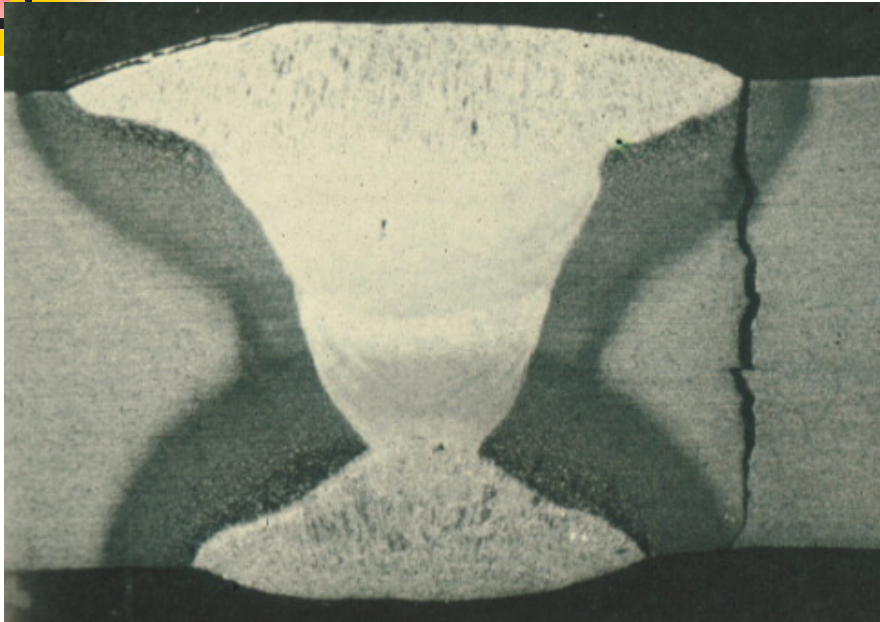


Overview of Weldment Fatigue Life Prediction



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The fatigue-prone machine





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Outline

- I Introduction
- II Fatigue Fundamentals
- III Fatigue Models
- IV Modeling Weldment Fatigue Behavior
- V Predicted Weldment Fatigue Behavior
- VI Classifications of Weldments
- VII Improving the Fatigue Life of Weldments



Overall objective

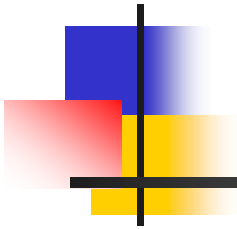
- To understand the factors which control the fatigue life of weldments.



Underlying ideas...

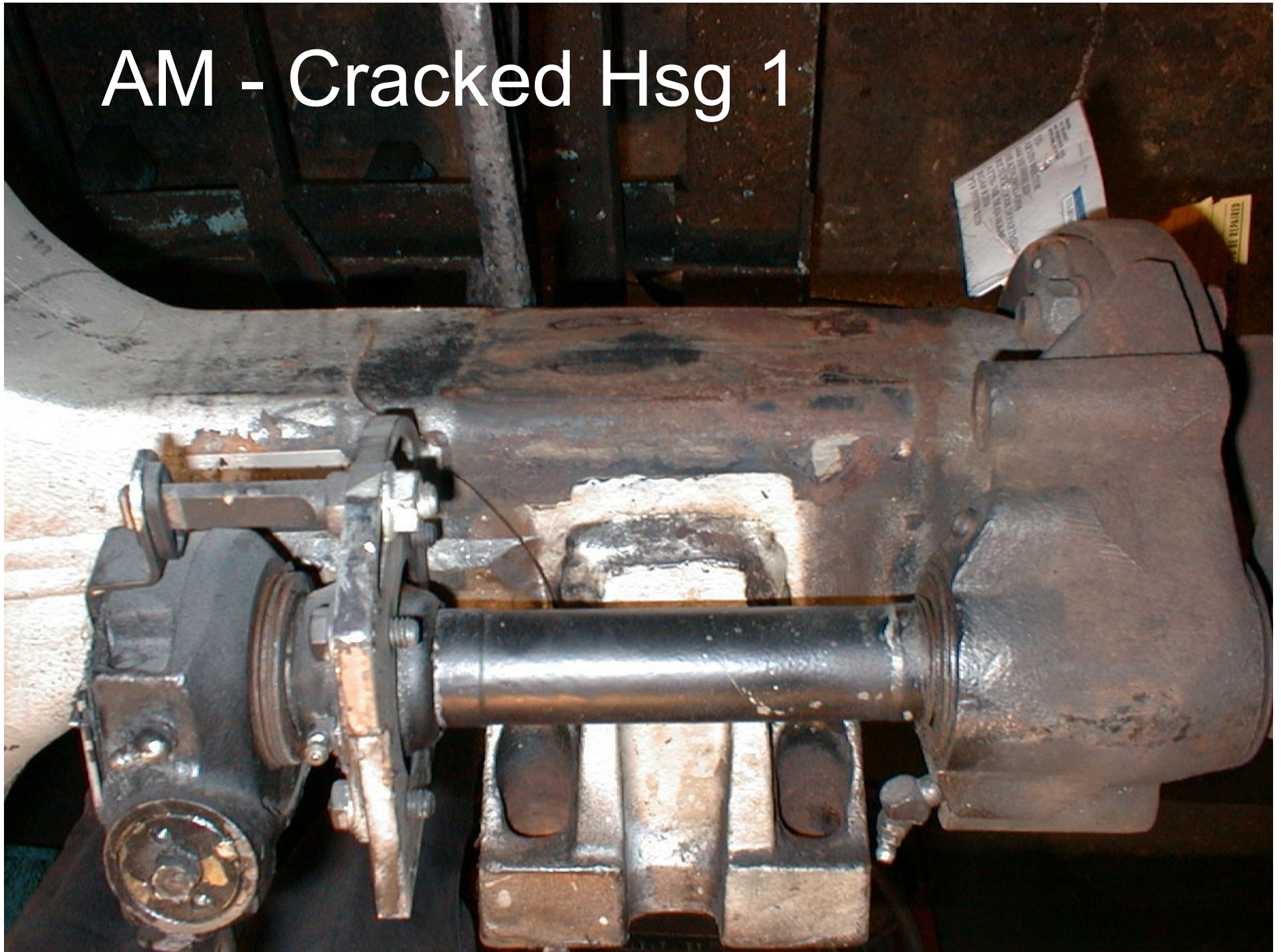
- No two weldments are **alike**!
- The fatigue of weldments is a complex, **non-linear** problem.
- Weldment fatigue life is strongly dependent upon **initial conditions**.
- Models help us understand what may happen and how to **control** it!
- Fatigue is caused by the fluctuation of **local** stresses and strains.
- There is nothing more practical than a good **theory**!

I Introduction



Fatigue of Weldments

AM - Cracked Hsg 1





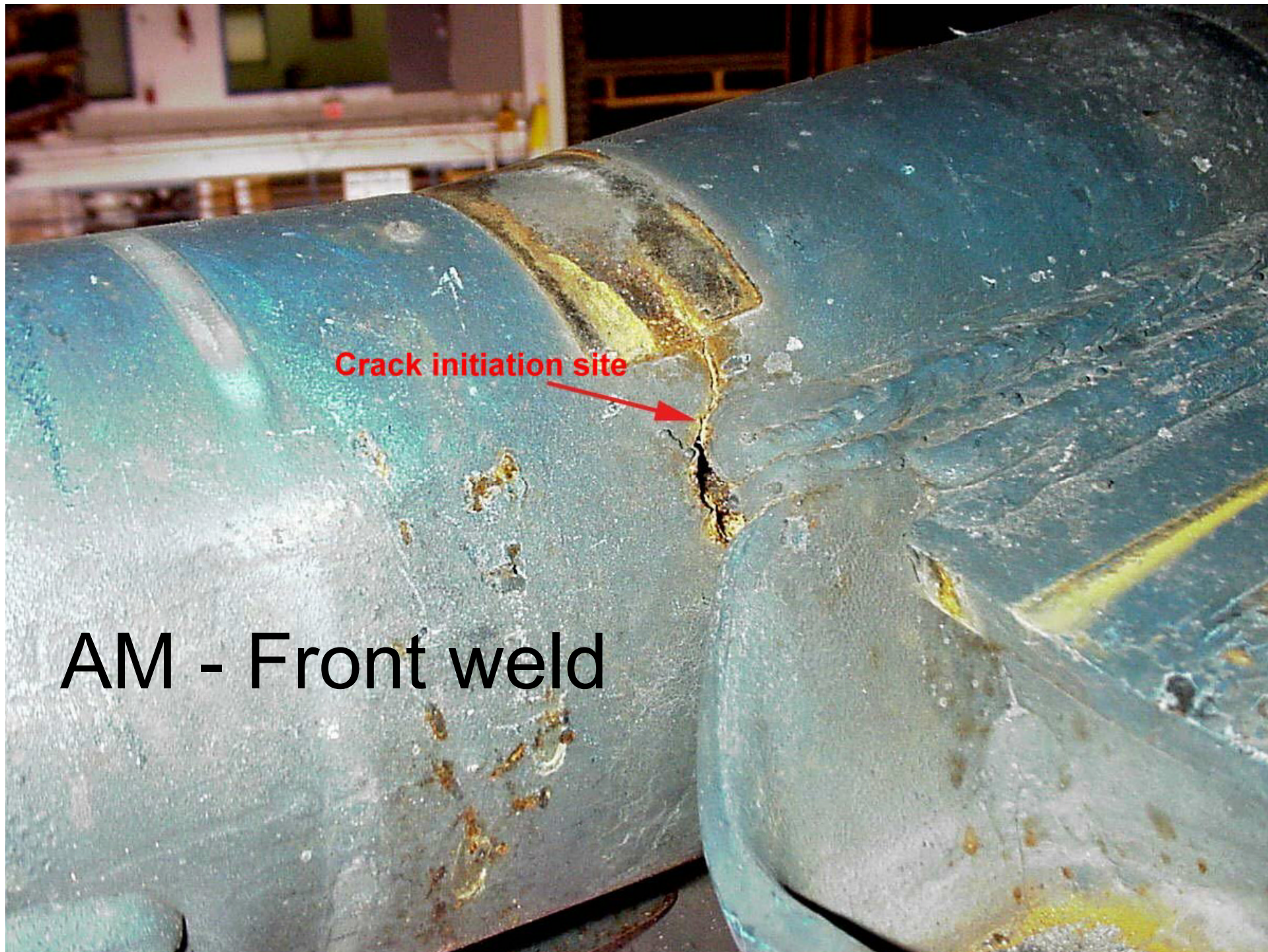
A close-up photograph of a damaged front axle assembly. The image shows a curved metal component, likely a control arm or steering knuckle, with significant surface cracking and peeling. To the left, there are circular components, possibly brake discs or hubs, and some wiring. The background is slightly out of focus, showing industrial equipment.

AM - Front Axle

APR 4 2002

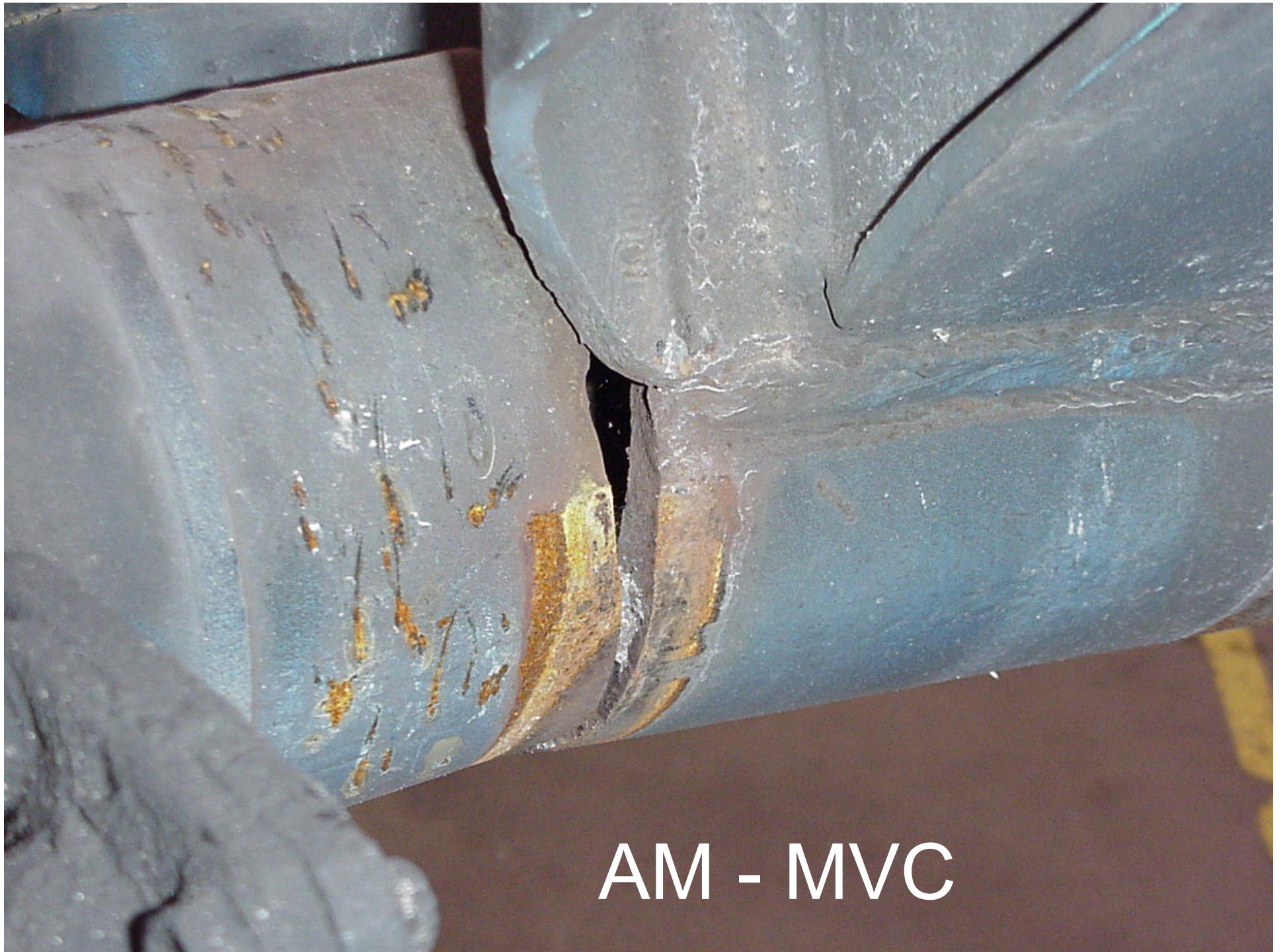
AM - Rear weld overall





Crack initiation site

AM - Front weld



AM - MVC



What to do?

- Reduce the local stresses and strains.
 - Redesign component
 - Reduce stress concentrations.
 - Avoid lousy weld geometries.
 - Make the weld toes nice.
 - Control weld distortions.
- Avoid tensile residual stresses.
 - Avoid high strength materials.
- Calculate, don't guess.
- Use fatigue life improvement techniques.