Notes About Hydraulic Breakers

Gas-fired vs. Oil-fired

There are two core technologies for hydraulic hammers but the basic mechanics are the same. Hydraulic oil from the carrier flows into the hammer and is controlled by a shuttle valve that reverses the hydraulics to move the piston up and down. On the down stroke the piston hits the working tool, which is typically a moil point, chisel or blunt. That tool does the breaking by transferring the energy that is started with the piston-tool contact at the top of the tool through the tool into the tip and then into the material. On the upstroke, the piston encounters resistance from a nitrogen gas charge that aids in the firing of the piston on the down stroke.

In a gas-fired hammer (aka “direct-fired”) the nitrogen is in an open chamber at the back head (top) of the hammer and the piston compresses nitrogen molecules on each upstroke. In an oil-fired hammer (aka “indirect fired”) the nitrogen is contained within a diaphragm that is sealed. With gas-fired, any lessening of the charge will likely be slow. With oil-fired, there is typically either gas in the bladder or there isn’t. In either case if the nitrogen charge weakens or disappears, the hammer will lose the assistance of the nitrogen and hit with less power. The oil flow aids the piston in firing but does not create a hard enough blow without the nitrogen assist.

Arguments For Gas-fired: more reliable technology with only two moving parts and easy maintenance

Arguments Against Gas-fired: nitrogen can leak out slowly and operator may not notice a weakening blow

Arguments For Oil-fired: more sophisticated design, protected gas charge, consistent power

Arguments Against Oil-fired: more moving parts and more that can go wrong

Floating/Suspended Construction

The predominant structure for a hydraulic hammer is with four tie rods (sometimes called through-bolts) on the four corners of the roughly rectangular box that hold the power cell that is the hammer’s machinery. On premium hammers the power cell is also suspended or floating with padding giving added support for proper alignment.

Arguments For Tie Rod Construction: tried and true method for maintaining the critical alignment of all components of the hammer power cell

Arguments For Floating or Suspended Construction: additional support for proper alignment of the power cell

Box Style vs. Side Plate Style Housing

Most premium hammers are housed in an enclosed box that protects the working part of the hammer, the power cell, from the elements and external damage. Many smaller hammers and a few of the larger ones are housed in side plates that do not completely enclose the power cell.

Arguments For Box Style Housing: power cell, which is the heart of the hammer, is protected from outside elements and external damage; the box suppresses some of the noise that the hammer makes while in operation

Arguments Against Box Style Housing: The box style housing requires additional components which need to be maintained and replaced; the box presents an obstacle to working on the power cell.
Arguments For Side Plate Style Housing: easier access for maintenance; fewer components

Arguments Against Side Plate Style Housing: higher noise levels; exposure to elements and contact damage; cheaper construction that should cost less but typically doesn’t

Manually Adjusted vs. Automatically Adjusted Stroke and Speed

The hammer can be adjusted for stroke length with the shorter stroke creating more blows per minute and the longer stroke creating harder blows. Some hammers can be adjusted with a screw and others adjust automatically to the sensed hardness of the material.

Arguments for Manually Adjustable Stroke: operator knows in advance what material he will be breaking and can set the hammer for power or speed to match the application

Arguments Against Manually Adjustable Stroke: material hardness can vary and the operator may not always be aware of that variation

Arguments For Automatically Adjusted Stroke: hammer adjusts quickly to any changes in material hardness; operator does not have to set stroke for speed or power because it's done automatically

Arguments Against Automatically Adjusted Stroke: requires more working parts; requires trust in a technology that is not always easy to see working properly

Dry-fire or Blank-fire Protection

This is a feature that requires there to be a load on the tool for the hammer to fire. As soon as the load disappears the hammer will stop firing. This simply means the operator has to press the tool against the material to facilitate the firing of the hammer. When the tool breaks through and is no longer loaded, the hammer stops, protecting the inner workings.

Hammer-mounted Grease System

This is a unit that comes mounted on the hammer and automatically greases the hammer through hydraulic pressure or, in the case of the GHB breakers, through the vibration of the hammer when it is firing. For many breaker manufacturers this is an option, but for some (including Genesis) it is a standard feature on every large hammer (GHB2000 and up).

Field-servicable Front Head Bushing

The front head is the bottom of the hammer and the front head bushing holds the tool in alignment just above where it protrudes from the hammer. A slip-fit bushing can be removed in the field because it does not require being pressed into the hammer. A press-fit bushing cannot easily be removed.

Rotatable Front Head Bushing

This style bushing can be rotated when the front and back, where tool contact is most frequent, are worn down. It allows two usages out of the bushing before it has to be replaced.

Abrasion-resistant Material in High-wear Areas

Premium hammers typically have special Hardox-type abrasion resistant material on the high wear areas at the front head (bottom) of the breaker. It can usually be replaced without having to replace the body of the hammer, thus saving significantly on hammer maintenance.

In-body Mounted Accumulator

The accumulator is a nitrogen charge within a bladder that mitigates the pulsating of the hydraulic oil before it flows back into the carrier. With no accumulator or with an uncharged accumulator, the hoses will jump wildly as the hammer operates and damage to the hoses and fittings is inevitable. Some hammers do not come with an attached accumulator and one has to be installed in line with the hydraulic flow.

Underwater Use With Compressor

Most premium hammers can be connected to a compressor for underwater work. Air must be flowing into the hammer at all times while underwater to prevent water from seeping into the hammer. Water will destroy the inner workings of a hydraulic hammer.