FORM NO. SEBG4260

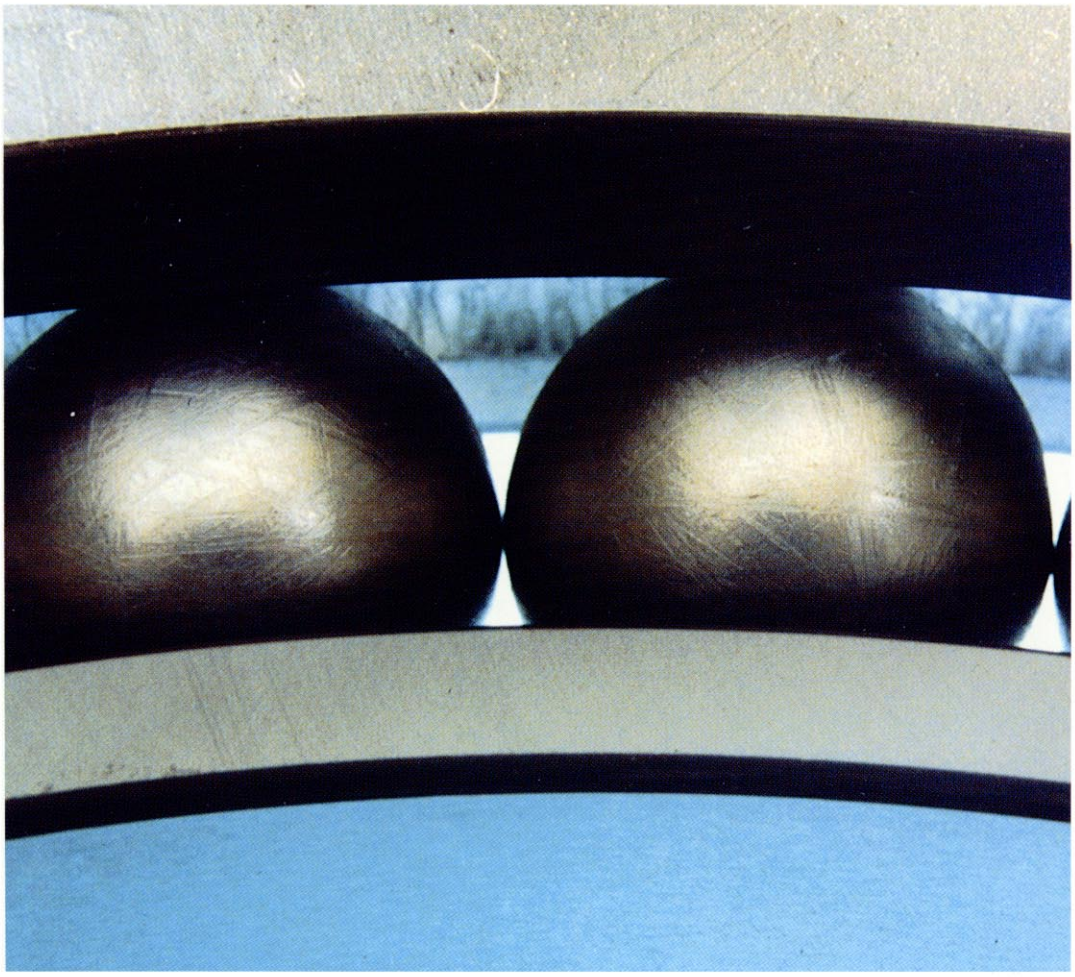
SHOP MANUAL

GUIDANCE FOR REUSABLE PARTS

ANGULAR BALL BEARINGS

(WITHOUT CAGE TYPE)

FOR PC200-3~PC400-3 FINAL DRIVE



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CONDITIONS AND DIAGNOSIS FOR REUSE

Whether individual bearings are reusable depends on the degree of failures. Bearing failures are ranked by three categories as follows.

Category	Failure degree	Remedy
A	Failure is minor or slight, posing no problems for machine function. Further, there is no possibility of this failure leading to secondary failures.	Use again
B	Failure is moderate, posing no immediate problems for machine function. However, there is a possibility of this failure causing a secondary failure. When used for heavy-duty operation, such a bearing should be replaced.	Use again only under moderate load condition
C	Failure is heavy, or critical or a bearing is at the end of its service life. If such a bearing is used continuously, it will cause a serious break down. Thus, such a bearing should be replaced immediately.	Do not use again

The degree of bearing failures hazard depends on both bearing application and operating conditions; a hazard rank for a certain type of failures may not be the same rank for the other bearings. Consequently, the detrimental effects of a failure, its degree of hazard, etc. must be determined by experience. Refer to the pictures on subsequent pages for ranking bearing failures.

Some failures have two or more symptoms. In such cases, failures should be ranked by the highest degree of hazard. Where a failure is ranked between category B and category C according to the reference pictures, its final rank should be category C which is the highest degree of anticipated hazard.

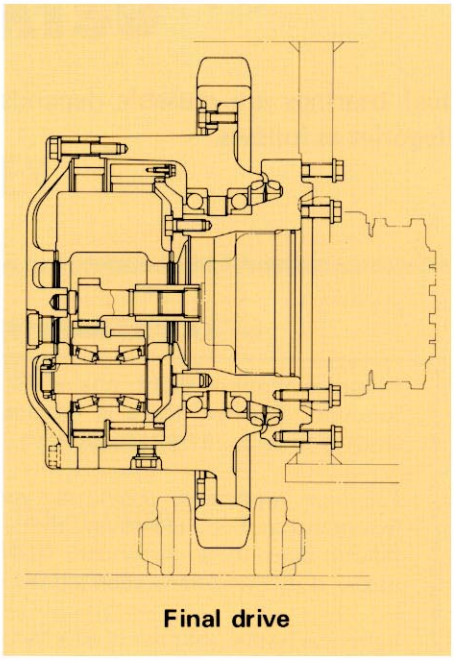
Parts usability depends much on the customer's requirement for the remainder of their service life. Consequently, the determination cannot be made unconditionally. It must be considered in context of operating conditions, bearing capability, and length of continued use.

EXAMPLES OF ANGULAR BALL BEARINGS (WITHOUT CAGE TYPE) FAILURES

As sprocket support bearings of final drive for hydraulic excavators (PC200-3∿PC400-3), angular contact ball bearings without cages are used and bearings with cages for another models are not used.

Mutual balls touch each other, slide mutually and roll on races.

Conditions different from bearings with cage are caused and the following photograph shows the example.



Final drive

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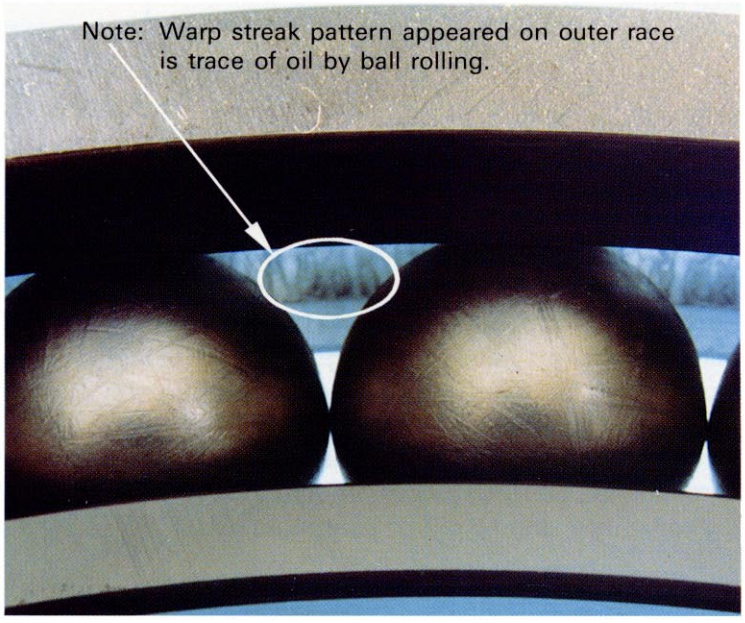

Category: A

Condition

- Abrasion flaw such as pattern of woolen yarn occurs all around spherical surface by contact of each ball.
  But flaw is normal, and there is no scuffing (smearing).
- The condition is good.

Photograph is enlargement of spherical diameter 22 MM

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Category: C

Condition

- Remarkable flaking occurs on several portions of spherical surface. Dent and deep flaw like stripe happen all around spherical surface and there is fatigue condition.

Causes

- This results from compound causes such as excess impact force, overload during traveling or contamination and deterioration of oil, foreign substance and fragment entered into bearing, etc. .

Photograph is enlargement of spherical diameter 22 MM

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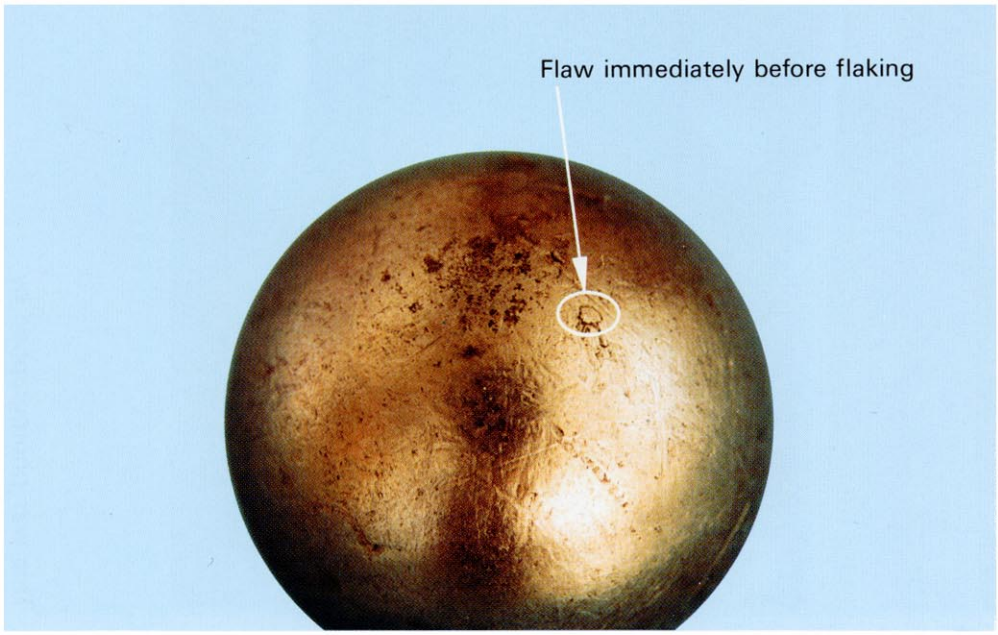

Category: C

Condition

- There are dent and seam all around spherical surface and flaw immediately before flaking.

Cause

- Contaminant and foreign substances entered into bearing.

Photograph is enlargement of spherical diameter 22 MM

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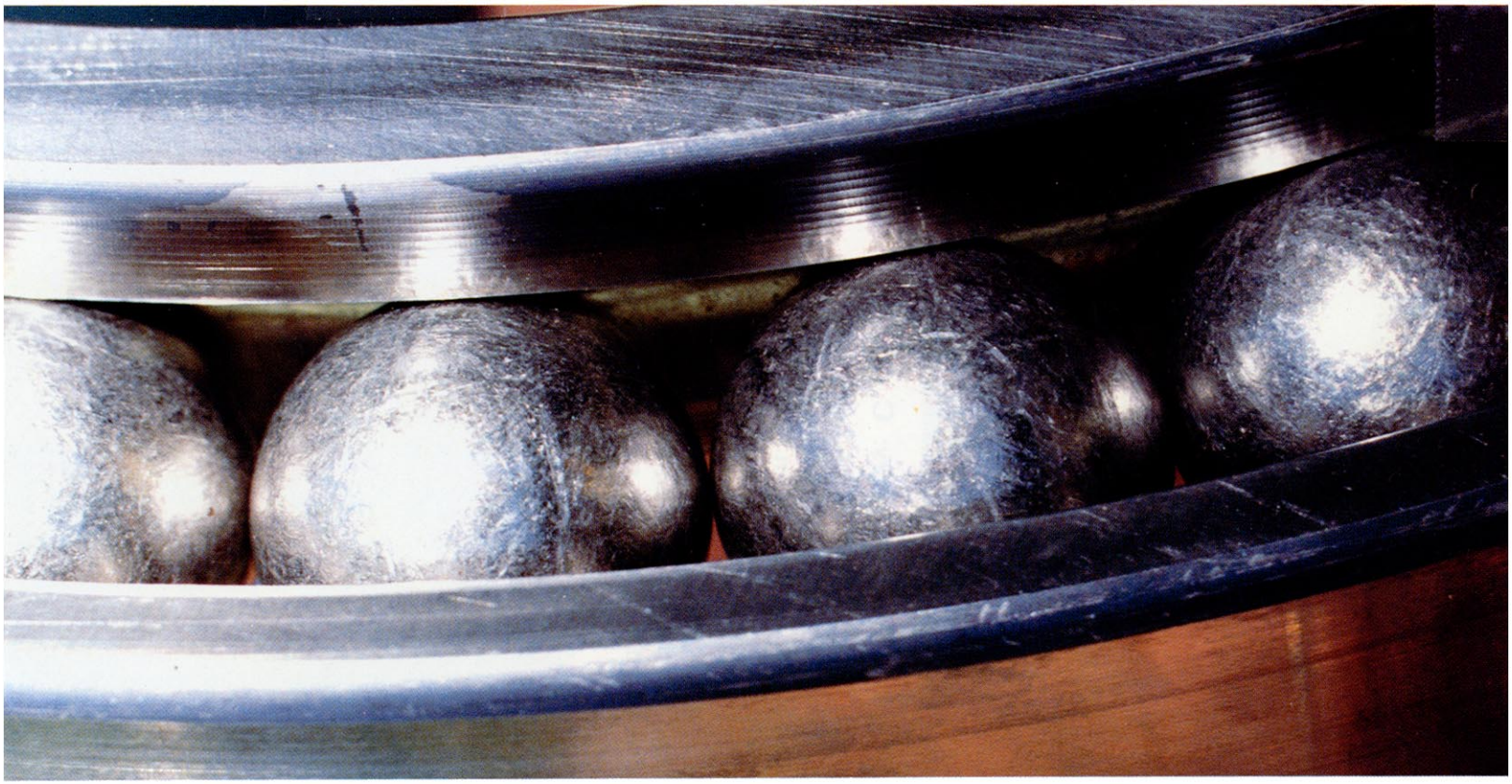

Category: A

This was photographed by
Mr. M.P. Berman, KAC DSM.

Photograph is enlargement of spherical diameter 22 MM

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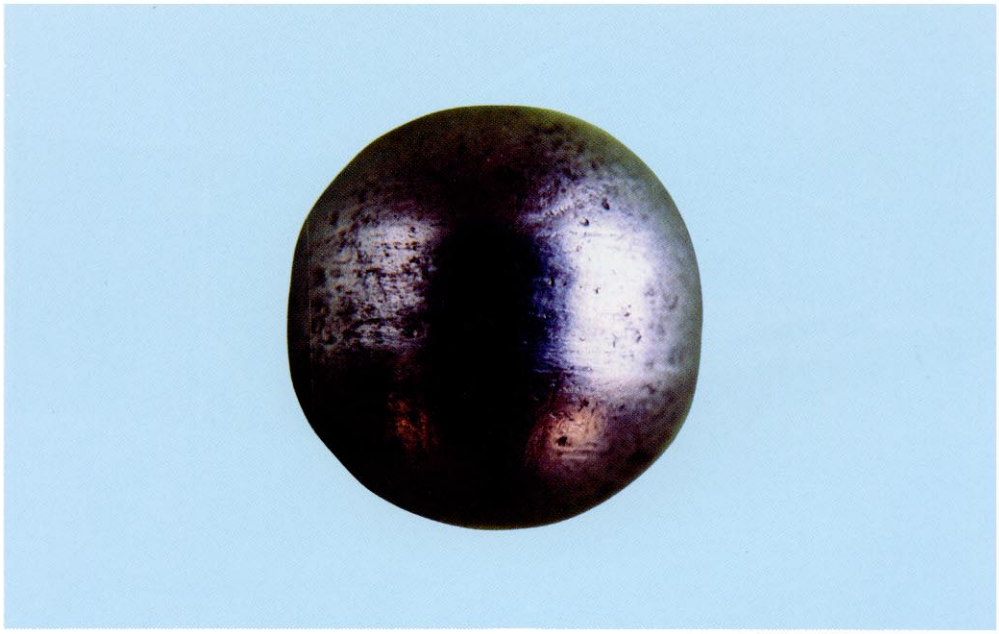

Category: C

Condition

- Dent and abrasion deformation like stripe caused all around spherical surface.

Cause

- Biased abrasion like stripe around spherical surface occurred by contact abrasion of each ball under bad adjustment of bearing (excess pre-load). Dent results from iron powder and abrasion fragment, etc. entered into bearing.

Photograph is enlargement of spherical diameter 22 MM

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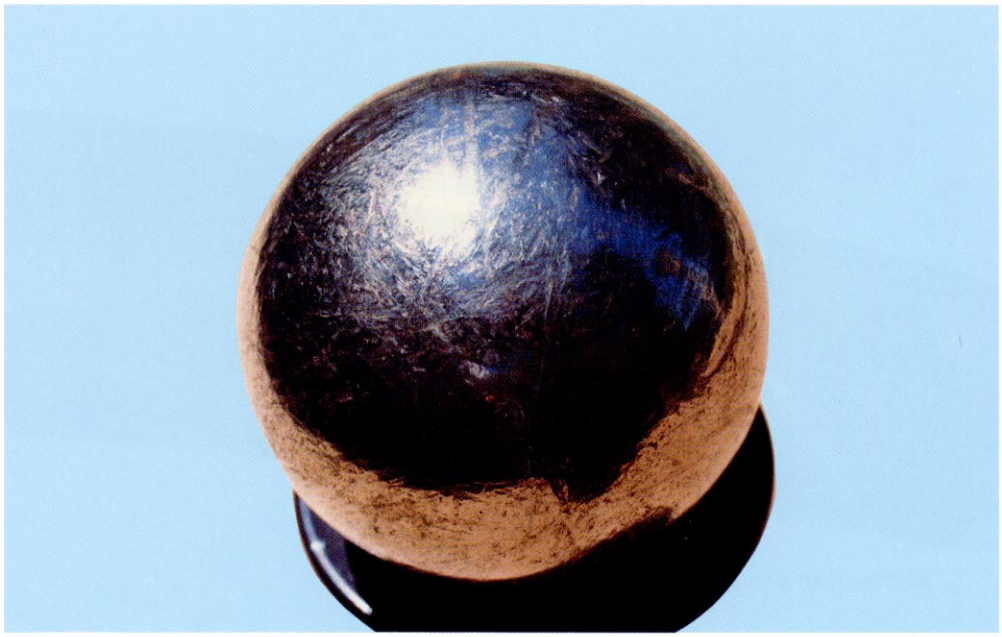

Category: A

This was photographed by
Mr. M.P. Berman, KAC DSM.

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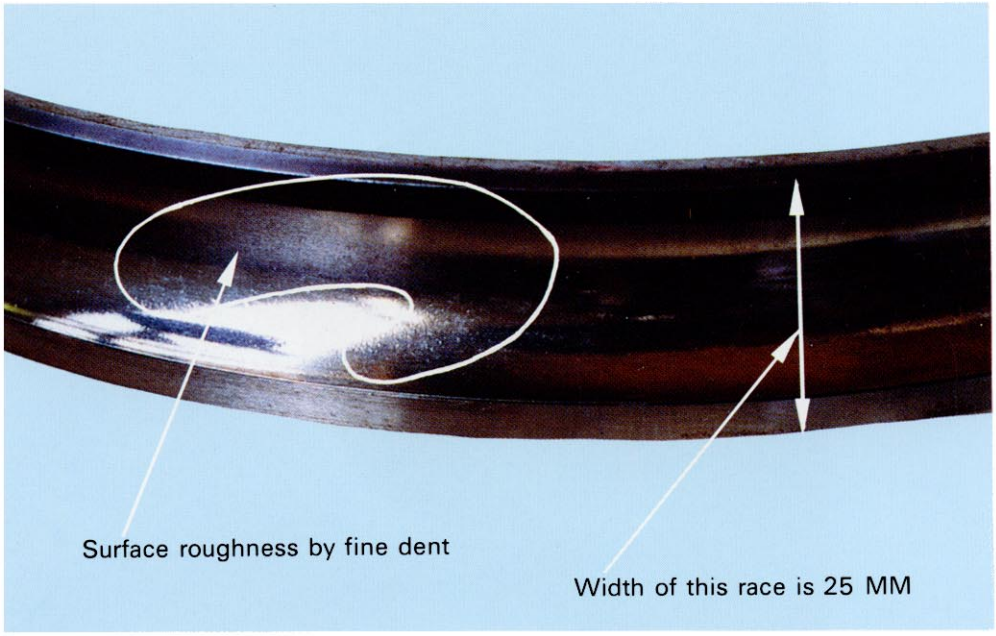

Category: A

Condition

- There is slight surface roughness on rolling surface by occurrence of fine dent.

Cause

- Abrasion fragment entered into bearing, others.

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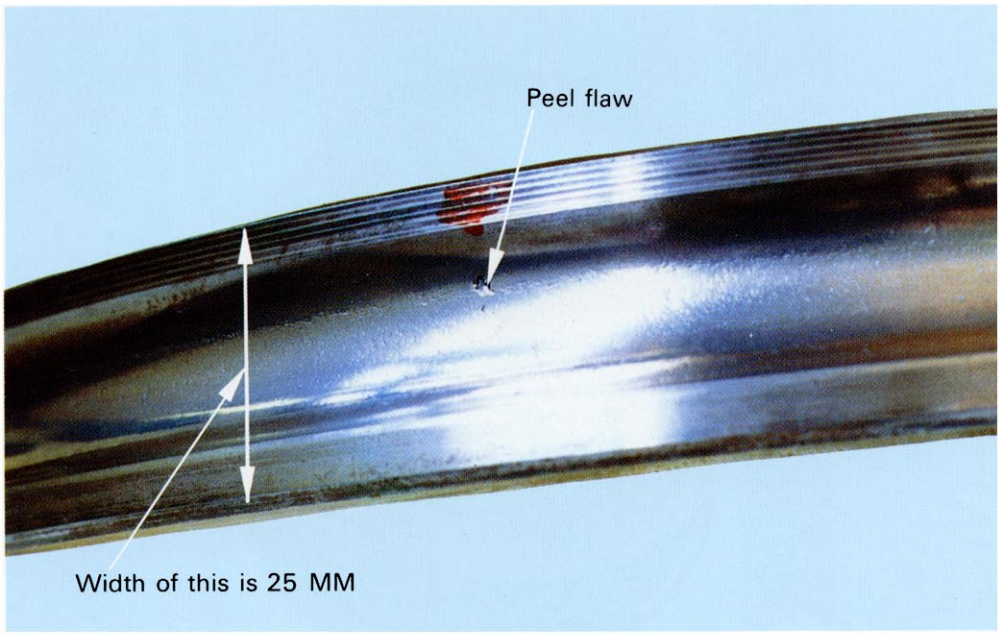

Category: B

Condition

- There is dent along side direction of ball rolling surface and one slight peel on surface.

Causes

- Excess pre-load. Bad adjustment of shim.

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Category: C

Condition

- There is peel like the scales on a fish on surface layer. Flaking condition.

Cause

- Fatigue by repeat of overload, etc. .

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