

Example No. 1: Coating and Substrate Failure

A major supplier of automotive bearings and gear wheels applied a “protective” coating to these parts in an attempt to increase their service life. The quality and performance of the coated parts, however, proved to be drastically inferior to that of uncoated parts. SIO (Saxonian Institute of Surface Mechanics) was called in to help troubleshoot the problem. We focused on the surface interface between the parts. Fig. 1 shows a representation of a surface conforming contact between two surfaces, as shown in Fig. 2, would not occur. However, if contact points between two serious problems can occur.

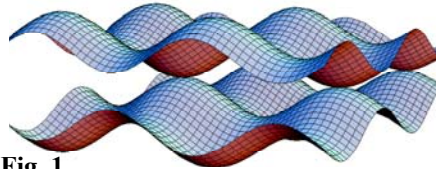


Fig. 1

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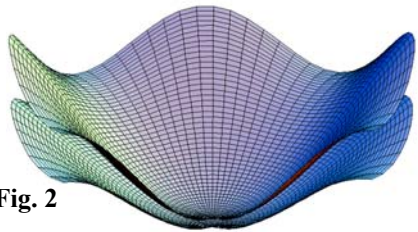


Fig. 2

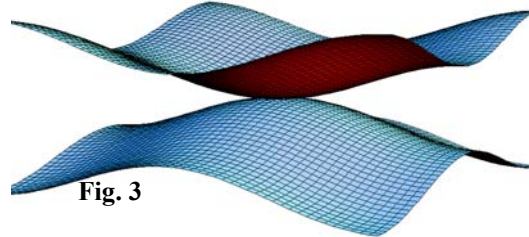


Fig. 3

Using SIO’s FilmDoctor software, our client evaluated what would happen in a tip-to-tip contact situation and was able to determine that plastic flow had damaged the substrate metal and eventually lead to delamination of the coating. The relevant details are shown in the diagram and graphs in Fig. 4.

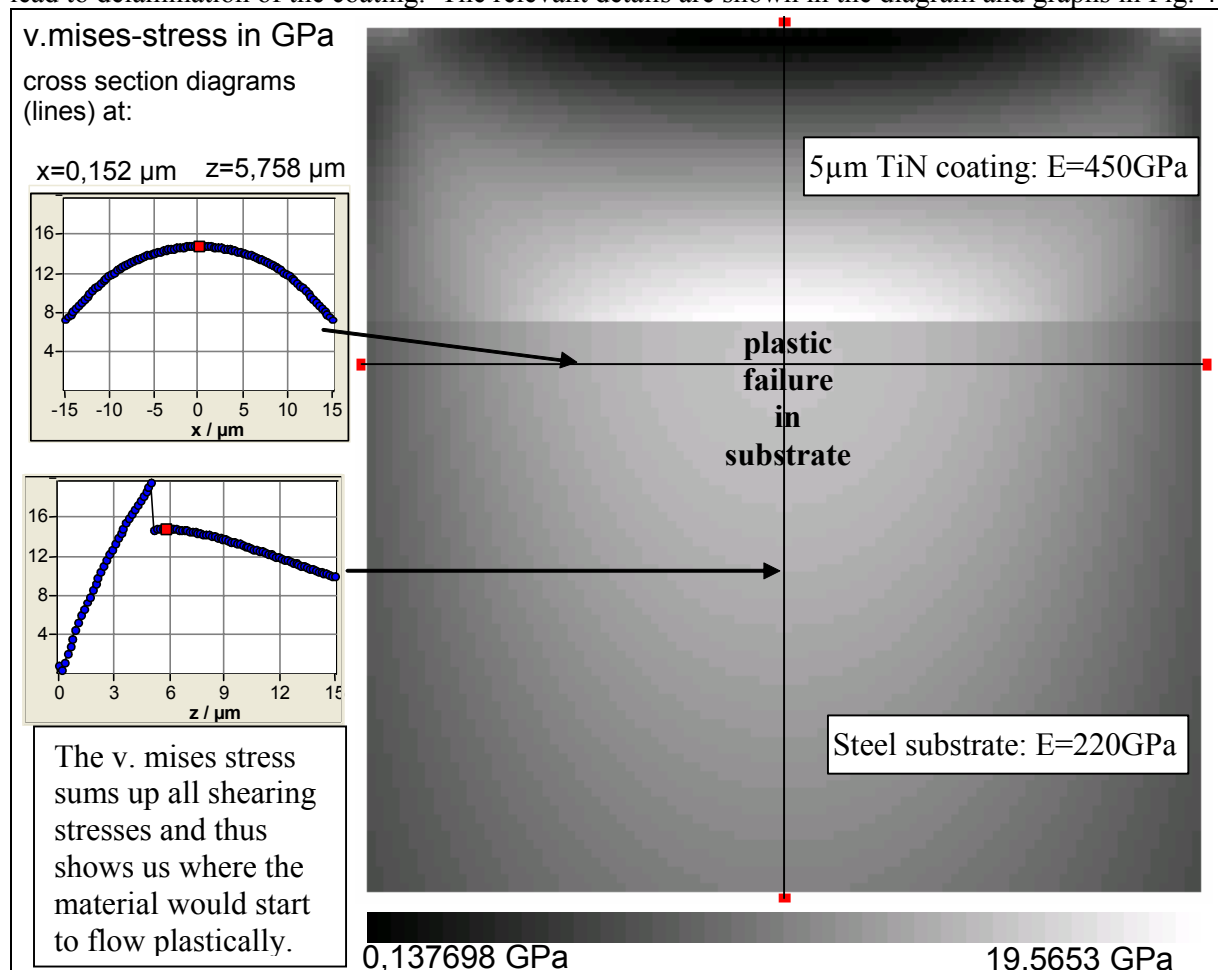


Fig. 4: SIO’s FilmDoctor software not only provided insight into the coating failure, but suggested ways to avoid similar problems and costly product failures in the future.