

High Performance Machine Vision System for Monitoring Railcar Health



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A. Completion of Mechanical Inspection Study

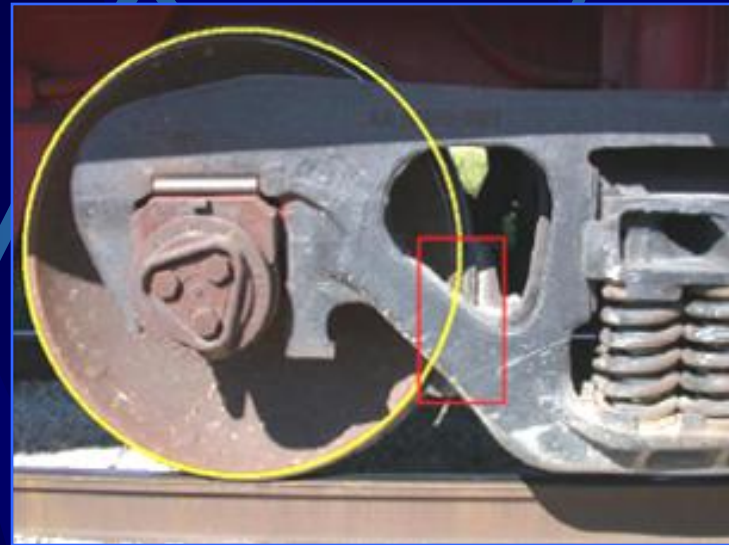
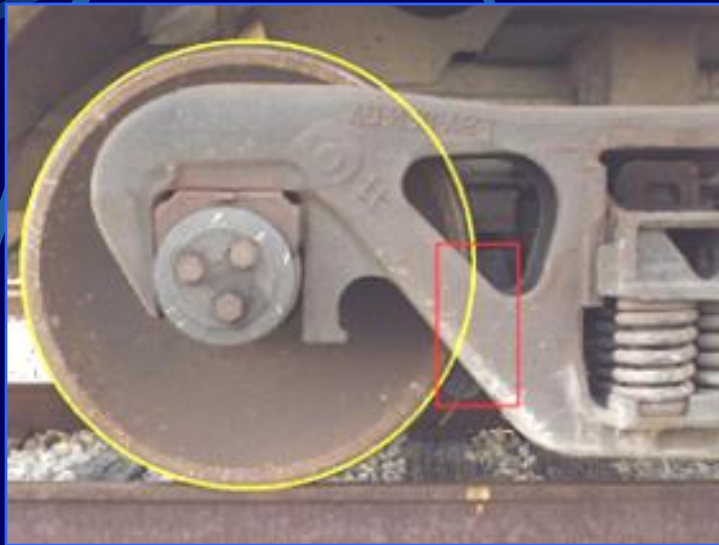
- Many Mechanical Components were Isolated Using Algorithms on Side View
 - Robust Wheel Identification
 - Brake Shoe Area Identified
 - Spring Pitch Measurement
 - Bearing End Cap Bolts Localization
- Algorithm Successfully Identified Missing Bearing End Cap Bolts

Results: Robust Wheel Identification



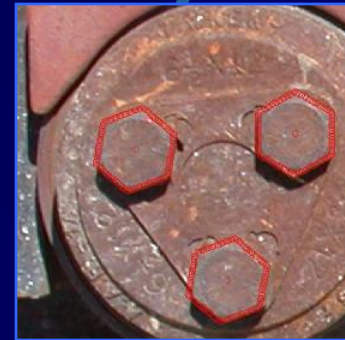
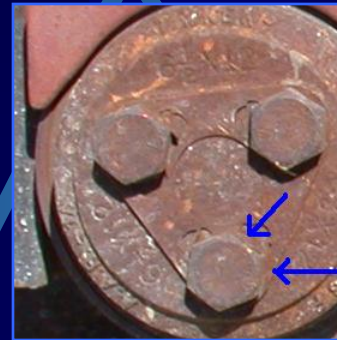
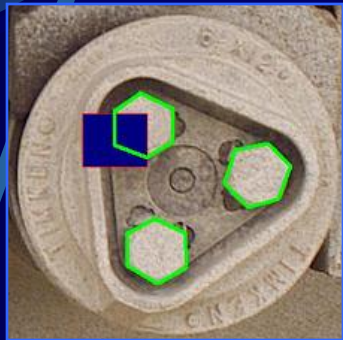
Wheel on left obscured by step and various shadows
Artificial block placed to cover large portion of wheel
However, algorithm identifies wheel correctly

Results: Brake Shoe/Head Location



Improved localization of previously identified brake area
Area now contains only brake shoe and head

Results: Robust Bolt Identification



Correct Identification of bolts and their orientation

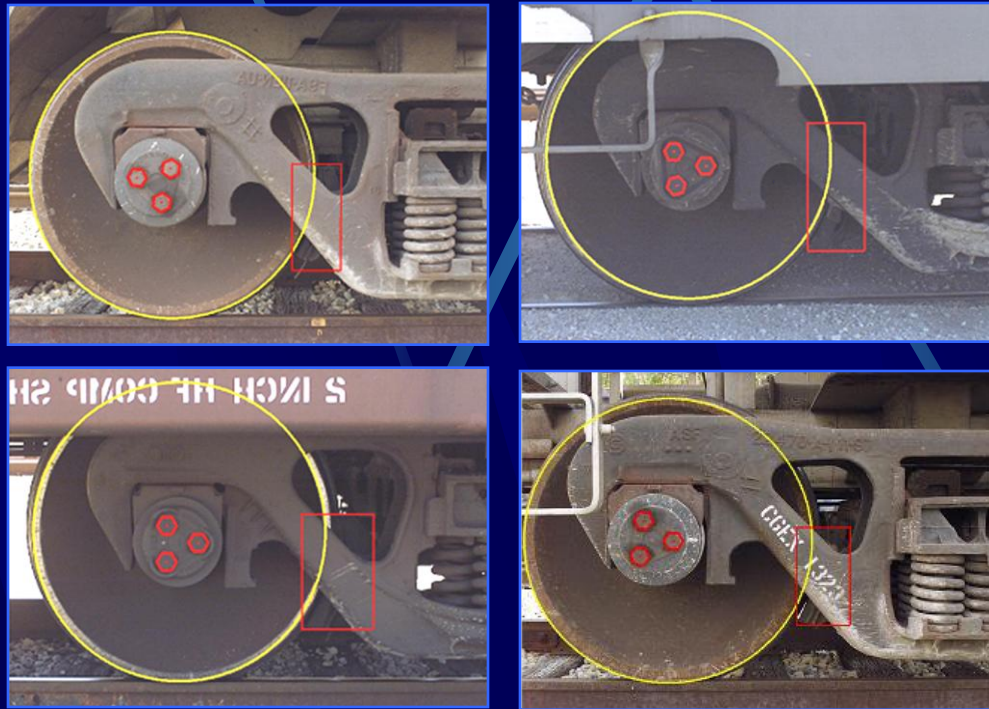
Blue block artificially added

Natural artifact on bolt

Bolt boundaries almost nonexistent

However, algorithm identifies bolts correctly

Results: Main Components Identified



Components identified in various car types

Missing Bolt Detection



Image from Gary Nelson - Norfolk Southern Car Shop in Decatur

Other Results: Technology Digest Completed

- Technical Digest Publication
 - TD-04-008 Published June 2004
 - *“A Machine Vision System for Monitoring Railcar Health: Preliminary Results”* by John M. Hart, Narendra Ahuja, Chris Barkan, and Dave Davis



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Image Sources - Norfolk Southern Car Shop in Decatur, Illinois
- CNIC Yard, Champaign, Illinois

Images taken by John M. Hart unless otherwise noted