A General Introduction To Grinder Hammers & Tips

Hammer Types: Rigid Hammers & Swing Hammers

Most grinders are set up with either rigid or swing style hammers, and hammer style variations must be considered in reviewing applications for safety, effectiveness, and productivity. Both rigid and swing hammers are often available in various shapes and thickness to better suit differing cutting and grinding needs, and some grinders are able to be changed from one style to the other.

Rigid hammers are normally held in place by 2 rods, multiple bolts, welding, or other retaining methods, so that the cutting edge remains rigid without flexing back. Swing style hammers are normally held in place by a single rod allowing them to dynamically "swing" outward when the mill spins & flex back when harder material is struck or heavier loads are encountered.

Although there are some applications where the swing hammer is less aggressive and possibly less productive than a rigid hammer, there are many applications where a swing style hammer works very well. A swing hammer's flexing provision also gives the mill a degree of counter-reaction & shock absorption. This flexing provision can add a layer of safety although no mill arrangement is ultimately intended to be exposed to hard ungrindable material.

Swing hammer arrangements normally do not include bolt-on tip provisions since flexing forward & backward can damage the hardware. Many *(but not all)* rotors require rod impact bushings in front & behind each swinging hammer.

Rigid hammers are often considered to be more aggressive and more productive than a swing hammer in many applications, but rigid hammers have no counter-reaction or flex provision, so the same feature that gains productivity could possibly result in increased damage if the hammermill contacts hard ungrindable material.

Some applications may require swing hammers.

Cutting Edge Types:

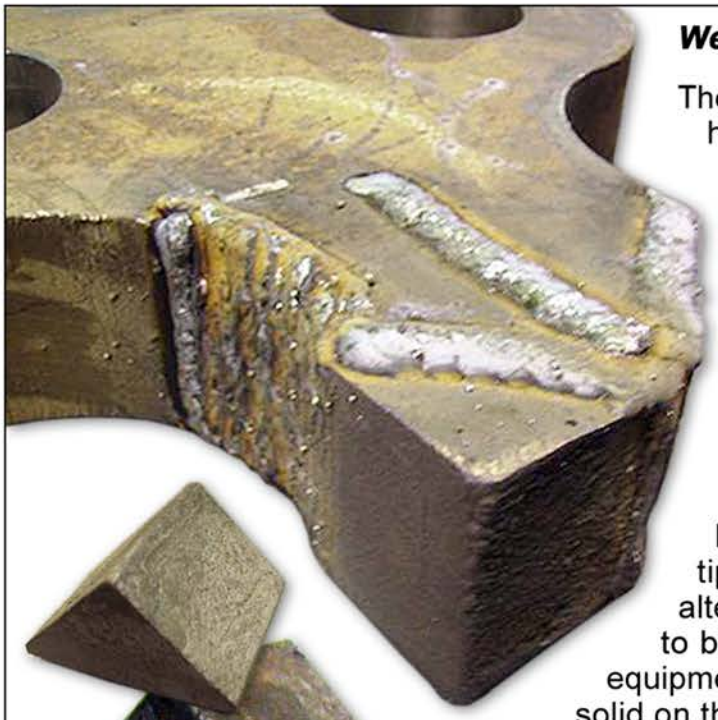
Depending on the chosen hammer style & mill arrangement, a variety of options may be available within each type of hammer, and a primary variation is in the way that cutting edges are maintained.

Hammer tip replacement is normally done in 1 of 4 ways.

- Bolt-On Tip Service
- Weld-On Tip Service
- Build-Up Welding Service
- Whole Hammer Replacement

Each of these methods of maintaining good cutting edges has its own unique benefits and potential drawbacks, and many grinders are capable of having different styles of hammers installed to facilitate the operator's choice of one or possibly more of the 4 different cutting edge maintenance practices. In that potentially catastrophic hazards exist, owners and operators must make sure that the machine and its mill components are properly setup, used, and cared for.

CW Mill Equipment Co., Inc., 14 Commerce Drive, Sabetha, KS 66534 USA
Call 800.743.3491(Outside USA), **785.284.3454**(Inside USA) **or Fax 785.284.3601**



Weld-On Tips *(Rigid or Swing Hammer Applications)*

The Weld-On style tip is where the mill's hammer shank has the cutting edge replaced through a removable tip that is welded on and cut off. Weld-On style tips come in a variety of configurations that mainly vary the size, thickness, and construction material. Most variations offer larger carbide formed into the tip rather than imbedded into a weld.

The users of weld-on tips are often more concerned about having a more secure and effective cutting edge and are willing to expend the extra effort on maintenance to meet their needs.

Being required to cut off old tips and weld on new tips requires more time and labor than some other alternatives. The maintenance technician is required to be a skilled metal worker and welder with welding equipment, but when done properly the tip retention is very solid on this 2-piece arrangement.

Contamination impacts the life of all cutting edges, but weld-on tips do not have the added risk of loosening or breaking hardware if the tip contacts hard ungrindable material. The possibility of contamination needs to be factored into the owner and operator's decision on the style of tip that they plan to use, and the possibility of dislodging a properly installed weld-on tip in a catastrophic event is significantly reduced in comparison to most bolt-on tip options.

Good quality cutting and welding is absolutely required to achieve a solid and reliable attachment of a weld-on tip. Only hammers specifically designed for weld-on tip applications should have tips welded to them. It is common for tip locating jig to be required so that weld-on tips are properly located since an improperly located tip could cause catastrophic damage or reduce the grinder's effectiveness.

Weld-on tips are great for many difficult applications.

Weld-on tips offer magnified carbide profile with large carbide chunks cast into the body of the tip providing aggressive grinding and long tip life.

Build-Up Weld Cutting Edges *(Swing Hammer Applications Only)*

Another possible cutting edge arrangement that is common in the grinding industry is the use of hard surface welding on the tip of the hammer itself. Hammers with hard surface welding directly applied to them for cutting edges can come in a wide variety of designs and configurations that vary the geometry and construction material. Although the cutting edge of the hammer can be built-up with additional hard surface weld, the hammer likely becomes more of a consumable part due to the risk of wearing the cutting edge beyond what normal build up can rebuild.

Narrow cutting edge applications, reduced abrasion applications, applications with an increased potential of contamination, and areas with more confined thrown object zones are among applications that need to review the possibility of using this type of cutting edge.

Contamination impacts the life of all cutting edges, but hard surfaced cutting edges do not have the added risk of breaking hardware or a 2-piece weld joint if the tip contacts hard ungrindable material as they are a one-piece component. The possibility of contamination does still need to be factored into the owner and operator's decision on any style of tips that they plan to use because there is still a reduced possibility of dislodging a piece of the hammer itself if it were to fracture in a catastrophic event (such as heavy contact with hard ungrindable contamination within the input material). The risk of fracture is further reduced as the chosen hammer thickness increases.

Good quality hard surface welding is required to achieve a solid effective cutting edge, and only hammers specifically designed for a direct hard surface cutting edge should be used in this type of application.

It is best to remove the whole hammer when it needs the edge rebuilt allowing it to be brought into a shop for the cutting edge maintenance process. Removing and replacing whole hammers is a sizeable commitment of time, but this allows already prepared hammers with new cutting edges to be immediately installed as the set in need of service is brought back to an equipped area for the process of building up the cutting edges.

Machines with power rod pullers make the hammer removal process much more efficient, and mills that are regularly serviced in this way are usually easier to service as less material is allowed to compact into areas of the mill between services.

Hard surface welding can come in a wide variety of material, designs, and configurations.

***Bolt-On Tips** (Rigid Hammer Applications Only)*

The Bolt-On style tip is where the mill's hammer shank stays in place, and the cutting edge is able to be replaced through a removable tip that is bolted on. Bolt-On style tips come in a wide variety of designs and configurations that vary the geometry, the number of usable cutting edges, bolt sizes, bolt types, wear resistant patterns, and many other variables. The users of bolt-on tips often observe the ease of maintenance and the potential economic savings associated with multiple edges that are usable in the life of the tip, but attention to safety must always be the priority. as tips and hardware must not be allowed to become dislodged.

Most bolt on tip options have a low tolerance for contamination or attempted operation in disrepair.

Critical care of the mating surfaces as well as proactive maintenance of proper hardware is required, and having proper bolt torque is important.

Many hardware options may exist for each size and style of tip. Selection of good performing hardware is of critical importance to avoid possible fatigue, shearing, or any other possible retention issues.

***Whole Hammer Replacement** (Swing Hammer Applications Only)*

Whole hammer replacement is basically the same as the Build-Up Weld style cutting edge only the hammer is simply considered to be a complete consumable, with no hard surface welding on the cutting edge. Other than the absence of hard surface weld for added life, this is the same as the build-up cutting edge version.

In some cases, the hammer shank itself is reversible/changeable such that more than one edge of the hammer shank can be put into the cutting position. Being only available in one piece construction, the operational concerns are the same as the build-up weld style although the absence of additional wear resistance may shorten the usable life of the part in some applications. Upgrading to a build-up weld with or without imbedded carbide is normally found to be economical over this option, but in some close tolerance fine grinding, a more precise edge without weld may be required.

Safety must be the Priority in Considering all Options:

Various machine setups and grinding applications can change performance and safety. Update all thrown object control practices and restraint equipment selections, all policies, and all procedures in accordance to the chosen application and machine setup prior to running the machine. Never compromise safety in configuring the machine, selecting parts, choosing applications, locating the machine, & maintaining a safe & secure thrown object zone.

Owners and operators must become aware and understand the construction of all hammermill parts including the possibility that many components may be offered with material, design, & other construction variations. Within possible variations come different possible performance properties including variations in the way that a part wears and/or stands up to use and possible miss-use. As an example, materials that wear better may sometimes present the possibility of being more prone to fracture when exposed to high stress, and selecting a softer metal may be less prone to fracture but sometimes present the possibility of being more prone to flex or bend. With those factors and other possible construction and design variables, it is important to consider how the part will perform in the toughest situation that an application can deliver including an assessment of how the part will perform when subjected to any possible catastrophic contamination.

Hammer and cutting edge style choices impact the machine's risk of thrown objects. Know and understand the risks associated with your machine's set-up and application prior to operating the machine. All hammer and cutting edge options require clean, grindable input material, and all machines should only be used following the manufacturer's recommendations. Proper parts vary between different models and mill configurations, so always confirm proper fit prior to installation and operation.

Critical care and inspection is required with proactive maintenance in all applications and all component options.