

STUDY OF HARD NON-FERROUS MATERIALS FOR
ARDUOUS CONDITIONS OF ROLLING CONTACT(*)

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As our technological civilization progresses, ever increasing demands are made on rolling mechanisms. Advance in some fields, such as aeronautical and space applications involving extreme operating temperatures and environments, can in many instances be achieved only by substantial improvements of the properties of currently used materials or the development and use of improved structural materials. Conventional liquid lubricants are generally unsuitable at elevated temperatures and are lost by evaporation in low pressure environments, and therefore some rolling mechanisms require to operate unlubricated or be lubricated by solid films or by surface treatments.

Hard, non-ferrous materials and non-ferrous surface treatments potentially suitable for unlubricated and elevated temperature rolling bearings have been compared by accelerated service simulation test, wear resistance being assessed by loss of weight under unlubricated conditions. The materials include intermetallic carbides, stellite molybdenum and solid lubricants such as molybdenum and tungsten disulphides.

Tungsten carbide was superior to other materials tested. Grain size of the tungsten carbide and the amount of matrix material can have a considerable effect on performance. Use of solid lubricants can eliminate or reduce wear. Hard facing surface treatments were generally not effective. Metallurgical investigations of failed specimens have been carried out.

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