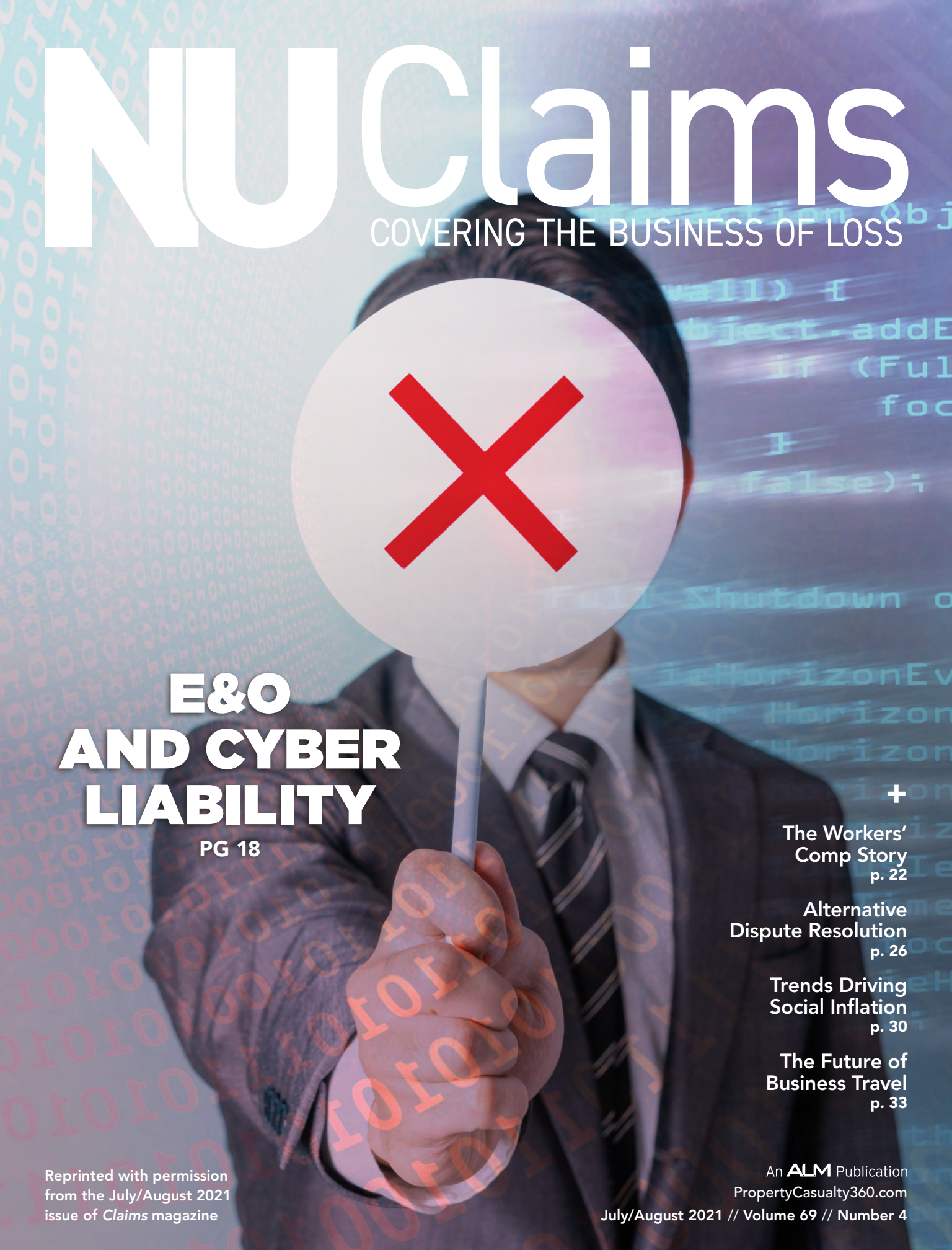

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An ALM Publication
PropertyCasualty360.com
July/August 2021 // Volume 69 // Number 4

Figure 1: Right rear tie rod.

Automobile Tie Rod Failure

By Charles C. Roberts, Jr., Ph.D., P.E.

DRIVERS FREQUENTLY CLAIM THAT their vehicle suddenly lurched to one side, resulting in an accident. On occasion, the cause may not be the fault of the driver. This case study illustrates that point. According to the insured, she was driving at the speed limit when suddenly her vehicle lurched to one side, causing loss of control and striking a wall head-on.

During an inspection in the body shop, there was severe damage to the front of the vehicle but no damage to the rear. It was discovered that the right rear tie rod that controls the alignment of the right rear wheel, as shown in Figure 1, had parted from its normal position (arrow). There was no evidence of an impact causing the tie rod, which controls the toe adjustment of the right rear wheel, to become detached. This can cause severe misalignment and loss of control that was consistent with that reported by the driver.

Figure 3 shows the threaded end of the tie rod that became detached. Close inspection of the threads at the right shows that the crest of the threads is deformed to the right. This suggests that an excessive force was pushing the adjusting nut to the right. The lock nut shows a chisel groove, suggesting that an individual was attempting to loosen the lock nut by turning the nut counter-clockwise. This particular nut and screw has a left-hand thread, which means turning counter-clockwise tightens the lock nut against the adjusting nut.

Figure 4 is a drawing of the nature of the damage to the threads. The upper drawing shows the crest and the root of a normal threaded screw. The lower drawing shows the damaged threads with the crest deformed to the right, which is consistent with a force to the right.

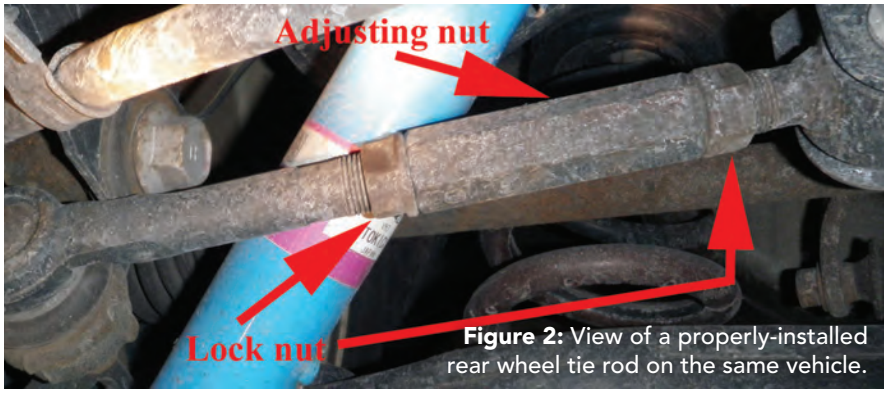

Figure 2: View of a properly-installed rear wheel tie rod on the same vehicle.

Photo: C. Roberts

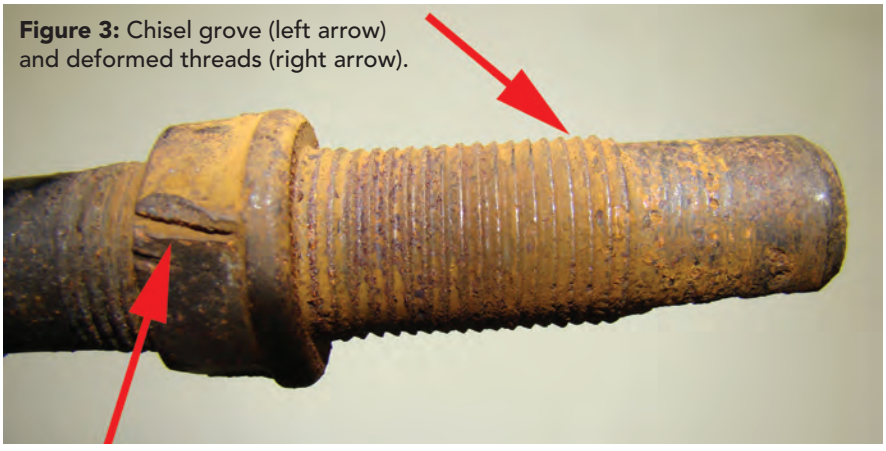

Figure 3: Chisel grove (left arrow) and deformed threads (right arrow).

Photo: C. Roberts

Apparently, excessive torque was applied to the lock nut which damaged the threads under the adjusting nut. As a result of normal tie rod loading from drive wheel traction and road variations, the tie rod eventually parted from the threaded connection, causing severe right wheel misalignment and loss of vehicle control.

The root cause is excessive torque applied to the lock nut which damaged the adjusting nut area threads. This is an improper adjustment procedure. The vehicle suspension had recently been realigned at a local shop.

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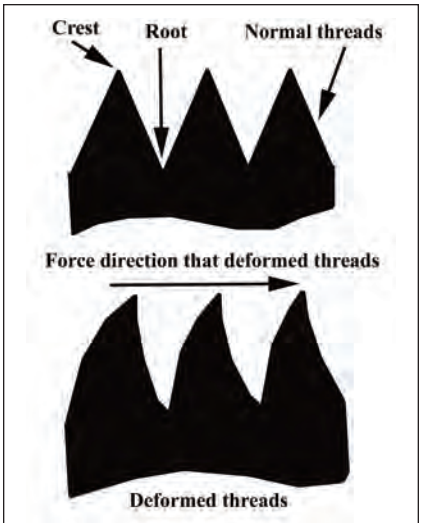

Figure 4: Normal and deformed threads.