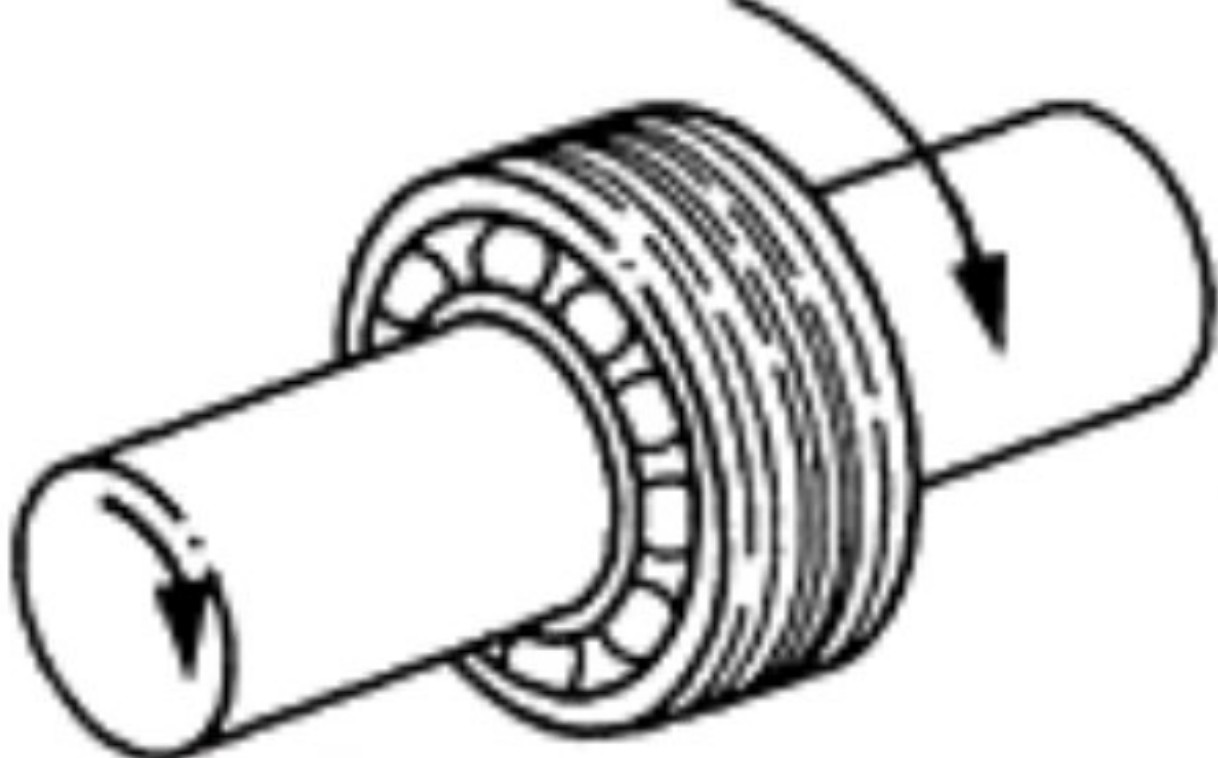
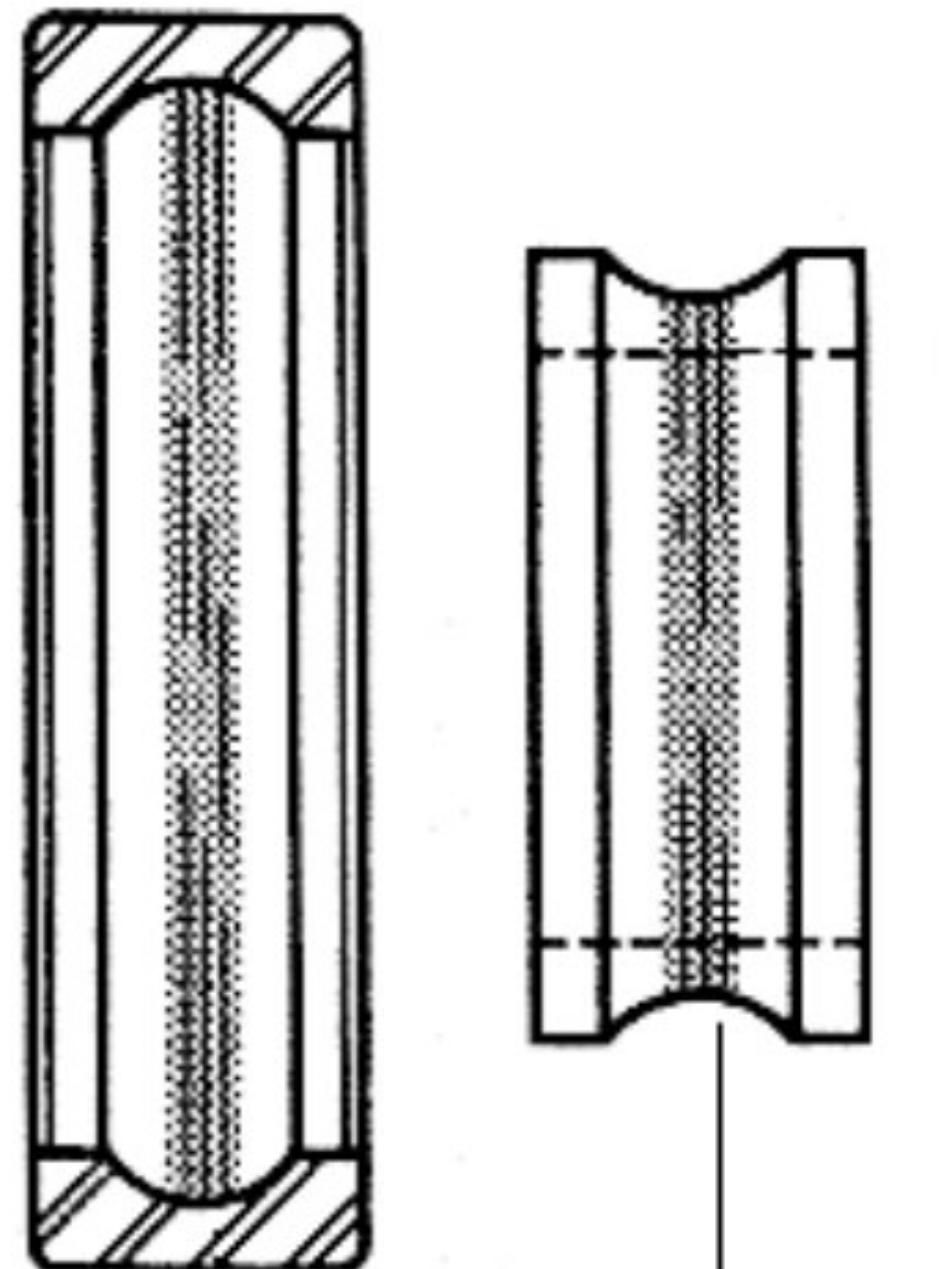
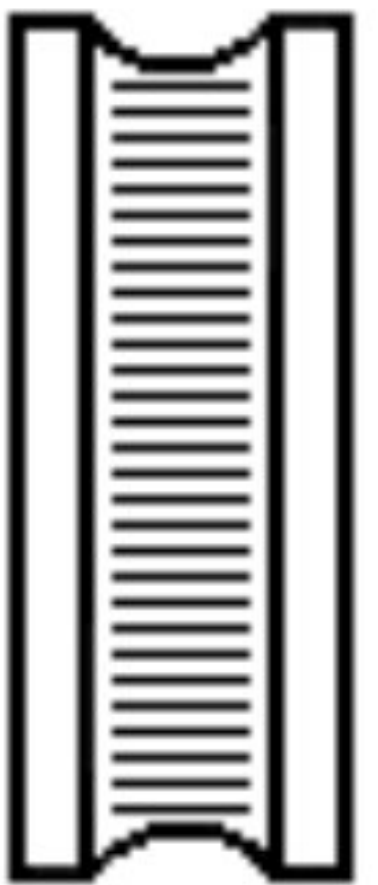
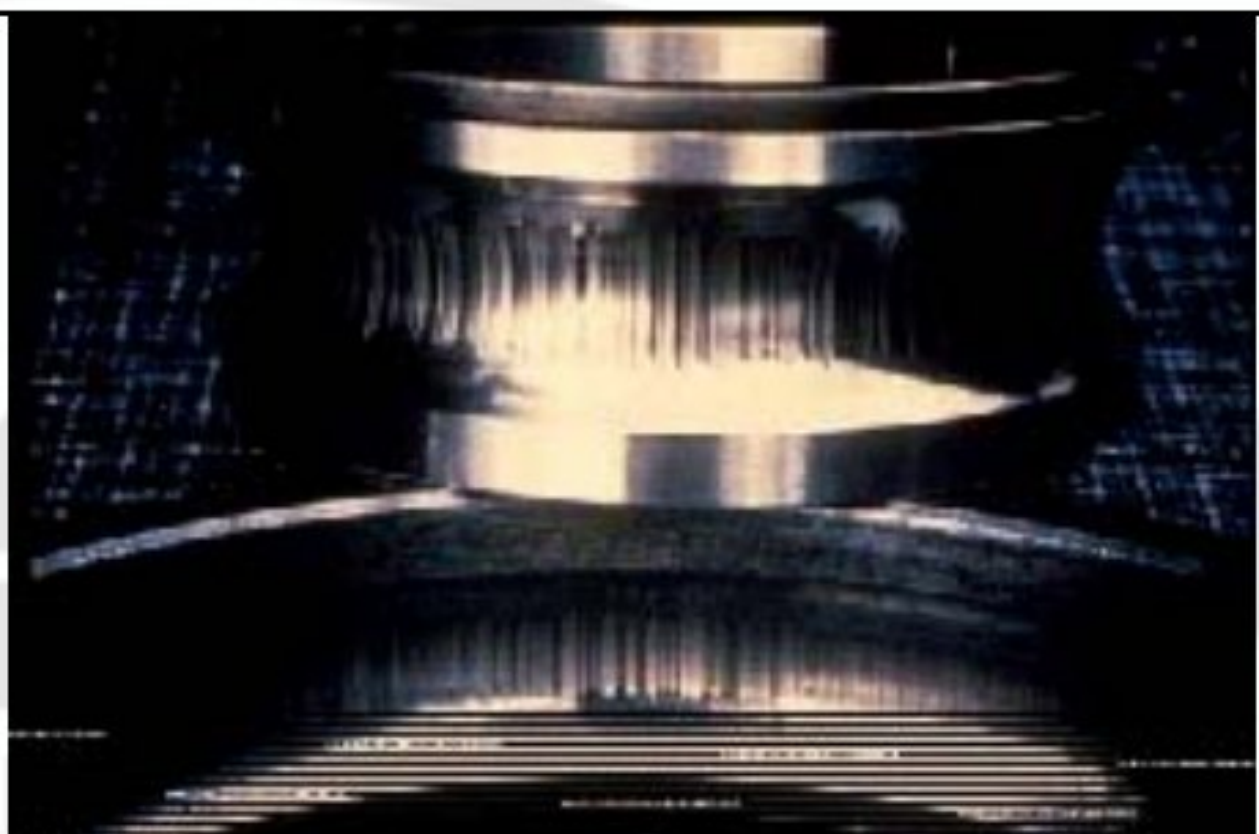
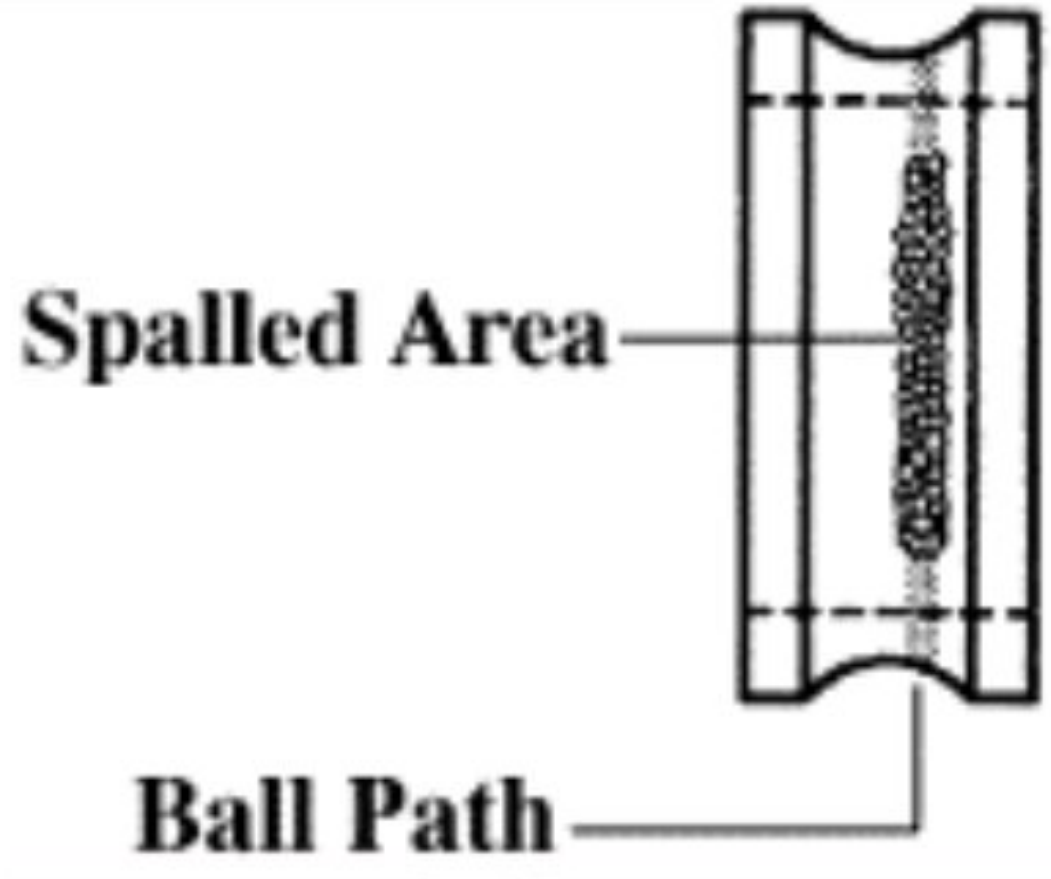
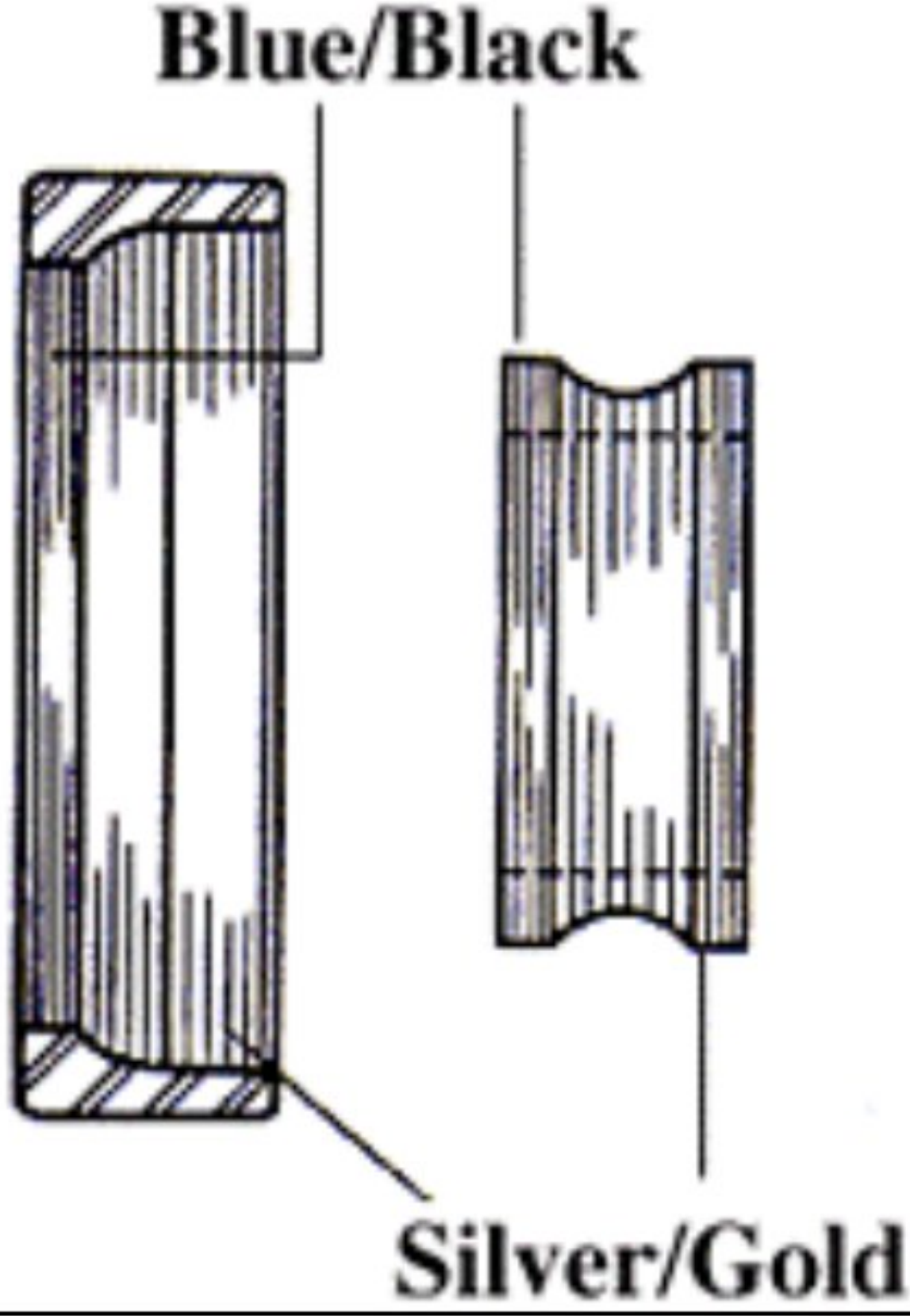
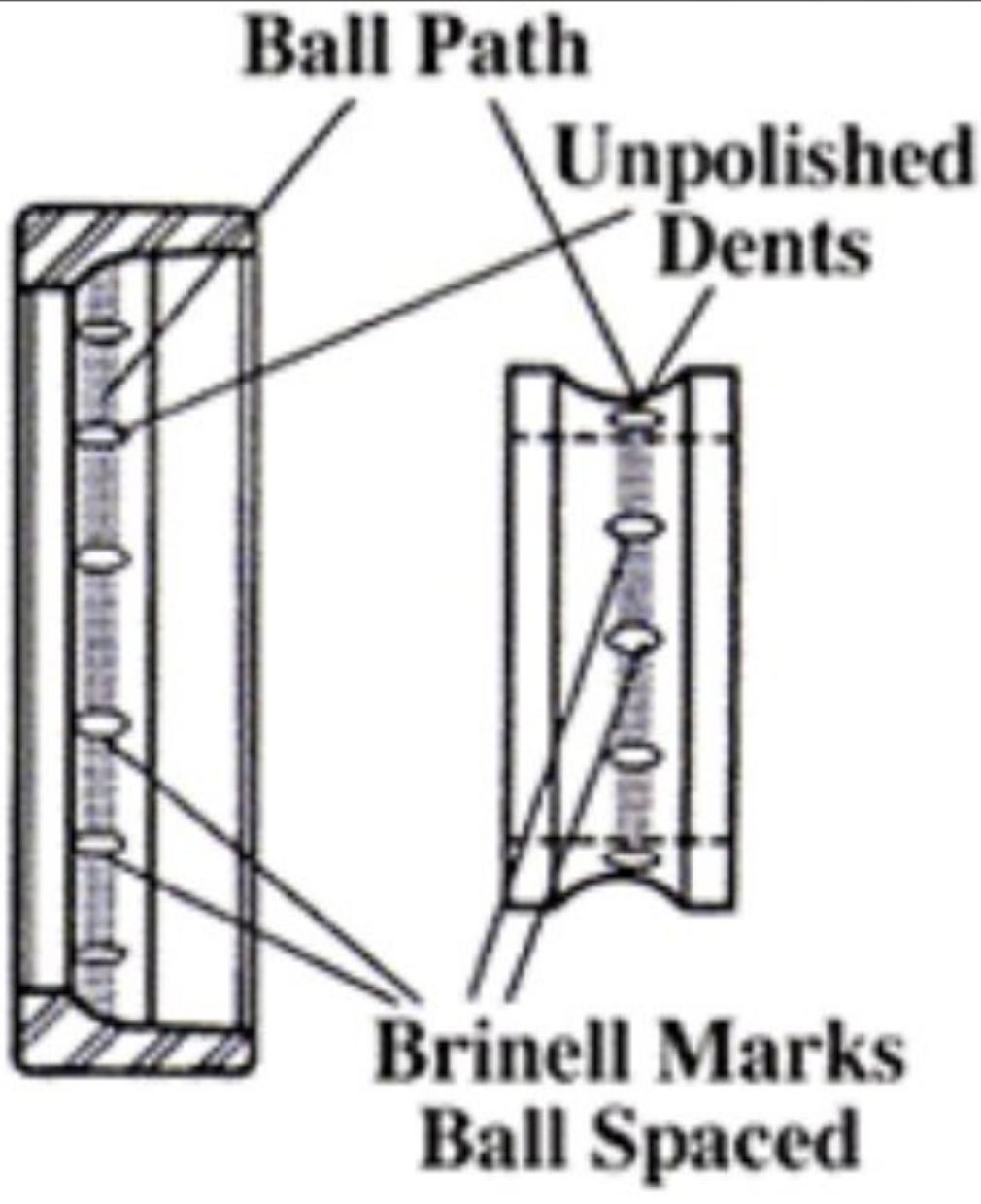
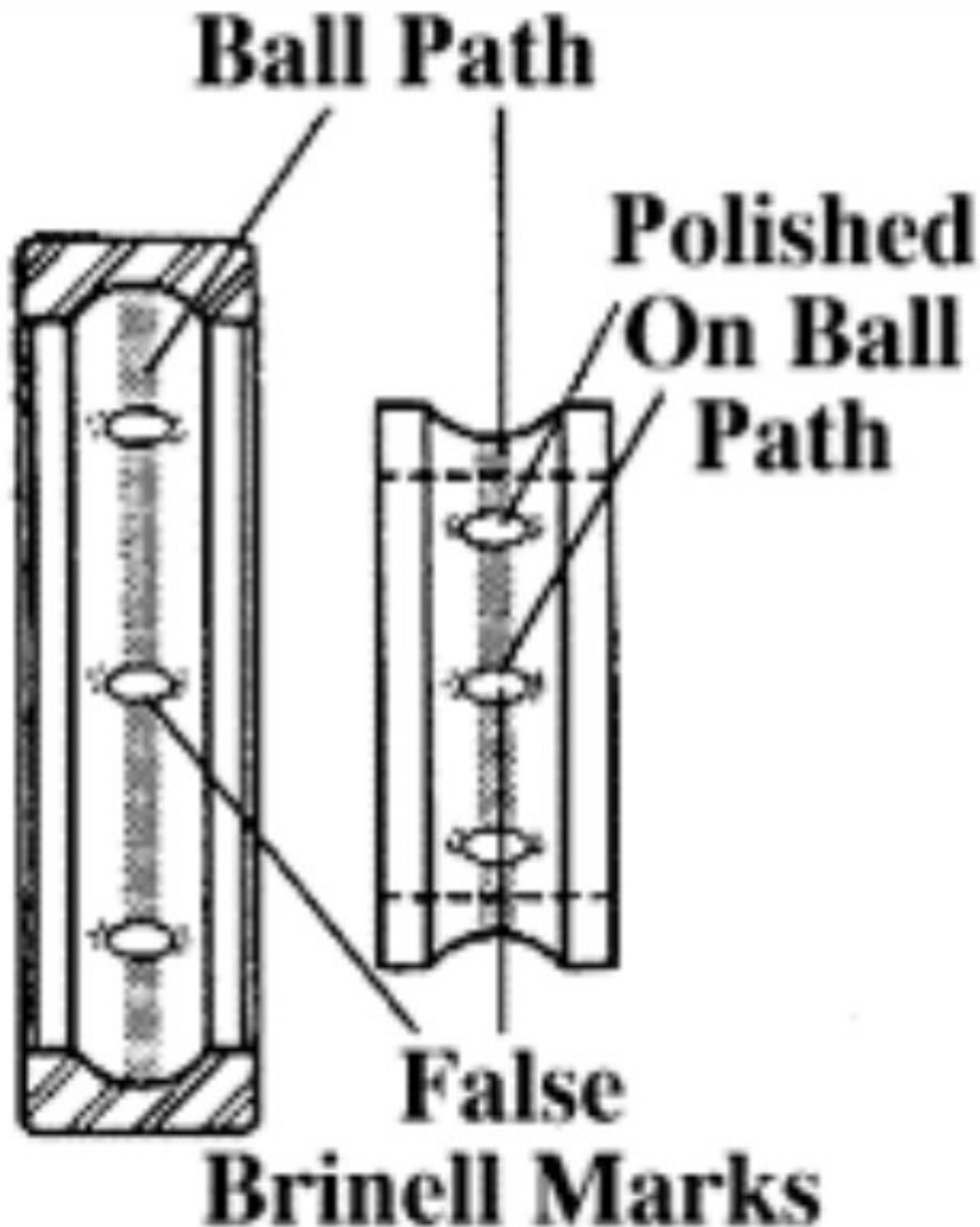
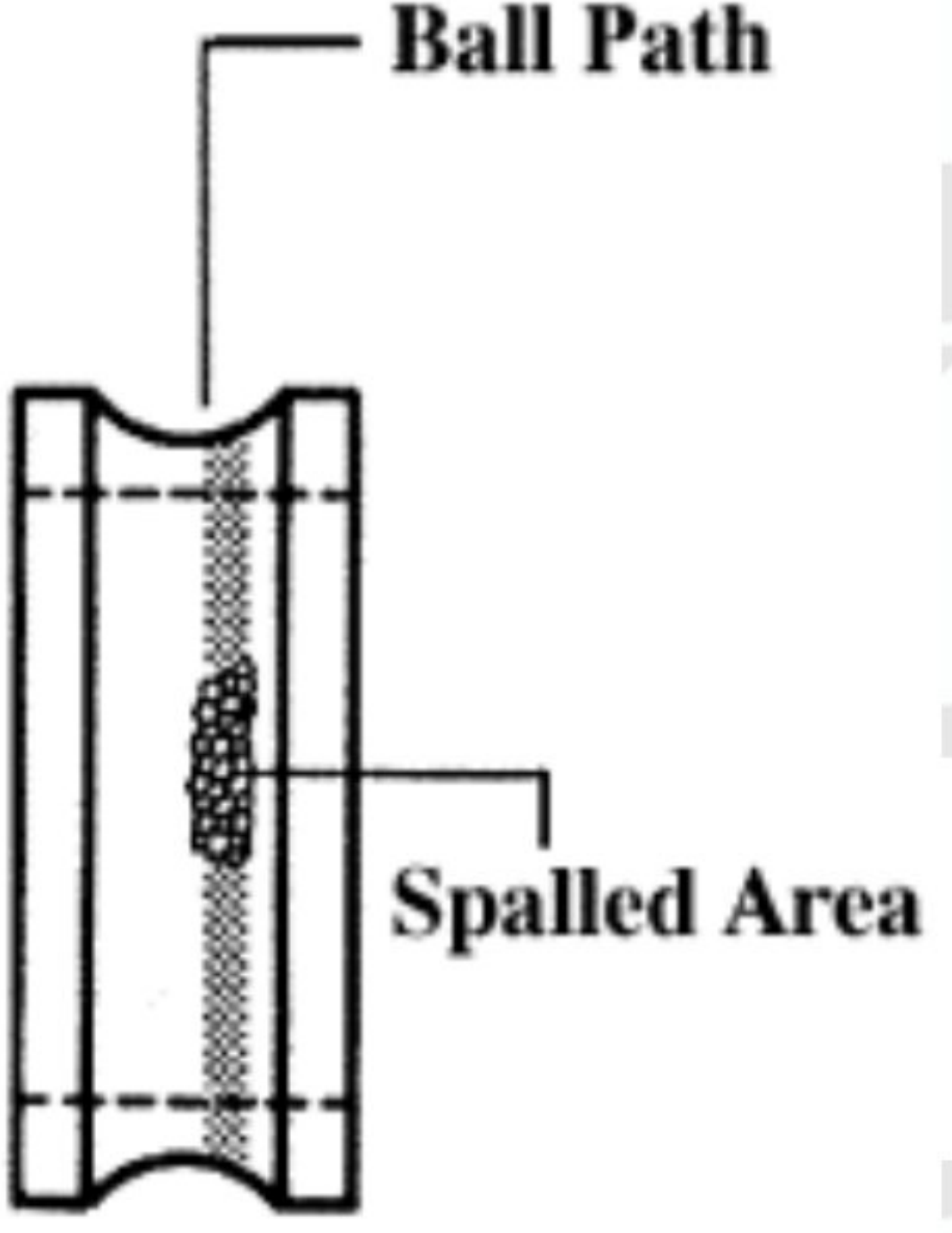
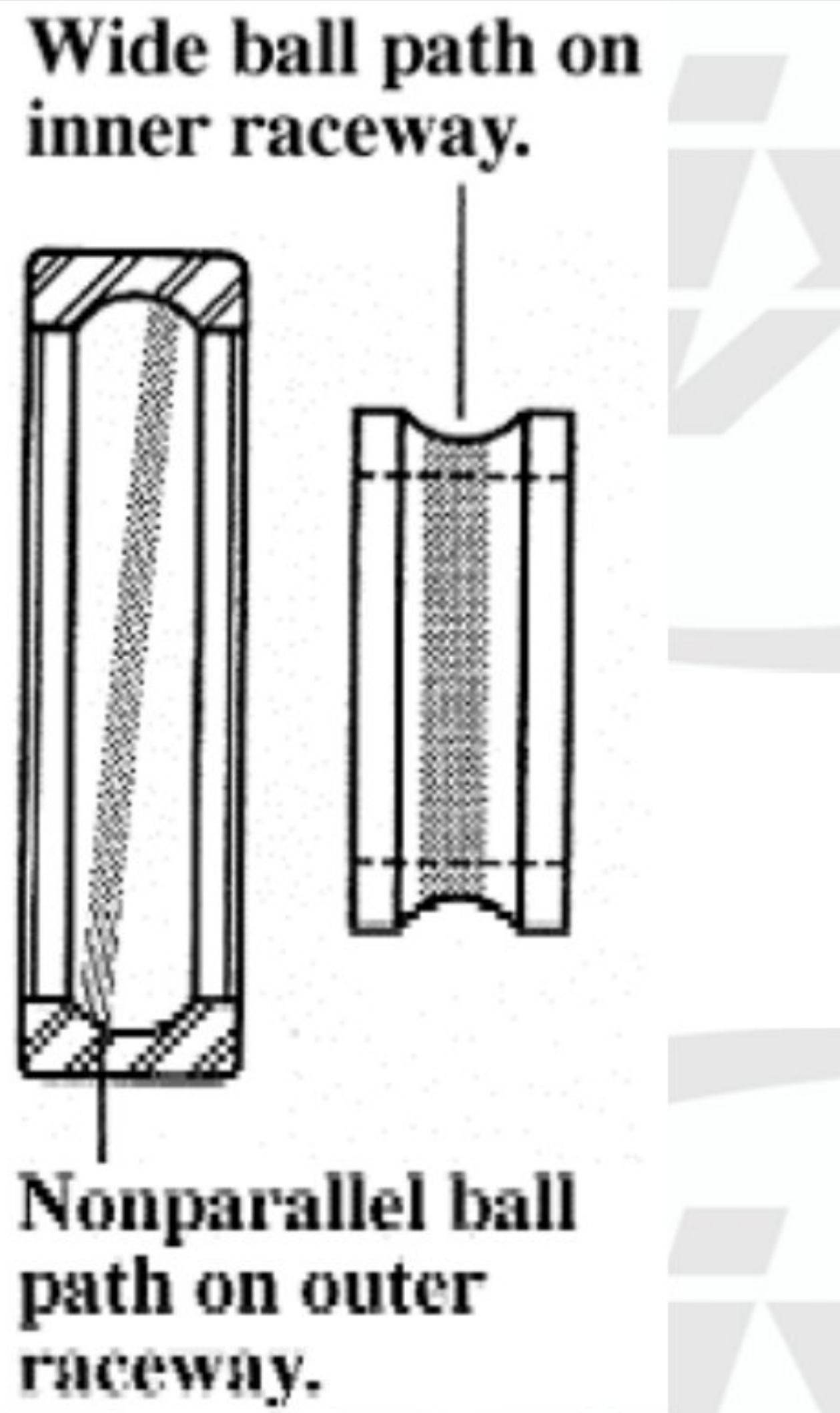


Bearing Failure Analysis

Have you ever looked at an alternator core or customer return with the bearings destroyed and questioned what the possible causes are? For years I had questioned how can I tell if it was the way the bearing was installed, the bearing or a vehicle related issue? Of course, when I would return bearings to a supplier I would get really vague feedback, typically something along the lines of "it was not the bearing." **Emerson Bearing** had put together a really excellent *Bearing Failure Analysis* presentation that was easy enough for me to follow. They were kind enough to allow me to pass on their information.

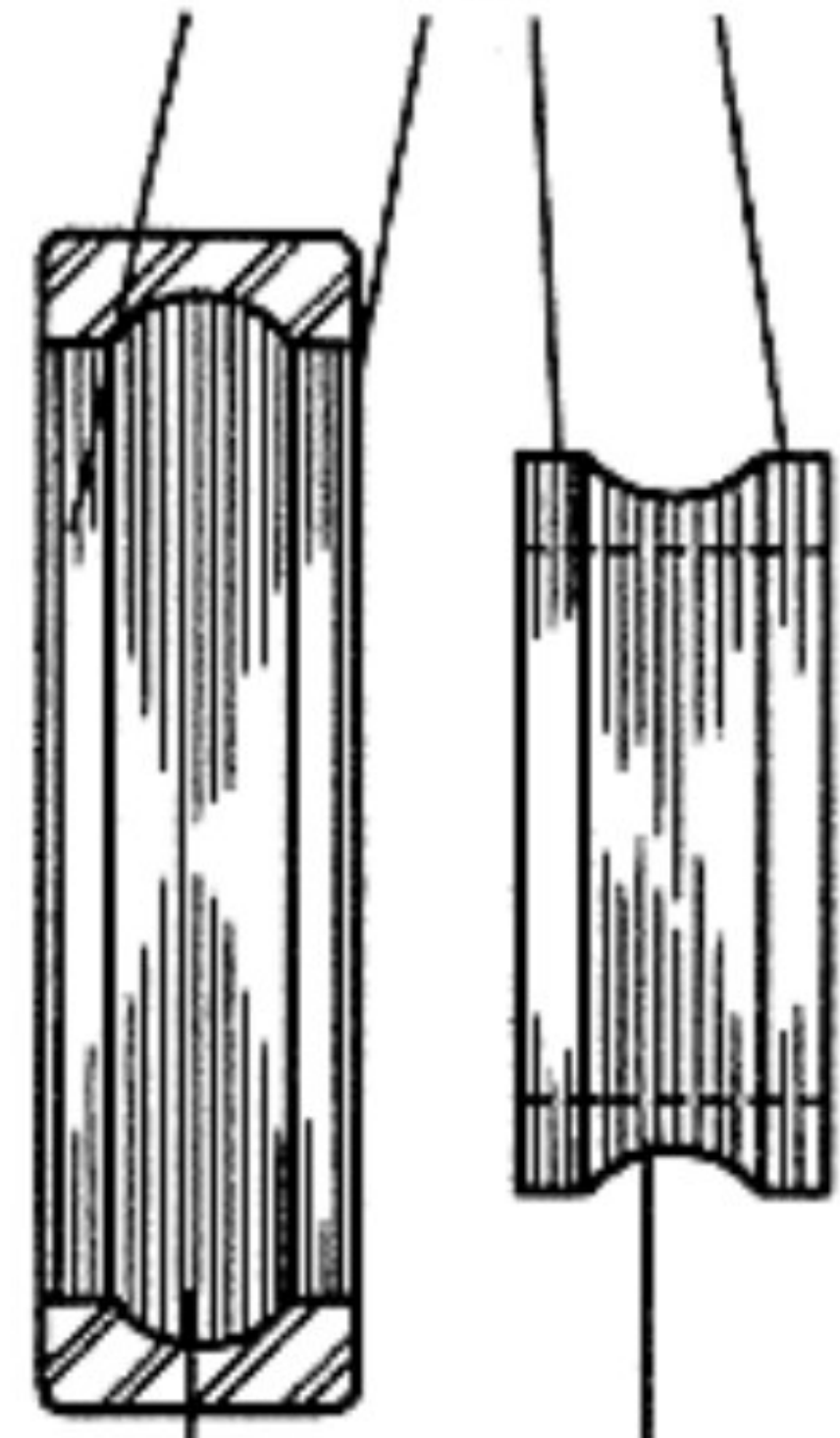
Sketch of Failure	Picture of Failure	Description	Cause
		Loose fit , causing inner or outer race to move, resulting in <i>fretting</i> . Fretting occurs when fine metal particles oxidize that result in a telltale brownish colour.	Shaft worn and undersized or housing bore worn and oversized
 Discolored, wide ball path at bottom of raceways.		Preload failures will appear as heavy, wide wear patterns in the bearing races.	Typically an oversized shaft or an undersized housing bore would cause this. The excessive interference fit generates a preload on the bearing and results in abnormal heat and wear on the race.
		Electrical Fluting will appear as lines perpendicular to the bearing race.	This will occur if current flows through the bearing instead of a proper ground route

Sketch of Failure	Picture of Failure	Description	Cause
 Spalled Area Ball Path		Excessive Load	A failed automatic belt tensioner or incorrect tension applied (manual application) or another component in the belt drive system failing resulting in an overload condition.
 Blue/Black Silver/Gold		Overheating	Typically occurs when the wrong bearing is used in a high heat or high speed application
 Ball Path Unpolished Dents Brinell Marks Ball Spaced		True brinelling will appear as small indentations see also false brinelling	Brinelling occurs when the load exceeds the elastic limit of the ring material. Using a hammer to install a bearing, dropping a bearing or pressing on the wrong ring during assembly cause this type of damage.

Sketch of Failure	Picture of Failure	Description	Cause
		False brinelling will appear as elliptical indentations but they will be wider and longer than true brinelling	This will most likely not appear in the auto-electric applications, this would occur when the shaft is rocking back and forth in the bearing when the shaft is not rotating.
	Not Available at this time	Normal wear is characterized by spalling, or the fracture of the running surface and the subsequent removal of small discrete particles of material. Spalling will show up on the races and/or balls.	Use over time
		Misalignment can be observed on the raceway of the non-rotating race. The wear pattern will not be consistent from the edge of the bearing.	Typical causes are bent shafts or spacers that are crooked with either steel shot under them or varnish (particularly on the alternator). In addition aftermarket spacers have been observed with too small of a mating surface to properly mate with the bearing surface.



TECH TIPS

Sketch of Failure	Picture of Failure	Description	Cause
Balls will also be blue/black. Silver/gold  Blue/black raceways		Lubrication breakdown will appear as discoloured balls and races.	Typically caused by the wrong bearing for the applications (excessive heat for the type of grease used).

Source, with permission: www.emersonbearing.com/technical.htm