



## Cavitation in Sleeve Bearings

**M 32**

Since introduction into the market in 1994 in the engine series M32 for bearing of the conrods and the crankshaft, sleeve bearings with a running layer on aluminium basis have been used. In both cases of application these bearings have proven extremely reliable and robust.

During routine checks and maintenance work on some engines cavitation marks were found in the area of the oil groove in the upper shell of the big end bearings. This phenomenon has partly disconcerted the engine users. With this memo we would like to give some basic information regarding the subject of cavitation and in particular the phenomena on the M32 big end bearings.

Cavitation is a known phenomenon in flow technology which cannot be completely avoided. Cavitation phenomena are caused by high pressure energy impulses in the oil circuit or within the lub. oil film of sleeve bearings. In areas with large speed increase of the oil due to negative pressure, gas bubbles develop which condense again in areas of higher pressure and cause local energy impulses owing to the resulting volume alteration. Due to these effects slight local material wear may result on the concerned components. Most of the material particles are washed out with the lub. oil.

In case of the flow cavitation which frequently exists in sleeve bearings the described phenomenon is caused by turbulent flows in the area of discontinuities in the running surface as e.g. oil grooves, bores, pockets and the like. Normally the characteristic spots for cavitation phenomena in sleeve bearings are localized and rarely expand.

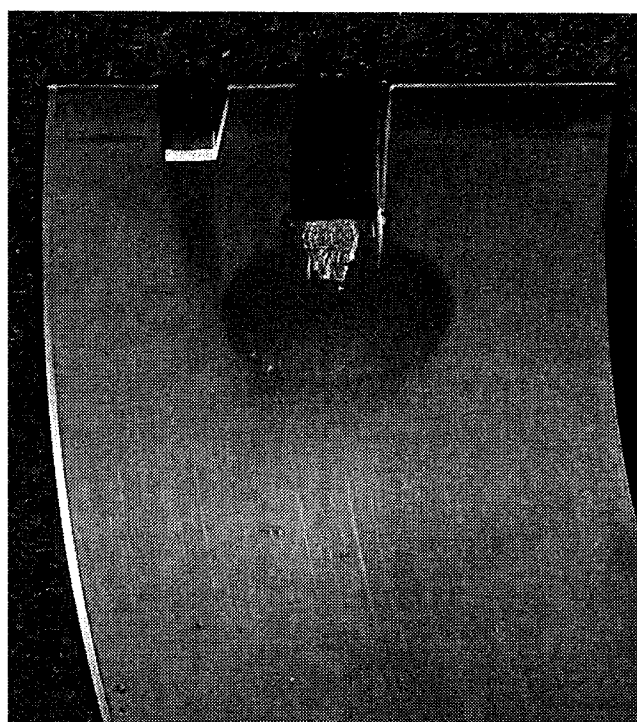
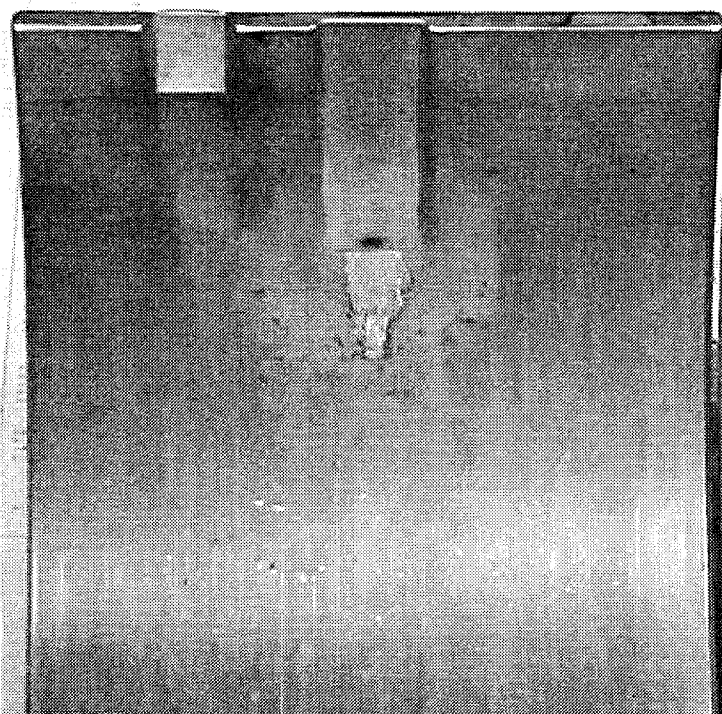
The spots of flow cavitation which partly developed on the M32, only appeared in the run out of the oil groove and consequently they are outside the zone of main load of the bearings. Furthermore in many cases it is observed that cavitation attacks are stopped after the flow conditions have slightly changed due to a certain slight material wear. In all cases we know only the aluminium running layer was affected and not the steel back. That means that the stability of the bearings is not reduced and the worn-off particles of the softer running layer do not endanger other components.

## Cavitation in Sleeve Bearings

**M 32**

In accordance with the experience in our works and at the manufacturer of the bearings these local cavitation marks do not spell danger for the operating safety. Bearing damages due to cavitation phenomena never occurred on MaK engines and are unknown to us in general.

The pictures show cavitation phenomena which can be considered as examples and are uncritical for the above reasons:



As the described cavitation phenomena were not found on the M32 engines in general, but only on single engines, this is no design fault. Slight differences in geometry from bearing manufacture and fluctuations in the operating conditions of the bearings or a combination of both are considered as reasons.

In order to avoid cavitation in the bearings as far as possible, attention must be paid that the regulations of the engine manufacturer regarding the lub. oil to be used, the necessary care and treatment as well as the admissible pressures and temperatures are observed.