

# RAAI project: new concepts for corrosion-fatigue assessment of axles

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## Corrosion assessment on axles

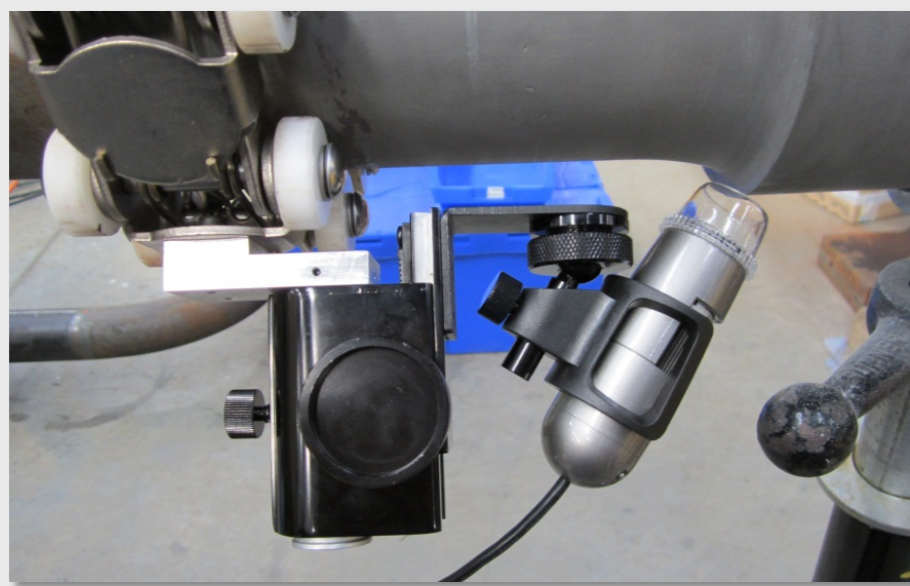
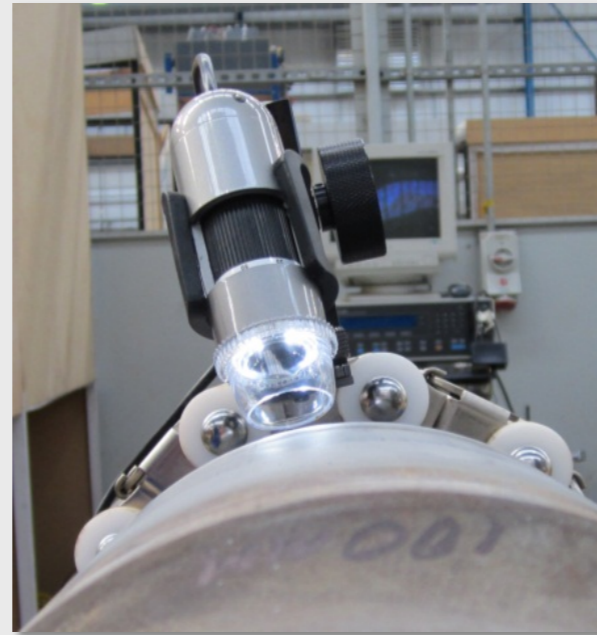
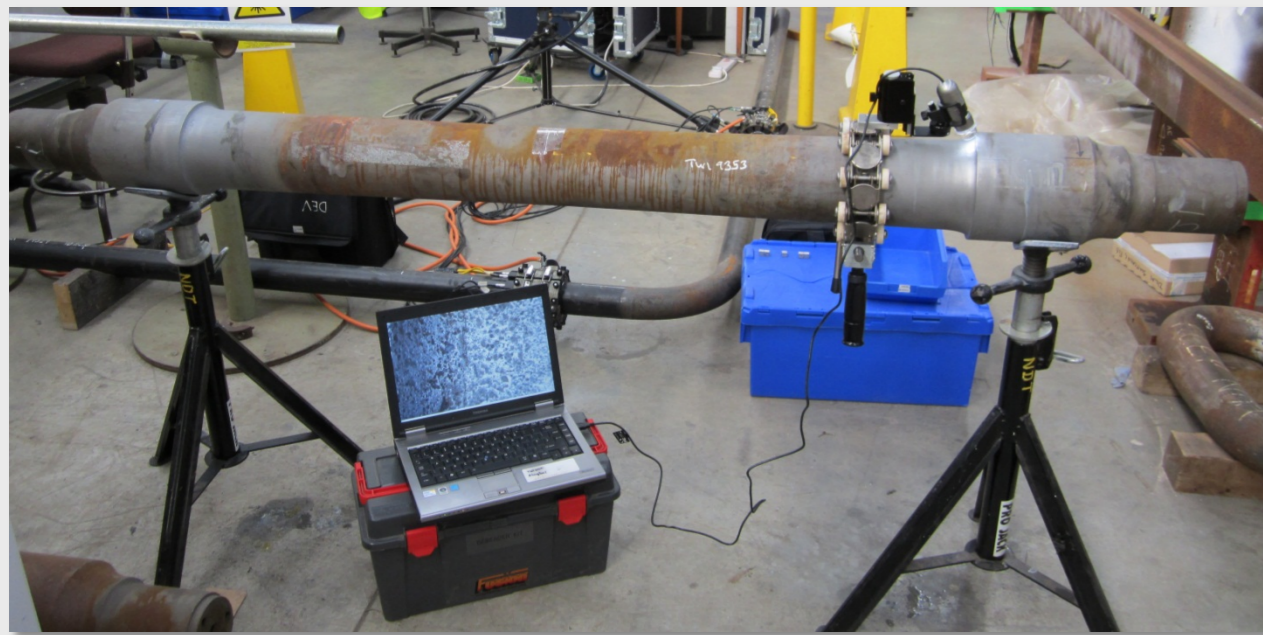
- Axles have been known to have had multiple cracking associated with corrosion pits (including some failures)
- Axles are withdrawn from service with only minor corrosion and some life left
- No method of quantification of corrosion (mainly visual assessment only)
- Limited knowledge of high cycle corrosion fatigue (risk of cracking)

## Corrosion fatigue (Polimi work)

- Showed that corrosion fatigue crack initiation occurred at low load values (no fatigue threshold)
- Showed a pattern of multiple crack growth from corrosion pits
- Significant life estimation change if a pit has a crack within it (ie corrosion->corrosion fatigue)
- Can sentence an axle based on this information
- Crack detection size required 0.3mm long
- Too small for normal NDT methods

## Wolaxim prototype

- Special holder developed to enable controlled movement of the microscope in both vertical and angular direction
- Robust scanning system
- Use of instrument around the axle circumference
- Battery operated (laptop)



## Problem with the prototype system

- Scanning large area OF AXLES inefficient manually
- No axial movement of scanner
- Manual data collection (individual shots)
- Limited analysis

## Work for RAAI (for Applied Inspection)

- Automated scanner
- Improved data collection
- Image analysis
- Automatic sentencing

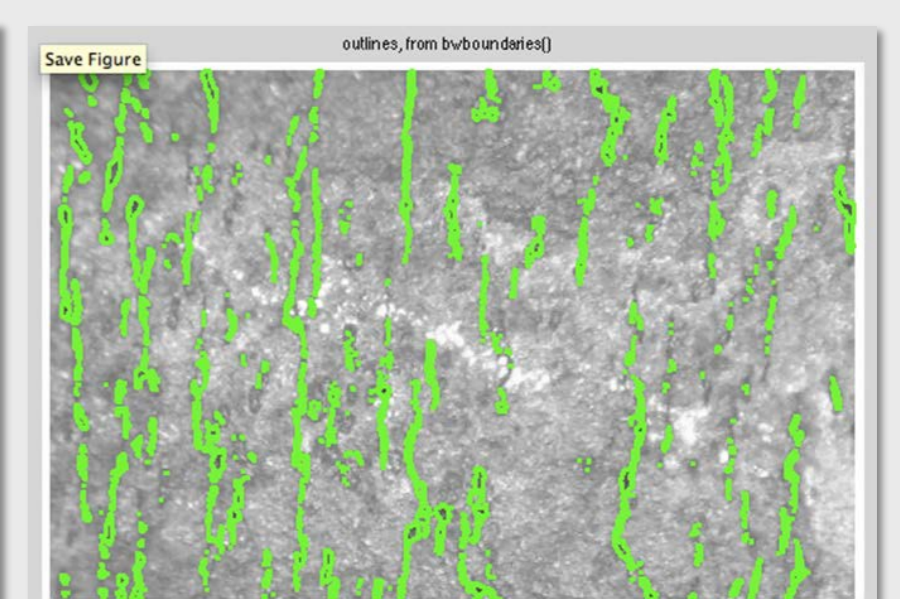
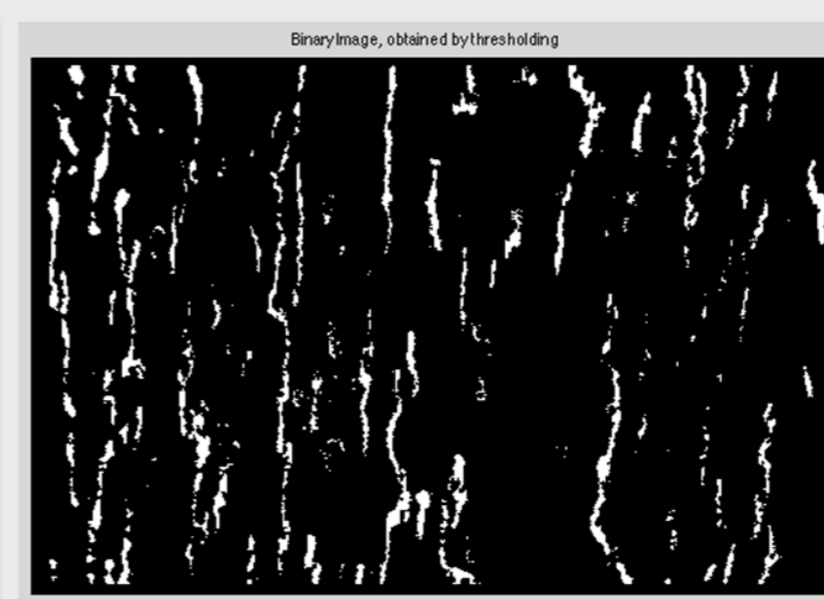
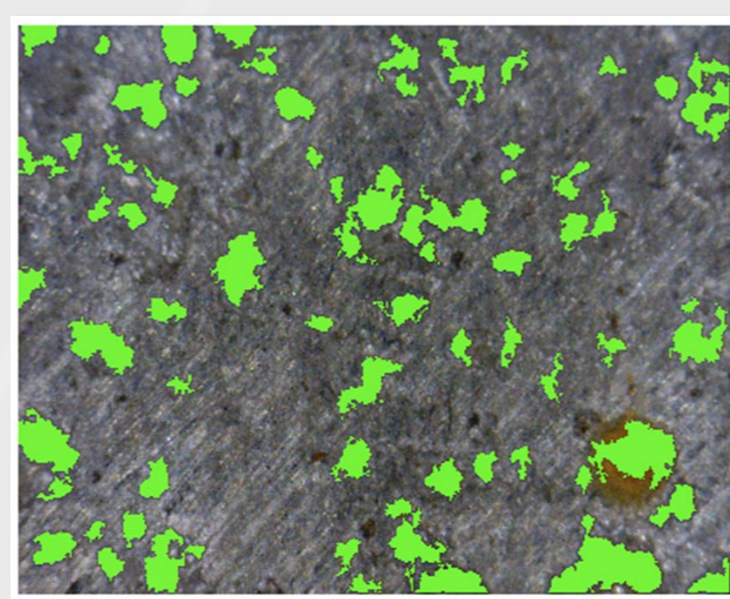
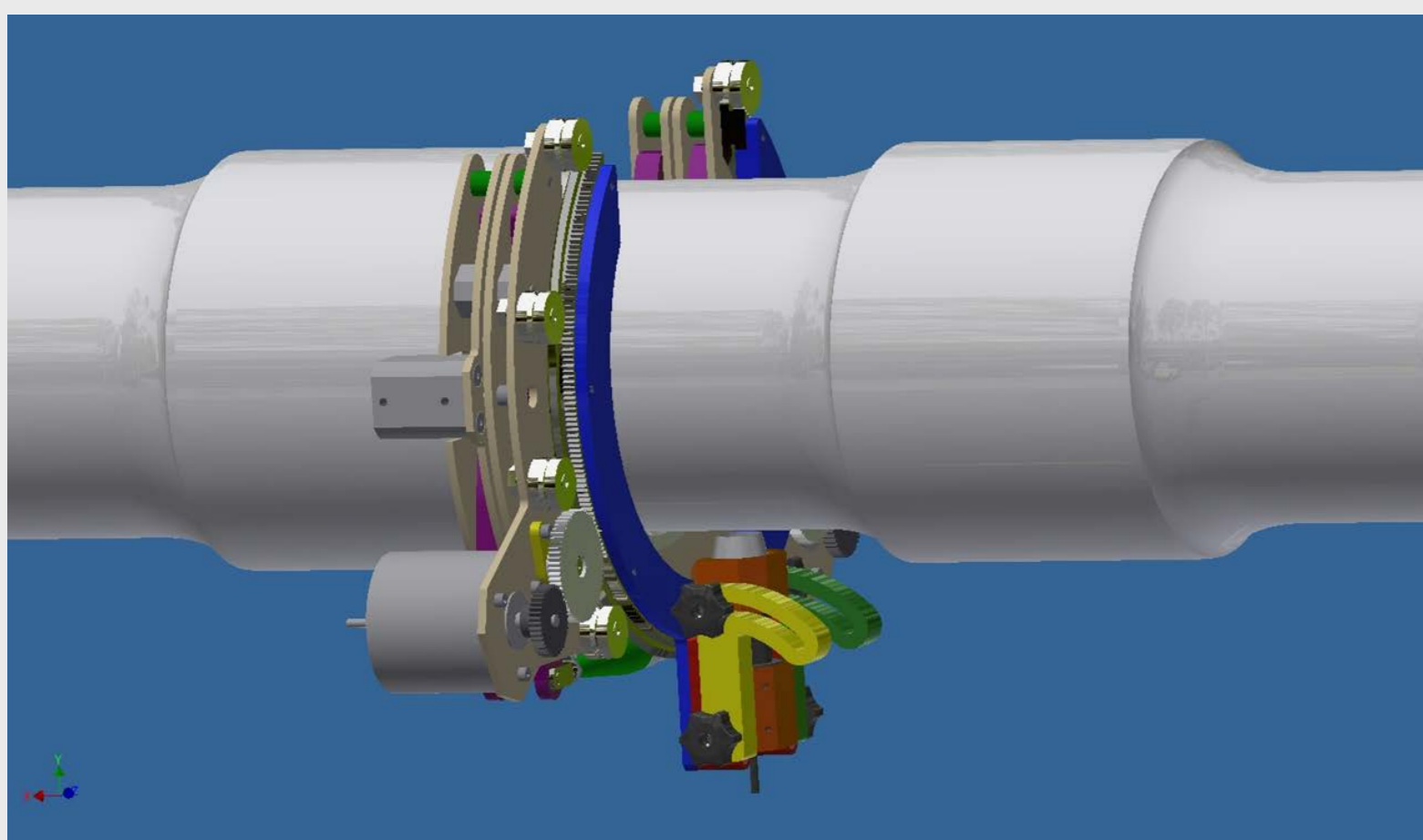


Image analysis

New scanner