Press Maintenance Checklist used in performing routine maintenance on punch presses

Press Maintenance Check List

**Daily (before each shift)**
- Point of operation guards and devices
- Other equipment safeguards
- Operator controls (Hand and Foot) and displays
- Mode of operation
- Clutch / brake operation
- Fluid and pressure levels
- Auxiliary equipment
- Die lubrication systems
- Note unusual conditions

**Weekly**
- Air component leaks, air filter and surge tanks
- Die installation and feeding equipment
- Oil filters
- Pressure line deterioration
- Electrical controls and selector switches
- Drain counterbalance cylinders, die cushions and surge tanks
- Die lubrication tanks, filters and drains, if any.

**Monthly**
- Air pressure regulators, switches and safety valves-replace as required
- Bolster plate (smoothness, depressions, raised areas) Blanchard grind as required
- Brake adjustments
- Clutch assembly
- Grounding system and magnetic starter
- Inclining mechanism
- Lubricator fault switches and pump
- Motor sheave and flywheel
- Rotary limit switches
- Solenoid valve operation
- Belts, gages and piping

**Semi-annually**
- Bearing clearances and lubrication, Slide and gibs, Frame, gears and legs
- Lubricator reservoir and change oil
- Isolation pads and footing.
- Machine level and floor foundation for cracks

**Press Maintenance**
The beginning of all press maintenance and troubleshooting starts with the press operator. This is the person who is the frontline defense against breakdown.
Accountability begins here. In order to implement any program, proper training and education is vital. The operator can often detect press problems early enough during the normal workday. The key to any successful press maintenance program is to be able to anticipate and react to potential problems before they become major disasters. There are different areas of press maintenance that need to be addressed. The different areas that need to be addressed are basic techniques, machine systems, alignment, pneumatics, lubrication and safety.

After the operator has been properly trained in all aspects of the machine, written procedures need to be in place. These procedures can be in the form of operator manuals or checklists for different areas of the press. Many standards and procedures can be obtained directly from the machine manufacturer’s handbooks or manuals. Remember, training the operator as to why is as important as how, when and what.

During the course of the workday, things can occur to the press that the operator can be alerted to: the sound it makes, unusual temperature changes, chips or metal dust or smoke in certain areas of the machine or leaky lines. The operator, if accountable, must have the authority to have his concerns acted upon. The operator is a customer of maintenance.

Minor repairs such as oil leaks or airline leaks may not warrant shutting down production. These problems should be identified and documented for future action as early as possible. It also should be noted what the consequences will be if not repaired. Many companies inhibit their own maintenance programs by budget restraints and production factors. They don’t see the benefits of these programs because they can’t financially account for it. Preventive maintenance is a part of the metal stamping process and must be recognized as such.

Preventive maintenance programs can vary in cost and complexity. Computer based programs are available and can be customized to particular applications. Some of which can automatically prompt action. Identifying the machine, cause of failure and corrective action is essential elements of any program.

Every metal stamping process should have two types of programs in place. The first is an operator observation that can be done daily. The second is a semi-annual or annual discrete program in which the machine is taken out of service. Data collection is essential to the success of any program.

An operator observation program should contain who, what, where, when and why in the heading along with simple yes or no questions to be answered.

Does the running motion of the press sound smooth?

Does the slide run smooth throughout the stroke of the press?

Is there any visible deflection from side to side when the ram hits the bottom of the stroke?
Are there any signs of “breathing” between the bolster and die when the press hits bottom?

Are there any leaks from the lube lines?

Does the clutch sound sluggish?

Does the motor sound sluggish?

Does the motor emit any odor?

Are all the safety controls working properly?

Are all the line pressures correct?

Are all tie downs secured properly?

The operator should also record all pressure readings on his form. This will allow for comparisons to the actual manufacturer’s machine tool manual. If any faults have been detected, notice should be given to the responsible parties to schedule a maintenance check and repair. These forms should be kept as part of a permanent record of press maintenance.

The second type of inspection and maintenance involves a more in-depth study and knowledge of machine systems, alignment of working surfaces, lubrication and safety functions. The operator observation form can serve as a guide for planning and performing more in-depth maintenance measures. In-depth press maintenance must be done in an exact step by step procedure and documented properly for permanent record.

Presses are similar to automobiles in many ways. They are made up of several major systems or sub-assemblies. First, there is the drive train; second, the motor itself; third, the electrical system and fourth, the alignment and moving parts. All of these systems or sub-assemblies are manufactured to certain engineered specifications and assembled together in a very deliberate and specific manner. Deviations from these specifications can cause machine breakdowns and major overhauls. As with an automobile, there are telltale signs of trouble and malfunction before major breakdowns. Squeaky breaks, pulling to one side, noises, etc. are all good indicators to forewarn against breakdowns. As in presses, these signs should not be taken lightly. Follow all safety manuals and lock-out tag-out procedures when working any machines.

**Tie Rods**

Machines are usually held together with tie rods. These tie rods can become loose and create many problems. Loose tie rods can cause the press frame to torque and possibly crack. This can also cause major misalignment of the bearing surfaces of the machine. Tie rods need to be pre-stressed and installed properly and checked periodically. Simple checks involve measuring differences between major components.
Alignment

The working areas of the press need to be in alignment within certain parameters in order to perform properly and not cause binding or tooling damage. Again, before making alignment checks, check operator’s safety manual and follow lock-out tag procedures. Certain tools are required to make alignment checks.

The tools needed are a precision machinist’s level and square, a dial indicator with magnetic base, small hydraulic jack and precision feeler gage (.001-.030). The first thing that must be done is check the machine to see that it is level. No other alignment checks can be considered valid unless the machine is level. This is done using a precision machinist’s level and placing it on the bed of the machine. This can also be done on the bolster plate providing the bolster plate is free of divots, dips and warping. If using the bolster, be certain that no gaps exist between it and the bed. The normal allowance is .001 per linear foot over the entire area. Keep in mind that the bolster and bed should also be flat within .001 per linear foot. Flatness can be checked with a precision straight edge or by running an indicator over the surface and record the readings. Certain high speed press applications may require tighter tolerance on flatness such as .0005 per linear foot. If the bed or bolster is warped, it needs to be re-machined flat. Do not assume that a warped bolster will be torqued flat when assembled.

With the machine bed flat and level, check the side frame for squareness to the bed using a precision machinist’s square. There are two ways to check the sides. One way is with the square and precision shim stock. The other way is with a sliding indicator. Parallelism between the sides should also be checked with expanding micrometers. All the readings need to be recorded. Again, .001 per linear foot can be used as a guideline.

The next critical alignment check is the ram to bed relationship. Misalignment and side play can be caused by worn gibs. Using the feeler gage, check clearances in the gibs. These checks should be made from left to right and front to back with the ram in the bottom position and with the ram in the top position. Record all readings. Clearances should meet the manufacturer’s standards as set forth in the machine manuals. Check all gibs for galling and interference. Prussian blue can be used to check the sliding action of the ram. Clearances in the gibs and ram are set by the manufacturer and should be maintained from side to side. If the ram and gibs (sides) are out of alignment and the press is level, check the crankshaft area for metal residues or dust. Check the entire press for cracks and make certain all slides are receiving proper lubrication. Check parallelism of the ram to the bed in the down position. Take indicator readings on the ram face, front to back and left to right. Again, use .001 per foot as parameters. Take another indicator reading measuring ram deflection.

Place the indicator on the ram face on the extreme left of the press and jack the ram up and record the findings. Repeat on the right side. Repeat mid-stroke and in the upper position of the ram. Excessive deflection can indicate worn bushings and
bears. As a general rule, deflection should not vary more that .010 from side to side. Check the machine manuals for specifications. Some allowable clearances may also vary according to the size of the machine. Alignment problems will cause die failures and part quality problems. The gibbs may need to be removed and re-machined, shimmed and set. Levelers may need to be installed and crank bushings replaced.

Contributing factors that can cause misalignment are poorly designed dies that have stresses and shock offset in the die, dies improperly mounted in the press, wear, uneven deflection, improper lubrication (or no lubrication), dirt and overload. Die sets are not designed to compensate for a misaligned press. Leader pins are only to insure proper punch and die alignment and repeatability.

Some alignment problems can be corrected temporarily using various “tricks” in order to complete production runs.

Clutch and Brake

The first thing to check and monitor is the air supply. The air supply must be clean, free from water, oil and debris. The pressures must be set at factory recommended values. Increasing air pressure does not increase tonnage or cause the machine to run better. The air supply operates the clutch, brake, counterbalance and cushions. Changing the air pressure can cause overload or underload to these components. The result will be excessive wear and eventual failure. Contaminated air supply will cause damage to the seals and packings that will also cause excessive wear and premature failure. Proper air pressure should be constantly monitored and recorded as often as possible. Improper air pressure can cause brake drag, thereby reducing tonnage. It can also cause delays in the clutch, which will not allow the ram to stop at a predetermined point.

Counterbalances

The counterbalances must also operate with the correct air pressure. They ensure quicker stopping, relieve excess strain on the brake and allow the gear train to operate smoothly. Counterbalances also assist in the proper circulation of lubrication about the bearings. Improper settings of the counterbalance can cause dies to bump bottom and not return. All air lines should be inspected for leaks. All pressure readings should be checked and recorded.

Air Cushions

Die cushions are designed to support and exert pressure on components evenly and straight. Die cushions must be loaded properly and off-center die locations should be avoided. Check all components of the cushions for evidence of wear, galling and straightness. Very often these checks for die cushions are avoided because of the awkward locations.

Lubrication

Check the operator or machine maintenance manual for the proper type of lubrication. There are several types of lubrication systems on the market. Manual
systems are fine for short run and light applications. Most metal stampers using high-speed presses need to employ automatic systems that set the lube at given intervals. In any case, checks should be made on the lube pump and lines for leaks and blocks. Lubrication of the machine slides is also critical. Check for “wetness” and return. These slide lubes are also intended to take out side play.

Cautions
Dedicated presses that are mainly used to stamp similar or the same parts on a high volume daily basis are very susceptible to ram and bolster indentation. This usually results in constant shimming of punch and die components in order to compensate for the indentations or depressions. If not corrected this eventually results in constant broken or sheared components.