

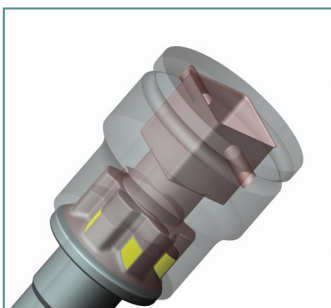
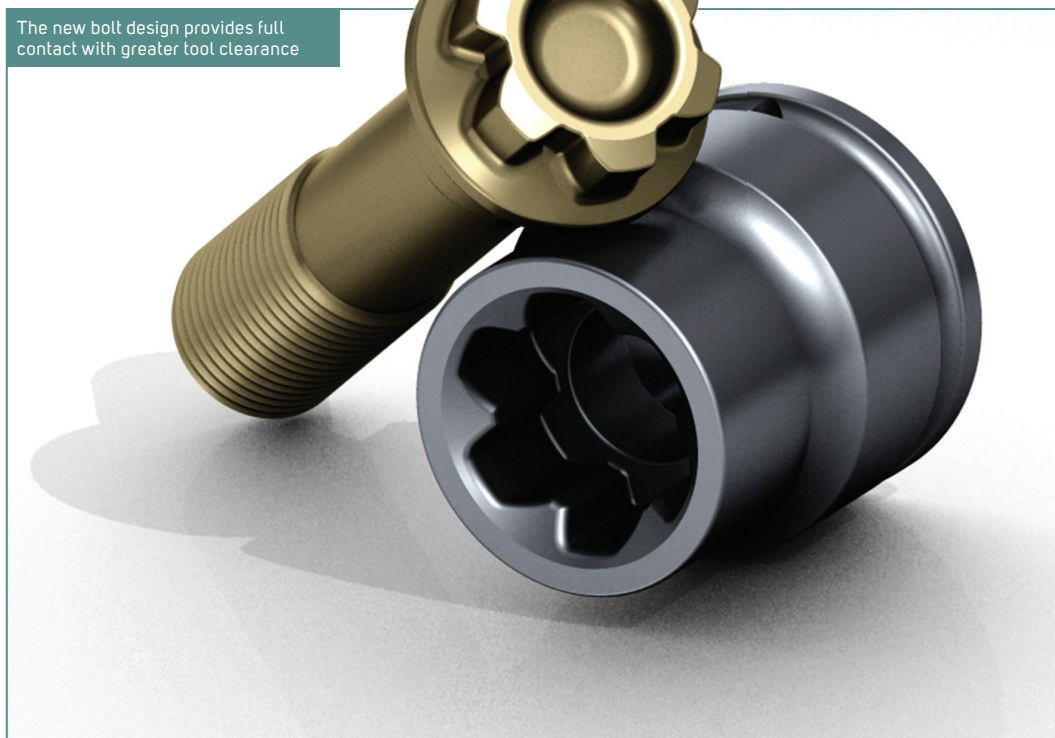
# Rethinking bolt heads

Balancing demand for lighter bolts and production-line efficiency is a tough challenge

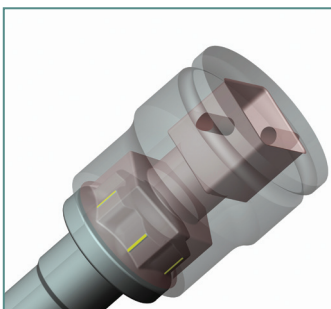
▶▶ Designers of high-performance engines and chassis face a daunting task. How do they balance the demand for lighter weight and the requirements for structurally sound joints while assuring efficient assembly and shop serviceability? Traditional hex head and bi-hex bolts are most commonly used, easily serviced and have widespread tool availability, but their tall heads and poor contact areas do not provide efficient torque transfer during assembly. The result is that weight is increased while joint integrity can be sacrificed.

Adopting a new bolt head design can improve the efficiency of the assembly operation but may require a new set of tools. The new External

The new bolt design provides full contact with greater tool clearance



Optimal torque transfer can be achieved thanks to the large contact area for tough removals when the matching socket is used



A common hex socket provides good contact for removal during service

MORTORQ Super bolt design resolves this conflict by providing efficient assembly with the matching socket, and easy serviceability through compatibility with the common hex and 12-point sockets already in use in service shops.

The new bolt design uses lessons learned in the aerospace industry to reduce weight while optimizing repair and replacement. The unique geometry of the spiral drive provides full contact over the entire driving wing wall with the mating socket. This provides optimal torque transfer while enabling reduced head height and lower overall bolt weight. The full curve engagement of the wings gives expanded clearance between the socket and the bolt head, making automated tool engagement fast and reliable.

Assembly automation can now be expanded beyond robotic welding to include robotic fastener placement and installation due to this improved tool-to-head fit. Additionally, the larger engagement surface of the drive reduces stress at the tool-bolt head interface, which has proved to extend tool life greatly. This prolonged service reduces assembly-line stoppages for tooling breakage and changes.

Further weight savings can be achieved due to the reduced head height, which requires shallower depth of countersinks. This allows the use of thinner, lighter castings and structures in the engine, drivetrain and chassis, which further reduces overall vehicle weight. Additional reductions have been achieved thanks to the large dimple in the top of the head. This

dimple is formed during the forging process and helps to fill in the curved wings of the head while reducing the overall weight without sacrificing bolt strength.

Once installed and in use, the serviceability of the bolt head with common tools makes the new design friendly both for service shops and do-it-yourself mechanics with common hex sockets in their tool chests. Optimal repairs and end-of-life recycling disassembly is achieved with the correct mating sockets, which are already available from global distribution sources such as Snap-On Tools and other automotive aftermarket channels. ©

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