Maha Fluid Power RESEARCH CENTER

PURDUE UNIVERSITY

- WEBINAR SERIES -

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Online*

The Influence of Key Microstructural Features on Rolling Contact Fatigue: A Combined Experimental and Analytical Approach to Determine Life

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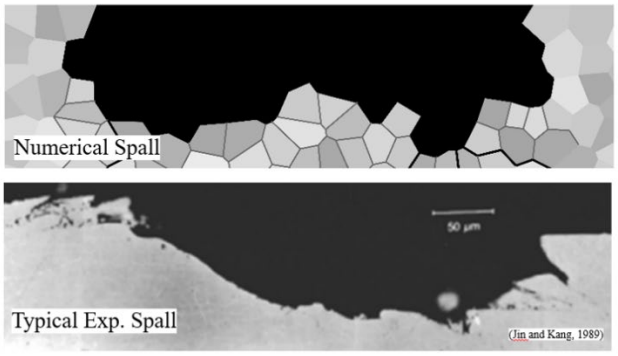
Abstract



Rolling contact fatigue (RCF) is one of the leading causes of failure in critical tribological components such as rolling element bearings (REBs), gears, cam and followers, etc. This is especially paramount for advanced aerospace applications where REB components need to operate for billions of RCF cycles before routine maintenance or inspection is performed. The rolling motion between the rolling elements and raceway produces RCF, wherein a complex, non-proportional, alternating contract stress is applied over a small material volume. Moreover, the highly localized stress occurs on the same length scale as microstructural features such as carbides, inclusions, grain size, hardness gradients from carburization, surface roughness, thereby amplifying their effect on fatigue performance and thus, making them a topic of interest.

Further, many of these key microstructural features have also been studied by the engineering community; however, many of these studies only focused on a few sets of operating conditions or failed to report the influence a given microstructural feature has on RCF life. This results in the findings offering more of a snapshot of the effect, rather than a generalization. Therefore, this investigation seeks to build upon previously developed computational tools, which have shown promise in corroborating simulations with experiments, to more efficiently and more thoroughly study the role that key microstructural features have on RCF performance. A primary objective of this study is for the findings emanating to be able to offer informed fatigue design recommendations that aid in the selection of rolling element bearings for critical tribological and aerospace applications. The webinar will provide details on the analytical modeling approach, discussion on the experiments performed to validate the model and will end with a Q&A sessions where observations and questions can be provided by the audience.