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Connection

A Quarterly Publication of Consolidated Metco, Inc. Summer 2005 Volume 2

Identify and Prevent Stud Failure in Hubs

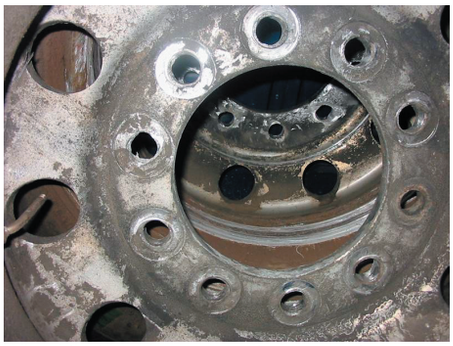
Wheel stud failure as everyone knows can create costly and dangerous situations. Most often the failure is caused by fatigue that is created when there is insufficient clamping force from the wheel studs and nuts. This insufficient clamping force is due to wheel nuts that are not torqued to the proper level.


Example of wheel stud failure due to fatigue.

High clamping force created when wheel nuts have adequate torque creates the friction that holds the wheel in place. Inadequate clamping force results in less friction to hold the wheel in place. This, in turn, leads to motion between the wheel and hub, which causes fatigue loads in the studs. Fatigue in high strength fasteners, such as wheel studs, can cause failure of the fastener.

Loose wheel nuts can be caused by any of the following:

- Insufficient torque applied to wheel nuts when the wheel is installed (Refer to TMC RP237 for proper torque levels)
- Misalignment of components when the wheel is installed
- Foreign material between components (hub, drum and wheel) when the wheel is installed
- Paint between components when installed
- Failure to re-torque nuts after run-in
- Damaged threads on studs and/or nuts
- Inner cap nuts too short (only applies to stud piloted wheels)
- Excessive overloads and unforeseen abuse


Wheel that has been run with loose nuts.

- Excess torque that has permanently stretched a stud, which reduces its cross section and causes it to lose strength and act like a loose nut
- Bent or cracked studs
- Badly corroded studs
- Studs that were overloaded because they were adjacent to a failed or loose stud or were in a hub that had two or more failed or loose studs

Look for the following conditions that may lead to stud failure:

- Polishing on wheel surface around or under the wheel nuts
- Deformation of the stud holes in the wheels or brake drums
- Aluminum or cast iron embedded in the threads of any wheel studs
- Any broken wheel pilots
- Any cracks in the wheel studs
- Inability of any studs to maintain torque
- Wheel nuts that are in poor condition (e.g. rusted between nut and collar)

Here are a few remedies to prevent the possibility of loose studs and stud failure:


Typical failure from running with loose nuts.

- Ensure mounting surfaces of hub, drum and wheel are clean and free of paint or contaminants.
- Ensure wheel studs and nuts are clean and lubricated according to recommendations
- Replace wheel studs that have damaged or distorted threads, are broken or bent, or are badly corroded
- Replace the stud on each side of the stud being replaced due to damage
- If two or more studs have damage, replace all studs in the hub
- See ConMet technology bulletins and drum installation for additional information

ConMet wheel studs meet or exceed SAE grade 8 specifications and should not fail when proper torque is maintained. For a complete description of servicing ConMet hub assemblies, refer to the service manuals on our web site at www.conmet.com.

For more information, refer to the following TMC Recommended Practices for proper installation of wheels to prevent stud failure and other negative conditions for wheel ends:

- RP 217B “Attaching Hardware for Disc Wheels”
- RP 237: “Retorquing Guidelines for Disc Wheels”