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Modular Chassis Construction

Modular chassis construction offers a range of advantages, including speed, cost efficiency, quality control, flexibility, and sustainability, making it an attractive option for any manufacturer. It is particularly beneficial for projects that require multiple components; standardising chassis components and processes can lead to greater consistency in the finished product.

This production method allows for a high degree of design flexibility. If the design allows, chassis can be easily modified by adding or removing components. This adaptability is particularly valuable for businesses that offer bespoke solutions and designs to meet the unique preferences and requirements of individual customers.

Building a chassis is a complex engineering task that requires a thorough understanding of structural mechanics, welding, and fabrication. Additionally, compliance with regulations and safety standards is crucial, but modular construction principles can certainly be applied to the design of chassis for various applications.

The term “chassis” typically refers to the framework or structural support of a manufactured object, which structurally support the object in its construction and function. Here are some considerations when exploring the use of modular construction for fabricating chassis:

Standardisation: While customisation is a key advantage, some modular components can be standardised to streamline the manufacturing process. This can help reduce costs and improve efficiency, especially if certain elements of the chassis are commonly used across different applications.

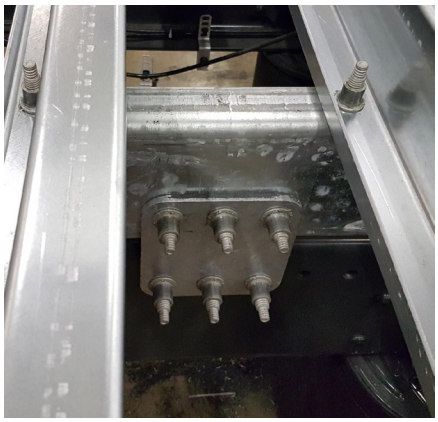
Assembly Efficiency: Modular construction often involves the prefabrication of components in a controlled environment. This can lead to increased efficiency during the assembly process, whether it’s for vehicles, machinery, or other structures requiring a chassis.

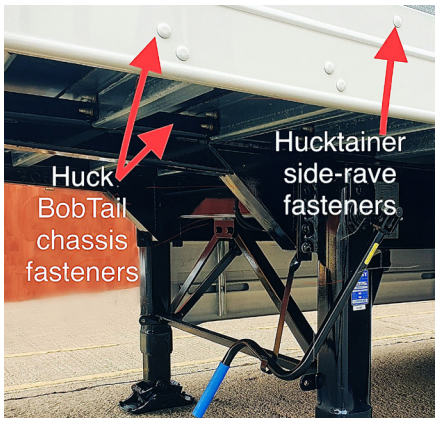
Ease of Maintenance and Upgrades: Modular construction allows for easier maintenance and upgrades. If a specific component of the chassis needs to be replaced or upgraded, it can be done more seamlessly in a modular system compared to traditional, welded designs - the modular approach allows for flexibility in design and use.

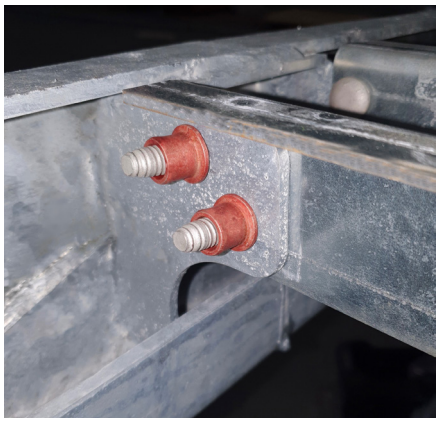
Transportation and Logistics: Chassis construction often involves the transportation of large prefabricated components offsite to be plated or painted. However, smaller modular components are generally easier and more cost-effective to transport than large welded structures. This is especially true when it comes to shipping components to subcontractors or to the final assembly site.

Scalability: The scalability of modular construction allows for projects of varying sizes to benefit from the advantages. Whether it’s a smaller scale domestic, agricultural (horse / livestock) trailer, or a large-scale double deck / lifting deck trailer or even Mega-Trucks used in the logistics industries. A modular chassis design can be adapted to suit various applications.

Quality Control: Manufacturing chassis components in a controlled factory environment enhances quality control. This can lead to better consistency in the fabrication of components, resulting in a higher quality final product.







BobTail fasteners in various chassis applications

Cost Efficiency: Modular construction can contribute to cost efficiency by minimising waste, optimising production processes, and allowing for economies of scale, particularly if standardised components are used.

Environmental Sustainability: The controlled manufacturing environment of modular construction can contribute to sustainability by reducing material waste. Additionally, modular designs may facilitate the use of efficient manufacturing processes.

Rapid Prototyping and Development: The modular approach is conducive to rapid prototyping and development. This is advantageous for industries that require quick iterations and testing of new chassis designs.

In summary, applying modular construction principles to chassis design can offer several benefits, including customisation, standardisation, assembly efficiency, and adaptability to different applications. This approach is particularly valuable in industries where flexibility, efficiency, and customisation are crucial considerations.

HOW TO FASTEN CHASSIS COMPONENTS AND SUB-ASSEMBLIES

Introducing the Huck® BobTail®

Huck BobTail® LockBolts® are used worldwide in a wide variety of industries by manufacturers looking to reduce the maintenance of bolted joints, avoid the hazards and the risks associated with welding, and just to clean up, as well as speed up their assembly processes.

Often the most vulnerable point on a design is where there is an interface or join between components. BobTail® fasteners can be effectively used with virtually any plated metals without damaging the plated / finished surface, also dissimilar metals with dissimilar coefficients of thermal expansion present no problems. Varying material thicknesses are readily accommodated.

BobTail® Huck® fasteners are DiBt approved. This approval means BobTail® Lockbolts® can be used in areas regulated by the building authorities as a replacement for non-preloaded structural bolting assemblies (acc. to EN 15048) or high-strength structural bolting assemblies for preloading (acc. to EN 14399). The values published can also be used in many other applications, including rail, commercial vehicles, lattice towers or wind turbines.

LockBolts® compare with nuts and bolts

Lockbolts® have a significantly higher fatigue strength than threaded fasteners, they can be used in areas where access to the joint from both sides is guaranteed. Due to their high static load-bearing capacity under shear and tensile loads and their outstanding fatigue strength, they represent an excellent alternative to bolted or welded connections, especially when high demands are placed on safety over the entire products service life.

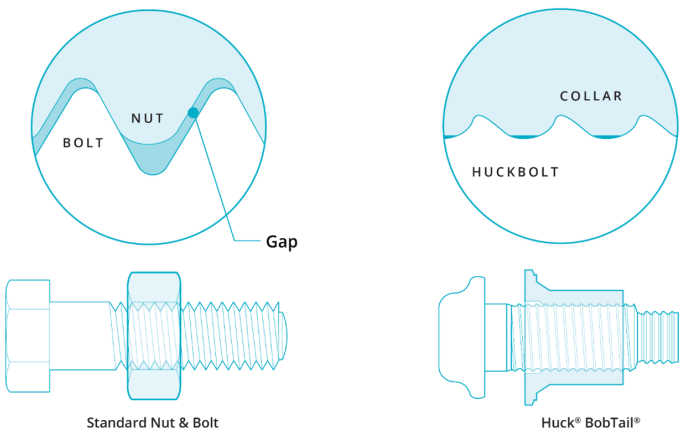
Huck® fasteners are precision engineered to deliver unmatched installation speed, fatigue life and vibration resistance, they have been tested and proven on commercial, agricultural and defence vehicles around the world for many years. Known for their industry-leading shear and tensile strength, once installed, BobTail® fasteners deliver consistent clamp. Each BobTail® performs identically in terms of strength and clamping force. Other mechanical fasteners

such as nuts and bolts must be installed using torque, or rotational force which varies with friction. BobTail® also consist of two parts - a pin and a collar, but uses an entirely different installation method to nuts and bolts.

BobTail® fasteners installation process

As with nuts and bolts, BobTail® fasteners can be pre-assembled by hand (at this stage no tools are required); they have a pre-fit-up function in the form of helical grooves enabling the structure to be 'lightly' assembled, in chassis production this often helps with the 'line-up' of the cross bearers. Once the engineer is satisfied with the alignment then the tool is applied and the fasteners can be permanently installed.

The locking groove on the BobTail® pin is an essential feature and differs from conventional bolts / set screws as it has a flatter groove geometry. This results in a larger stress cross-section with the same nominal diameter and a lower notch sharpness. As a result, LockBolts® have a significantly higher fatigue strength than threaded fasteners.

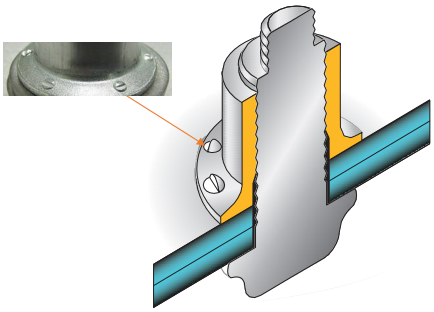


Comparison of threaded fasteners and LockBolt with lock grooves

As mentioned, BobTail® fasteners are a two-part fastener, they consist of a headed pin and a collar. The BobTail® pin is made with a series of pulling grooves at its tail end. The installation tool (driven by pneumatic, hydraulic or battery power) grips onto these grooves, pulls the work together, then the conical shaped cavity of the nose assembly is forced down the collar which is axially pressed firmly into the grooves of the pin by the processing tool. At this stage of the installation the tool has progressively cold formed (swaged) the collar into the grooves of the harder pin. The squeezing action reduces the diameter of the collar, increasing its length. This stretching of the pin and collar generates the clamp force over the joint. The pin and swaged collar combine to form the installed fastener providing a permanent and completely vibration resistant joint.

Installation is quick; typically, less than two seconds per fastener, and unlike traditional LockBolts® no pin-break is required, therefore leaving no corrosion-prone area of bare metal or spent mandrels to be collected. This direct metal-to-metal contact of the collar swaged into the grooves of the pin eliminates the loosening effects of transverse vibration.

The setting process is complete with the deformation of at least one of the six indicators (on sizes 12mm / 1/2" diameter and above) on the flange of the formed collar. In the case of collars without indicators (on sizes 9.5mm / 3/8" diameter and below), in all diameters, a ring gauge check can be performed to check the installation procedure. Also available is a colour changing collar which shows a distinct visual difference between an installed or an uninstalled fastener.



Swage indicator on a Huck® Collar

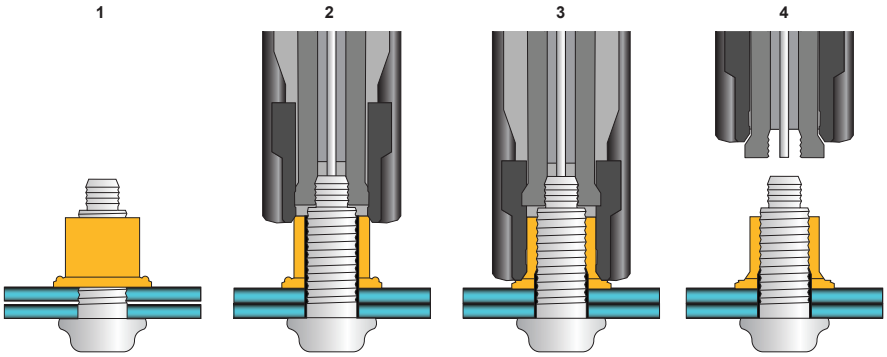
Once installed, the fastener will perform consistently for the lifetime of the joint without requiring checking or retorquing.

Recognising the cost associated with assembly time, BobTail's® installations are fast, smooth, low noise and shock free (no jolts or vibrations on the operator's hands and arms). The time saved by utilising BobTail® fasteners is significant when considering the large number of potential fastening points. It could be argued that the cost of the BobTail® fastener and installation tools are more than those of a nut and bolt, but when considered, the high fatigue strength of BobTail® fasteners means that fewer are needed, joint integrity is not compromised, and overheads are quickly saved in other areas. Post-installation Huck® BobTail® only requires a quick visual inspection (no torque, therefore no re-torque is required), saving even more time and expense. In addition, Huck® BobTail® fasteners have been designed to be tamper-proof for an additional measure of security.

Huck® BobTail® fasteners are a cost-effective fastening solution for industries and applications where reducing labour and installation costs is essential. A combination of quick, straight forward installation and long-term reliability make them a preferred choice for many professionals looking to optimise both time and budget resources.

Star Fasteners are Huck® fastener experts and the UK's largest Huck® fastener distributor. We work globally with a diverse range of end users and distributors from across a number of industries, offering technical application knowledge and customer support. Huck® fasteners guarantee performance and help maximise return on investment; get the right fastener for your project and achieve your business goals. With many added value services and years of product application knowledge, Star Fasteners are able to offer a unique customer experience.

Lockbolt® installation sequence (BobTail®)



1. The pin is inserted into the prepared hole, and the collar is spun onto the pin.
2. The installation tool is applied to the annular pull grooves. When the tool is activated, a puller in the nose assembly draws the pin into the tool, causing the swaging anvil to press on the collar, drawing up any sheet gap.
3. At a predetermined force, the anvil begins to swage the collar into the pin's lockgrooves. Continued swaging elongates the collar and pin, developing precise clamp.
4. When swaging of the collar into pin lockgrooves is complete, the tool ejects the fastener and releases the puller to complete the sequence.

Based on a typical installation of 5/8" grade 8 fastener

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