

Technical Report PolymerMetal®

TEC-# 001

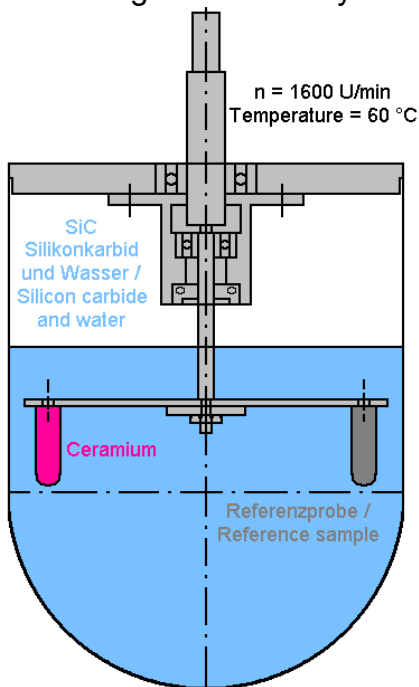
Wear behaviour of polymer materials

Used products

Ceramium®, VP 10-017, MM-Elastomer

Description

Mechanical and chemical stress acting on surfaces lead to wear and corrosion. If a high wear resistance is required, usually a very high hardness is needed, too. The hardness – Vickers, Brinell or Rockwell hardness – of polymer materials, like PolymerMetals or polymer ceramics, is meaningless for nearly all wear mechanisms of wear stressed machine parts. Mixtures of ceramic, metallic and polymer materials as well as elastomers show, that wear resistance and hardness do not correspond. Nowadays, erosive-abrasive wear stress is simulated with the help of a slurry pot or an abrasive wheel. The test in the slurry pot is very meaningful when the metals are exposed to sandy streamings. The water-sand mixing ratio determines the degree of wear. The adhesion between the sand grains is rising when the water content is very low. As a result wear is increasing as well. However, the influencing factors in praxis should not be underestimated. Tests carried out in model experiments help to determine the material's quality and to choose the right material. A guarantee for the durability cannot be given by these tests. Ceramium® is a reliable material to protect metals against abrasion and surface destruction provided that the size of the particles is not more than 500 µm. In the following test a medium grain size of a very strong hardness was chosen: SiC ca 60 µm. Water and SiC were mixed in ratio 1 : 2 by volume. It is quite obvious that Ceramium® was exposed to a very high stress.



The used materials showed the following results:

Material	Hardness (Vickers)	Wear (after 30 days)
Ceramium®	HV 28	2,93 ccm
Tool steel	HV 840	3,60 ccm
Steel St-52	HV 120	7,20 ccm

In case that the particle size is higher than 500 µm the wear of Ceramium® increases progressively. MM-Elastomer and VP 10-017 show a better wear resistance, because they are plastically deformable. On the other hand, it has to be considered that the bonding on water-stressed metal surfaces of all elastomer materials is diminishing with advancing time.

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