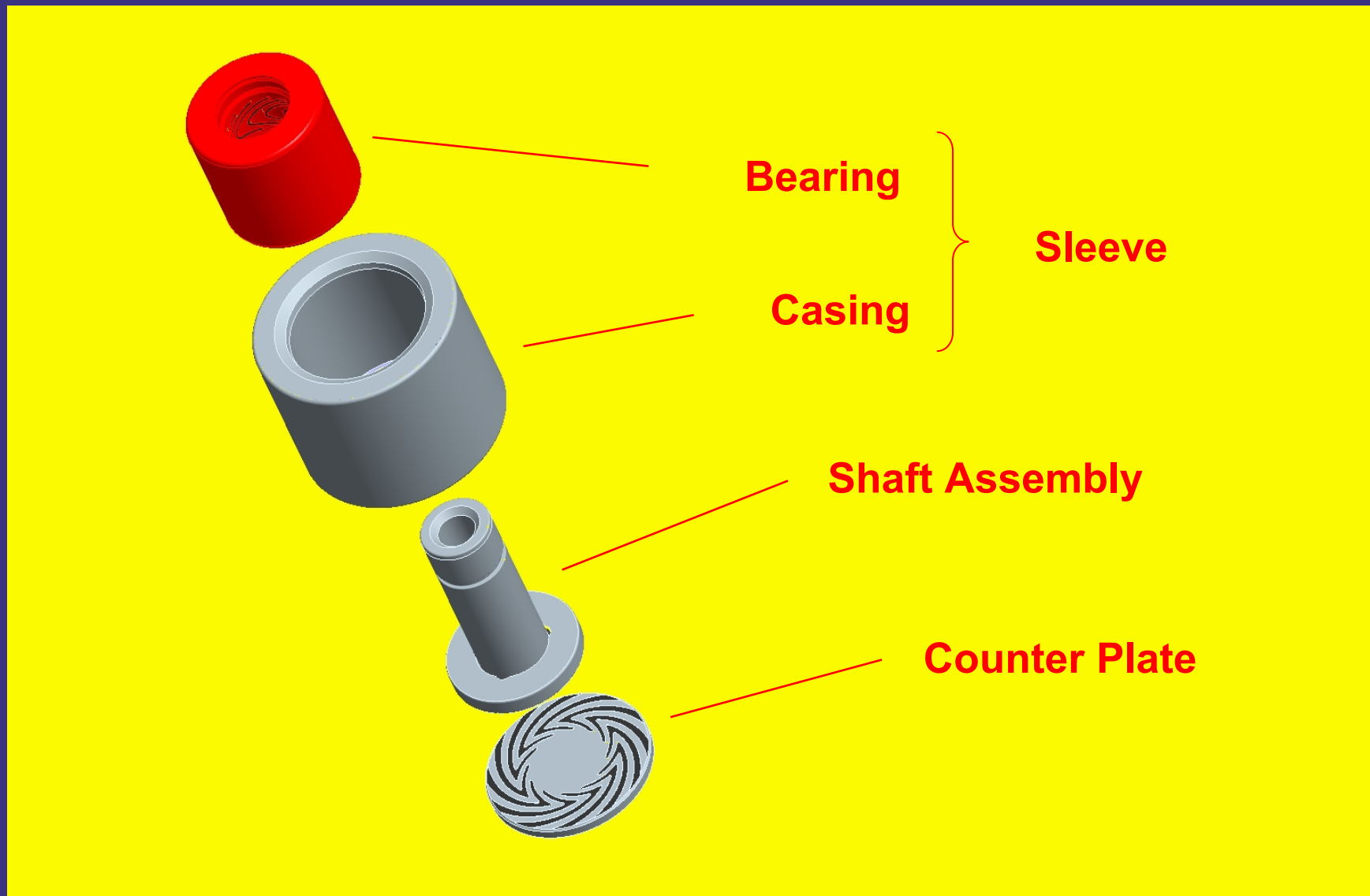
Quenching and Grinding Finish to Stainless Steel,

the key component of FDB ~ the Bearing portion ~ is produced.

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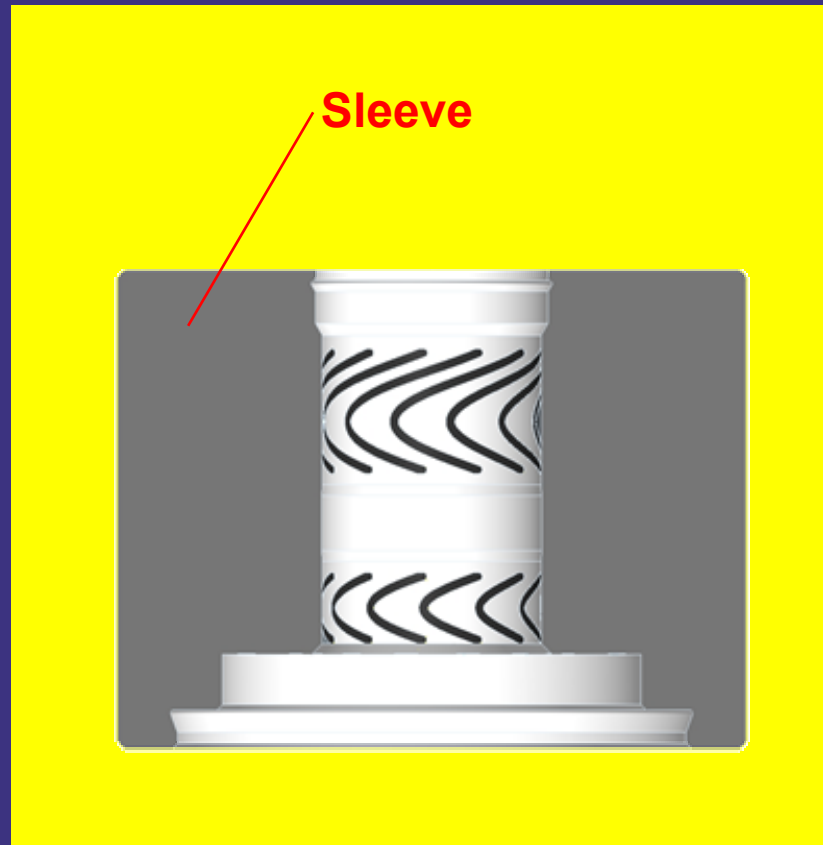
3. Structure of ROF Type FDB Unit



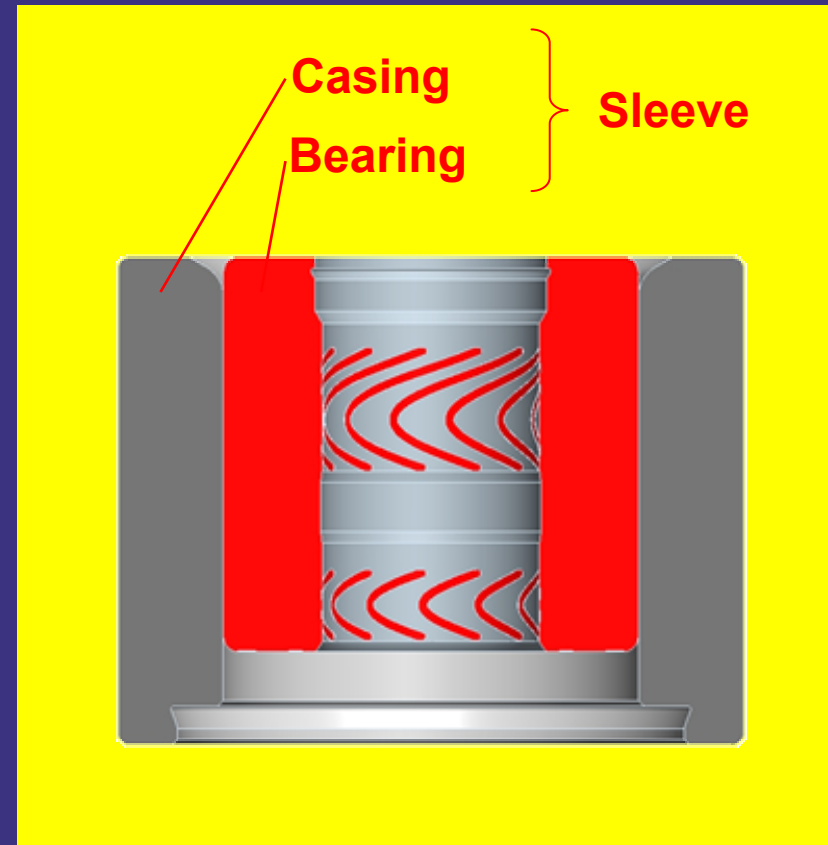
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4. Sleeve

Conventional Type



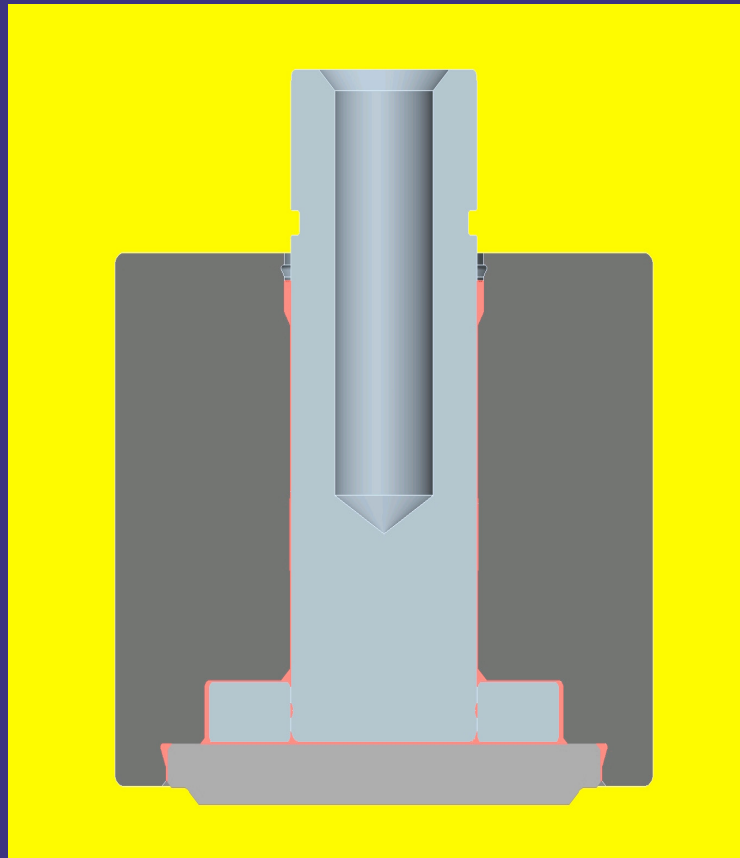
ROF Type



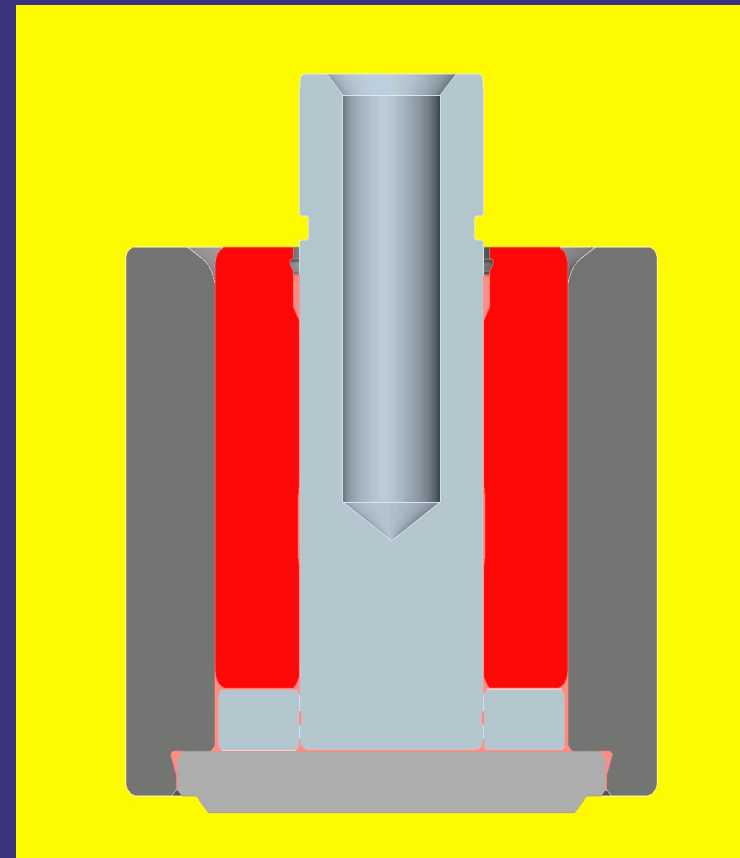
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5. Comparison with Conventional FDB

Conventional Type



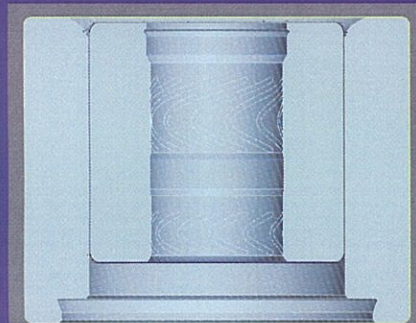
ROF Type



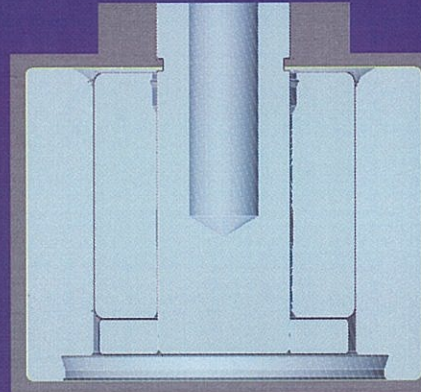
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6. Outline of Assembly Process for ROF Type FDB

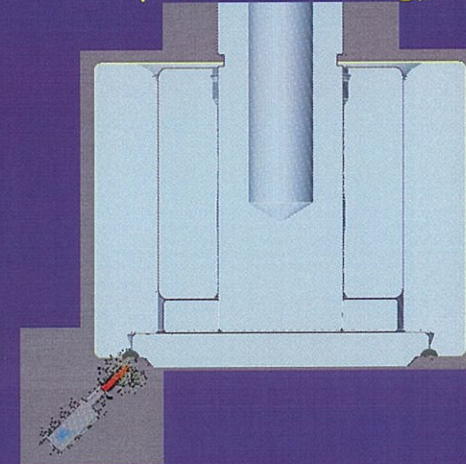
(1) Fixing the Casing and Bearing



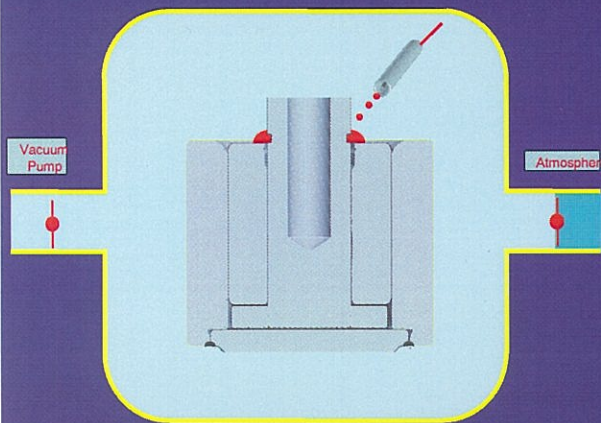
(2) Insert of Shaft Assembly



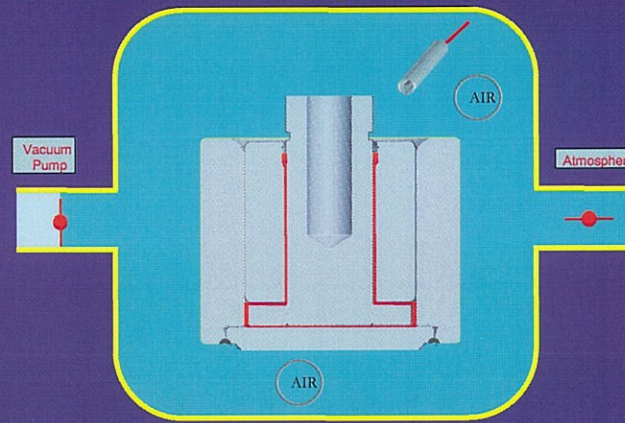
(3) Fixing a Counter Plate (Laser Welding)



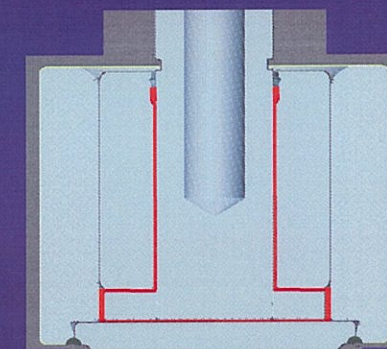
(4)-1 Oil Fill (Vacuum Fill)
Oil fill in vacuum



(4)-2 Oil Fill (Vacuum Fill)
Release to atmospheric pressure



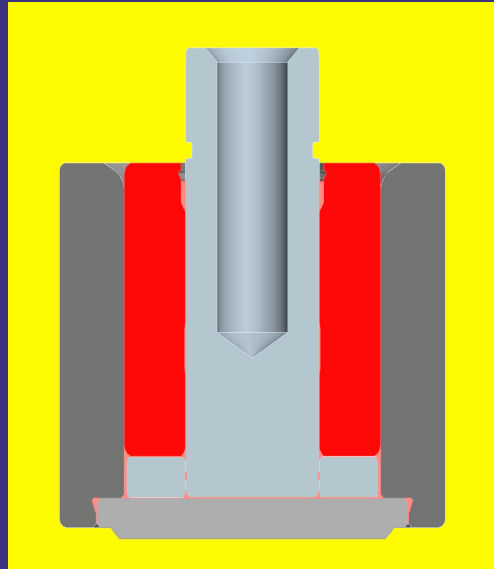
(5) ROF Type Completed



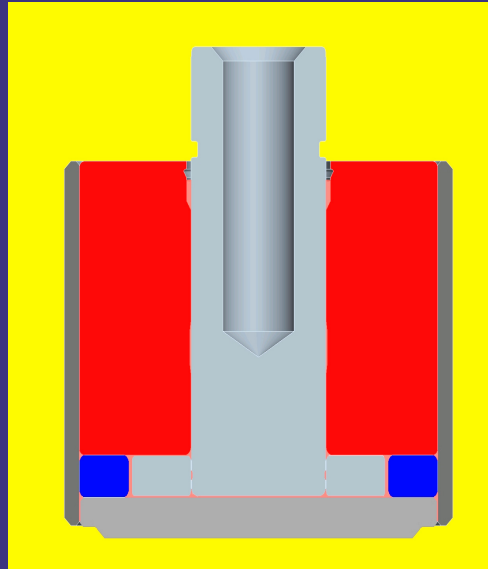
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7. Structural Examples of ROF Type FDB

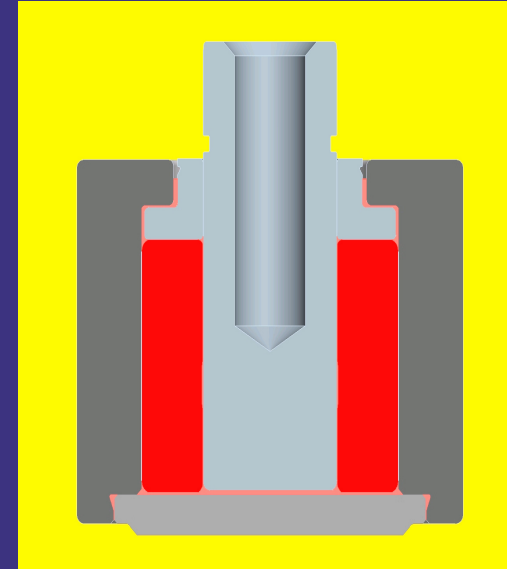
Example 1



Example 2

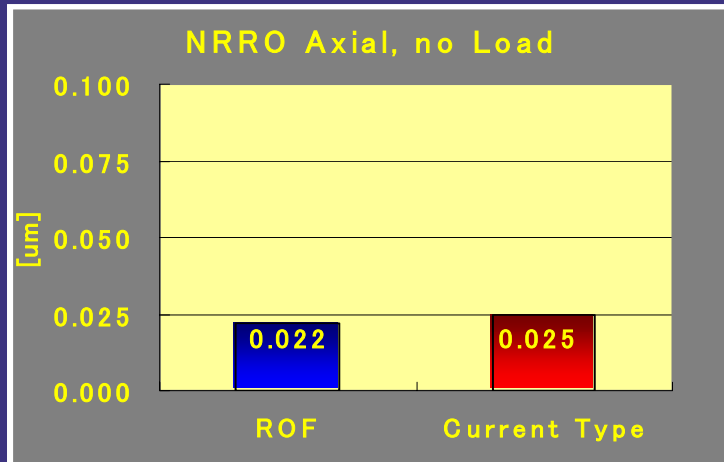


Example 3

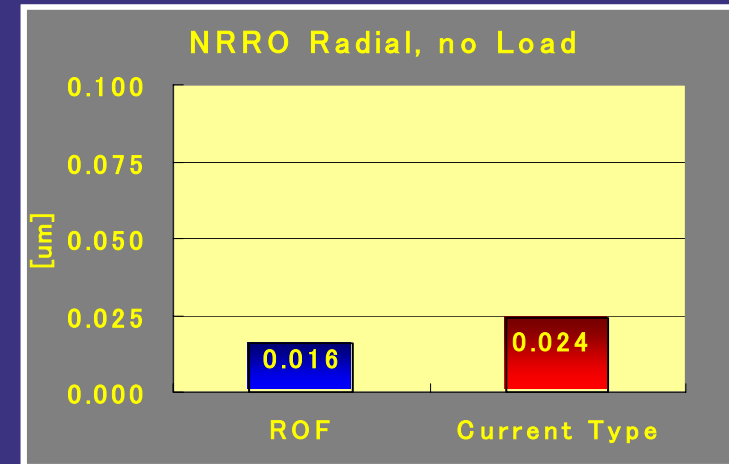


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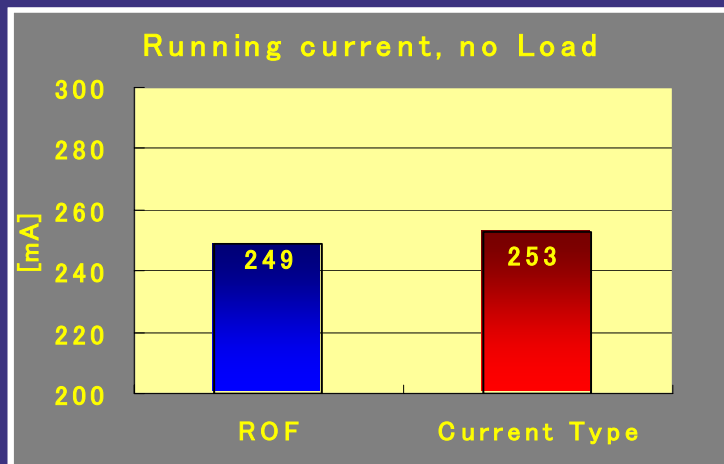
8. Performance Comparison between Conventional FDB Motor and ROF Type FDB Motor



NRRO Axial, Hub Disk Seating Surface



NRRO radial, Hub Outer Diameter ($\phi 25$)



Motor Run Current (No disk)

**Improved basic property,
in comparison with
conventional FDB motor of
identical dimension**

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9. Comparison of Groove Shape between Conventional FDB and ROF Type FDB

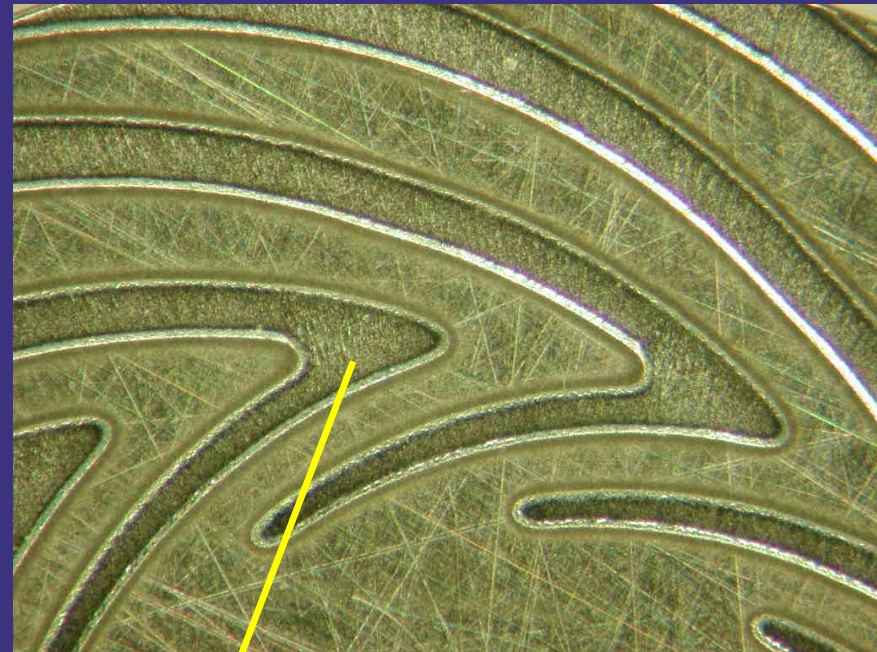
<Photo>

Conventional FDB



Groove looks rough

ROF Type FDB

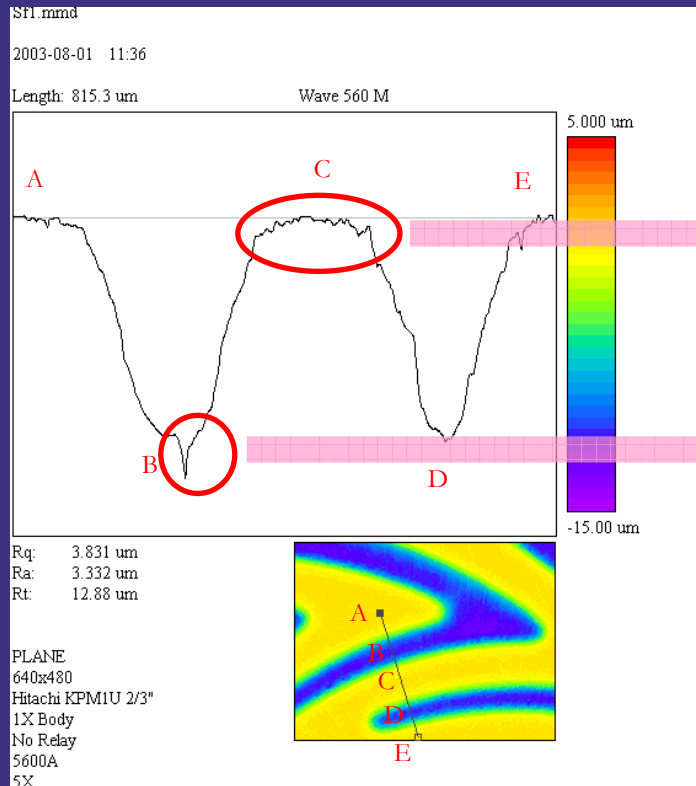


Groove looks smooth

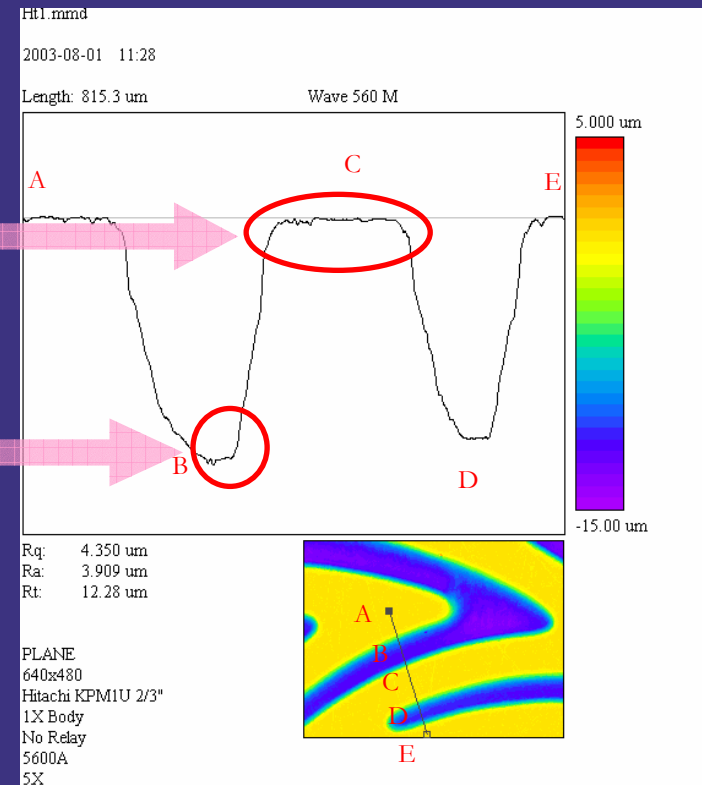
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9. Comparison of Groove Shape between Conventional FDB and ROF Type FDB

Conventional FDB



ROF Type



Groove shape is notably improved.

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10. Productivity Comparison

	As compared with conventional FDB unit
Personnel	1 / 3 or less
Floor Area	1 / 4 or less
Time Required	1 / 4 or less

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MINEBEA CO., LTD.

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Any statements in the presentation which are not an historical fact are future projections made based on certain assumptions and our management's judgment drawn from currently available information.

Please note that actual performance may vary significantly from any particular projection, due to various factors.

Factors affecting our actual performance include: (i) changes in economic indicators surrounding us or demand trends; (ii) fluctuation of foreign exchange rates or interest rates; and (iii) our ability to continue R&D, manufacturing and marketing in a timely manner in the electronics business sector, where technological innovations are rapid and new products are launched continuously. However, this is not a complete list of the factors affecting actual performance.

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