

Forged 'Humps': Heavy Machinery's Safest Pivot Joint

Why massive bearing blocks and clevises are best drop-forged to withstand extreme dynamic loads in heavy equipment and off-road machinery.

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/EINPresswire.com/ -- Articulated pivot joints consist of a bearing block (title image) and a clevis, which together form a heavy-duty hinge. At first glance, these forged bearing blocks resemble three-humped camels—hence the nickname forged “humps.” Behind this distinctive geometry, however, lies a highly engineered load-bearing component—which is best drop-forged.



Heavy-Duty Drop-Forged Bearing Blocks

Forged bearing blocks by KB in Germany.

Closed-die forging is a hot-forming process in which an alloy, such as steel, is plastically deformed between two tool halves (the forging dies), forcing the material to fill the cavity of the dies. The exceptional longevity of drop-forged articulated joints lies in this controlled material flow: unlike milling from rolled steel plate—which severs the internal structure—or casting, which offers no oriented grain flow and risks brittle failure, the grain structure remains completely uninterrupted. It precisely follows the component's geometric contours and critical radii, much like natural wood grain, resulting in superior multi-directional stability and mechanical strength.

****Grain Flow Forging – Lighter, Stronger and Safer****

Although a previous article covered this in depth for forged hooks and eyelets (<https://logistik.pr-gateway.de/grain-flow-forging-benchmark-for-stability-and-strength/>), this principle applies equally to heavy-duty bearing blocks.

=> A comprehensive engineering study conducted by the University of Toledo (Ohio) evaluated the fatigue behavior of crankshafts, which operate under similar stress profiles to

heavy-duty bearing blocks and their corresponding clevises. The research demonstrated that transitioning from cast iron to a drop-forged component of a similar steel variant increases total fatigue life by up to 500%—a sixfold increase over cast components (ResearchGate (https://www.researchgate.net/publication/238088123_FATIGUE_PERFORMANCE_COMPARISON_AND_LIFE_PREDICTION_OF_FORGED_STEEL_AND_DUCTILE_CAST_IRON_CRANKSHAFTS))!

This superior strength-to-weight ratio enables lighter yet safer machine designs.

About the Author

Thomas Henneke is a mathematician with a focus on physics, mechanics, and geometry, and Managing Partner of KB Schmiedetechnik GmbH (<https://kb-schmiedetechnik.de/products.html>), a precision drop-forging company based in Western Germany, specialized in small-batch production of closed-die forgings from 200 g up to 130 kg of all steel grades, nickel and titanium alloys. Additional examples of similar forgings can be found on his blog under “ Joints (<https://drop-forge.com/kb-forged-sized-heavy-duty-joints-hinges-clevises-bearings>).”

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