

Wheel Off Incident Prevention



Maine State Police - Commercial Vehicle Enforcement Unit

This training is informational and is not a substitute for training requirements of OSHA and the FMCSA discussed later in this presentation.

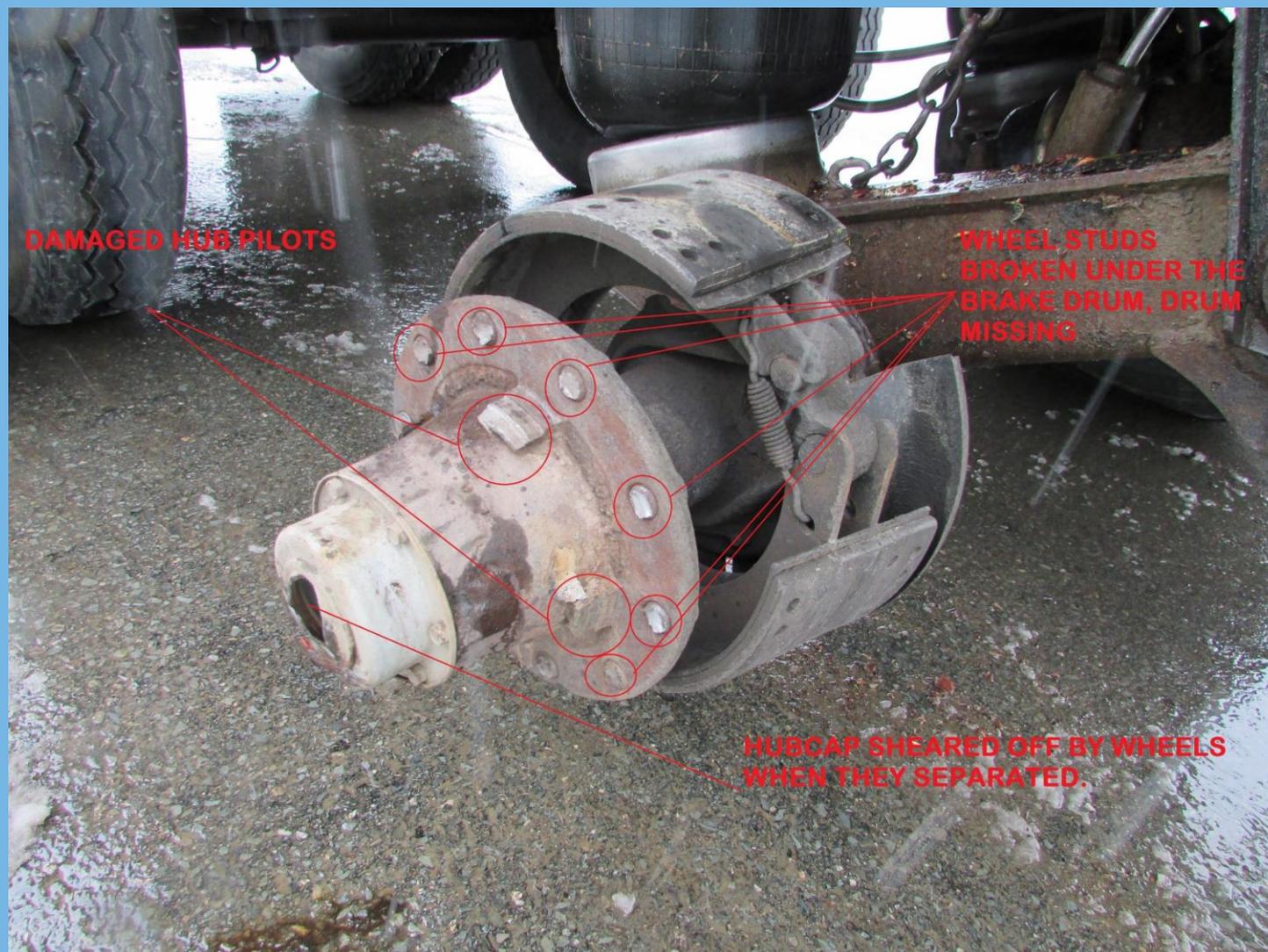
Detective Ben Campbell Crash 4/3/2019

- A crash occurred in Hampden, Maine on 4/3/2019 in which a Maine State Police Detective who was attempting to assist a disabled motorist on I-95 was struck by a tire and wheel that separated from a logging truck. Detective Campbell dies as a result of the injuries he sustained from the impact of the tire and wheel.
- The Maine State Police conducted an investigation into the cause of the wheel separation which yielded some lessons to be taken away by both enforcement and industry.

Photos from the crash scene:



Note indicators visible with the wheels off:





- It was determined during the investigation that the wheels separated due to several mechanical issues, not just one. We will discuss methods of detecting some of the defects discovered.

Defective wheels studs:

- Defective wheel studs causing a loss of clamp force in the wheels are suspected as the first critical event that lead up to the Det. Campbell crash. There are many things that can cause studs to loose their stretching properties, including over tightening by improperly calibrated equipment and impact damage.
- It is critical that technicians thoroughly clean and inspect all wheel studs during every installation.



This is the inside wheel from the Det. Campbell crash:



Wheels:

- Wheels with contaminated, rusty, dirty, or cracked mating surfaces WILL NOT seat correctly, resulting in wheels that become loose in operation. Wheels that are loose in operation will show signs of movement, pay particular attention to any surface that is shiny that shouldn't be.
- Wheel nuts do not have to be loose for the wheels to move around behind them





Flange nuts have distorted the wheel.

Hub Piloted Wheels, improper centering due to worn hub pilots:

- Hub piloted wheels are particularly susceptible to wheel of incidents if the hub pilots are worn to the point that the wheels contact the studs in a vertical motion. The force of the loaded wheels striking the studs as the axle rotates will fracture the studs causing them to shear off.



Technician and driver training

- It is critical to prevent wheel off incidents that technicians working on commercial vehicles have training in inspecting and mounting wheel end components and know which types of hardware are appropriate for hub piloted, stud piloted, and spoke wheels. Please contact your wheel end/ axle manufacturer to obtain training videos and service literature prior to servicing any wheel end component.
- Training videos and materials are available online from Michelin, Accuride, Meritor, Alcoa, and many other reputable manufactures.







OSHA Requirements for technician training

- OSHA Requirements for technician training can be found in 29 CFR 1910.177

FMCSA driver training requirements:

- Requirements for drivers to conduct pre-trip equipment inspections can be found in 49 CFR 392.7

Online Training Videos:

- <https://www.youtube.com/watch?v=wrsj2UoMeys>
- <https://www.youtube.com/watch?v=n1sZ5OAcaFc>
- <https://www.youtube.com/watch?v=ETOAVzB2cOw>
- <https://www.youtube.com/watch?v=7hByRqr3gog>
- <http://archive.constantcontact.com/fs164/1103610692456/archive/115125676890.html>

Roadside Inspection by Enforcement

- 49 CFR 393.205 WHEELS:

(a) Wheels and rims shall not be cracked or broken.

(b) Stud or bolt holes on the wheels shall not be elongated (out of round).

(c) Nuts or bolts shall not be missing or loose.

CVSA Out of Service Criteria

*14. WHEELS, RIMS AND HUBS

a. Lock or Side Ring

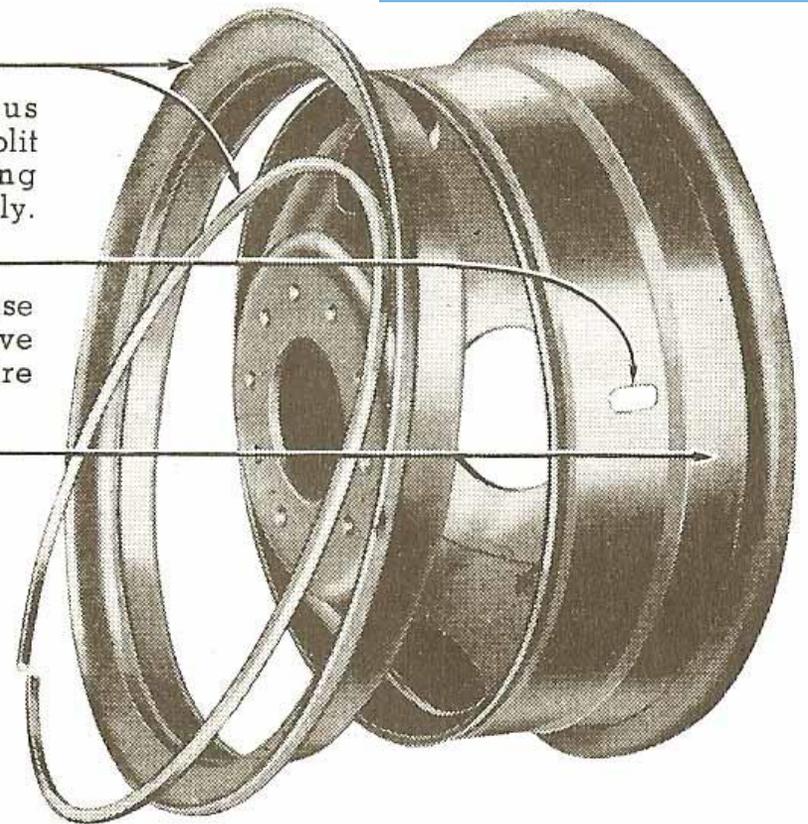
Bent, broken, cracked, improperly seated, sprung or mismatched ring(s). (393.205(a))

Removable continuous side flange ring and split reversible clamp ring provide easier assembly.

Semi-drop-center rim base simplifies inserting valve stem and assembling tire on the rim.

The 5° tapered bead seat under both tire beads assures concentric mounting of tire.

**WHY ADVANCED
W I D E - B A S E
W H E E L S A R E
B E T T E R:**





b. Rim Cracks

Any circumferential crack. (393.205(a))

c. Disc Wheel Cracks

(1) Any crack exceeding 3 inches (76.2 mm) in length. (393.205(a))

(2) A crack extending between any two holes (hand holes, stud holes and center holes). (393.205(a))

(3) Two or more cracks anywhere on the wheel. (393.205(a))

d. Bolt/Stud Holes (Disc Wheels)

Any visible elongated bolt/stud hole. (393.205(b))

e. Spoke Wheel Cracks

(1) Two or more cracks more than 1 inch (25.4 mm) long across a spoke or hub section. (393.205(a))

(2) Two or more web areas with cracks. (393.205(a))

f. Tubeless Demountable Adapter Cracks

(1) A crack exceeding 3 inches (76.2 mm). (393.205(a))

(2) Cracks at three or more spokes. (393.205(a))

g. Wheel Fasteners

Loose, missing, broken, cracked or stripped wheel fasteners that are ineffective as follows: for 10 fastener positions - 3 anywhere or 2 adjacent; for 8 fastener positions or less - 2 anywhere (this applies to both spoke and disc wheels). (393.205(c))

h. Welds

- (1) Any cracks in welds attaching disc wheel to rim. (393.205(a))
- (2) Any crack in welds attaching tubeless demountable rim to adapter. (393.205(a))
- (3) Any welded repair on any aluminum wheel(s). (396.3(a)(1))
- (4) Any welded repair other than disc to rim attachment on steel disc wheel(s). (396.3(a)(1))

i. Hubs

(1) When any bearing (hub) cap, plug or filler plug is missing or broken allowing an open view into hub assembly. (396.3(a)(1))

(2) Smoking from wheel hub assembly due to bearing failure. (396.3(a)(1))

NOTE: Refer to "Brake Systems – Brake Smoke/Fire," as the cause may either be the brakes or a problem in the hub and bearing area.

(3) When any wheel seal is leaking. This must include evidence of wet contamination of the brake friction material and accompanied by evidence that further leaking will occur. (396.5(b))

NOTE: Refer to the applicable contaminated friction material criterion in "Brake Systems," when condition is present.

NOTE: Grease/oil on the brake lining edge, back of shoe, or drum edge and oil stain with no evidence of fresh oil leakage are not conditions for out of service.

(4) Lubricant is leaking from the hub and is present on the wheel surface (caused by a loose hub cap or hub cap bolts, or hub cap damage) accompanied by evidence that further leakage will occur. (396.5(b))

(5) No visible or measurable amount of lubricant showing in hub. (396.5(a))