



Title

**A HIP JOINT SIMULATOR STUDY OF THE PERFORMANCE OF METAL-ON-METAL JOINTS.
PART I: THE ROLE OF MATERIALS**

Authors

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Purpose/Premise

This article discusses a hip simulator study conducted to determine the role of material composition and processing methods in the wear of metal-on-metal articulations. The authors compared wrought high-carbon cobalt-chromium alloy, cast high-carbon cobalt-chromium alloy, and cast low-carbon cobalt-chromium alloy.

Material and Methods

Simulator testing to 5 million cycles was performed on 26 pairs of 36mm diameter components exhibiting similar clearance.

Outcomes

The report shows that the microstructure of wrought Co-Cr has a fine distribution of small carbides. The as-cast material has large, blocky carbides. The cast, homogenized material has reduced carbide size, but with large grain size. Low-carbon cast components showed higher wear rates than the high-carbon cast and high-carbon forged components. The high-carbon cast components showed slightly higher wear rates than the high-carbon forged components in the smallest clearance of 105 μ .

Conclusion/Recommendation

The authors conclude that run-in wear volume is not significantly affected by alternative combinations of high-carbon Co-Cr but that component design can affect the load relief provided by lubrication of the articular surfaces.

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