

# *Re-Manufacturing Scope*

- I. Pressure wash entire machine to remove all dirt, grease, oils etc.
- II. Hydraulic reservoir drained, cleaned, and rust removed.
  - Pump shutoffs installed if needed
  - Sump filters replaced.
  - Oil level gauge cleaned or replaced.
  - All covers secured with new gaskets, new hold down studs where necessary.
  - All tank return check valves rebuilt/replaced as required.
  - Tymac thermocouple installed.
  - Reservoir sealed and air vent filter installed.
- III. Heat exchanger.
  - Water passages cleaned, flushed, then pressure checked. If any leakage is found rebuild or replace exchanger.
  - End caps replaced as required, new gaskets installed.
  - Oil passages cleaned and flow checked.
- IV. Hydraulic system.
  - Manifolds
    - ☑ Remove all components from manifolds, clean and inspect manifolds for cracks, worn passages etc. If wear is excessive quote replacement.
    - ☑ Stone or surface grind valve mounting surfaces.
    - ☑ All "O" rings replaced with viton.
    - ☑ Replace all relief valves, pilot operated relief valves, sequence valves, solenoid operated valves, pressure reducing valves, one-half inch and smaller with new valves. Rebuild all other valves.
  - Cylinders
    - ☑ All cylinders disassembled and cleaned. Bore honed to clean up. If scoring is excessive, quote replacement.
    - ☑ Install new piston rings, rod packing, rod guide bushing, end cap seals.
    - ☑ Cylinder rod inspected, checked for straightness polished or rechromed/polished if necessary. If bent replace.
    - ☑ Reassemble.
  - Slow down valve (if applicable) - cam operated.
    - ☑ Disassemble, clean, inspect for proper operation and/or wear.
    - ☑ Reassemble with new seals. If wear is excessive, rebuild.
  - Telescopic tubes, (if applicable)
    - ☑ Inside tubes checked for straightness, polished or rechromed/polished if necessary.
    - ☑ Reassemble with new seals and bearings.
    - ☑ Alternatively, replace with hoses at Tymac's option.

## *Re-Manufacturing Scope*

- Pressure piping/hoses.
  - ☑ All piping removed, drained, and cleaned.
  - ☑ Any rust or scale/loose material removed.
  - ☑ Inspect for wear or washout. Any pipe showing reduced wall thickness replaced.
  - ☑ Inspect all welded joints for cracks, pin holes etc.
  - ☑ Reclamp or secure to machine as necessary.
  - ☑ All flexible hose replaced with new.
- Pressure gauges.
  - ☑ Recalibrate all functional gauges.
  - ☑ Replace all defective gauges.

Note: Machine to have pressure gauge on the following;

  - Low pressure relief valve
  - High pressure relief valve
  - Shot pressure reducing relief valve
  - Pilot pressure reducing relief valve
  - Accumulator(s)
- Pumps
  - ☑ Rebuild all pumps, except shot end pump (with shot end).
  - ☑ Pump ratings as appropriate
  - ☑ Pumps to be installed in such a manner as to facilitate normal maintenance activities.
  - ☑ Pump relief valves to be solenoid controlled with multiple relief settings to facilitate energy conservation.

Note: Relief valves to be sized to match pumps.

  - Relief valve 1 - 3 Stage if applicable.
  - Relief valve 2 - 3 Stage if applicable.
- Valves
  - ☑ All hydraulic valves not replaced under 4.A.4 to be disassembled, cleaned, inspected. All valves to be rebuilt to meet OEM specifications. All gaskets, seals, "O" rings etc. to be replaced with viton. All rebuilt valves checked under maximum system operating pressure for external and internal leakage.
  - ☑ Any valve not meeting OEM specifications to be replaced.

### V. Central Lubrication System.

- Replace all meter units.
- Disassemble all piping and clean inside and out.
- All flexible hoses to be replaced.
- Clean and inspect pump reservoir. All seals replaced.
- Pump cleaned and new filters installed. Pump output to be tested.
- If unserviceable, quote new.

# *Re-Manufacturing Scope*

## VI. Machine Base

- Inspected for cracks and leveled.
  - Any cracks found to be arced out, welded up.
  - Base to be straight and level.
  - Leveling on site by Customer.

## VII. Electric Motor(s)

- Electric motor(s) to be rebuilt as required.
  - Installation to be in such a manner to facilitate normal maintenance activities.

Note: Motor specifications to be determined by the pumps.

## VIII. Electrical System - Optional

Note: Existing relay logic to be replaced with Omron or A-B PLC controls. Electrical system design and layout to be done in such a way as to be compatible with new Tymac end components and utilize existing materials if possible.

- Remove all existing relay logic.
- All machine wiring replaced.
  - All rigid and flexible conduits to be cleaned and reused where possible. Must be reclamped.
- Operator station to be pedestal mounted.
  - Station cleaned, all components inspected and checked for proper operation. Any defective components replaced.
  - All nameplates replaced.
- All limit switches replaced as needed.
- All junction boxes cleaned and secured.
- Provide additional junction boxes and wiring as required to meet professional standards.
- Main electrical cabinet.
  - Note: Prefer all electrical components to be grouped as to function. For example, all power components to be grouped together, all control voltage/low voltage/computers etc. together. Existing cabinet assessed for size and suitability. If new cabinet(s) will be required consult with Customer (extra cost).
- Purchase and install PLC controller for die casting machine. Must have enough capacity to control machine and accommodate future output signals for auto ladle, sprayer and extractor (this aux. equipment would be self-controlled but will require timing signals from the PLC).
  - Programming requirements to be determined during electrical system design/layout.
  - PLC specifications -
  - Ladder and timing diagram to be provided to customer upon completion of project.

## IX. Clamp Remanufacture.

- Inspect cross head and guide bars for cracks.
- All toggle links inspected for cracks.

## *Re-Manufacturing Scope*

- All bushing bores inspected and restored to OEM centers. Any bores tapered/out of round to be bored oversized and oversized bushings installed.
  - ☑ All bushings to be replaced with new.
  - ☑ All bushings to be shrink fit-not press fit.
- Any galled faces to be repaired.
- Thrust washers installed where needed to maintain alignment.
- Cross head inspected for cracks.
  - ☑ Cross head guide bars inspected for roundness, fatigue, and straightness. Replace as needed.
  - ☑ Cross head guide bars inspected for cracks. Replace if cracks are found. Re-polish as needed.
  - ☑ Fit of clamp cylinder checked. Rework as needed.
- All link pins replaced or remanufactured as required.
- Tie bars checked for straightness, cracks, excessive nicks/high spots. Measure length and compare with OEM specs.
  - ☑ Rework ring grooves as needed.
  - ☑ Inspect threads for cracks, chips, rework as needed.
  - ☑ Replace damaged tie bars to OEM specs at additional cost if required.
  - ☑ Gun drill tie bars for tie bar strain transducers. **Optional** at additional cost.
- Ejector bump plate resurfaced.
  - ☑ Replace plate if resurfacing will remove more than 1/4".
- Platen carriers and rails inspected for flatness & parallelism. Replace as needed.
  - ☑ Rails reground and polished.
  - ☑ Rework or replace shoes.
- Platens.
  - ☑ All platens cleaned and machined, or ground flat and parallel as required.
  - ☑ All "T" slots cleaned and inspected. Re-machine as needed.
  - ☑ Linkage mounting inspected. Machine flat and parallel as needed.
  - ☑ Replace all guide bushings. Inspect back plate tie bar holes and rework as needed.
  - ☑ All bumper pin holes inspected. Any tapered or out of round holes to be welded up and re-bored.
  - ☑ Weld and re-machine stationary platen to accept shot heights and Tymac shot end.
- Reassemble clamp. Align parallel and square with base. Adjust platen carriers for proper bushing clearance.

X. Rebuild motorized die height system as required.

XI. Tymac tie bar strain monitoring system. - **Optional At Additional Cost**

- System to monitor strain on each tie bar and provide output when out of tolerance condition occurs.
- Total clamp tonnage to be part of SPC data retained for each shot during runoff.
- OOT conditions noted in SPC runoff data (Tymac RTU-9000).
- Requires gun drilled tie bars option.

## *Re-Manufacturing Scope*

### XII. Machine safety requirements.

- Meet ANSI B152.1 requirements.
- Operator side safety door to be power actuated at additional cost.
  - ☑ Must be select able for automatic or manual operation.
- Shot safeties to include:
  - ☑ Full hydraulic system pressure on clamp cylinder.
  - ☑ All guards in proper position.
- Low pressure close.
  - ☑ Machine to close under a selectable low pressure until die faces nearly touch, at this point full hydraulic pressure is applied.
- Rebuild safety ratchet as required.
- Repair/replace all guards.

### XIII. Assemble and paint with Polane per customer color requested.

- Runoff test to consist of 8 hours continuous operation.
- A Tymac RTU/LCM-9000 monitor will monitor the machine continuously during the runoff.

### XIV. Install new Tymac Shot End consisting of the following items:

- RTU 9000B Operator Terminal and the LCC 9000 Data Acquisition & Control unit for state of the art monitoring
- Model 680K1 SuperShot III Shot End with 7 phase Real Time Velocity Control, filtration system and a separate adjustable “Intensimax” Hydraulic Intensification System
  - ☑ 2350 psi
  - ☑ 71 tons Injection Force
  - ☑ 500 ips dry shot speed
  - ☑ 5.5” Piston diameter, 3.5” Rod Diameter
  - ☑ 18-24” adjustable shot cylinder stroke (30” optional)
  - ☑ 0-10” adjustable shot height
  - ☑ Processes Programmable: Conventional High Pressure Aluminum & Magnesium Castings, Squeeze & SSM

### *Note*

If the machine was not previously inspected by Tymac, or a Tymac clamp end check list was not filled out and returned, Tymac will repair or replace defective components (such as linkage, platen and tie bars, etc.), not explicitly covered by this quotation as enumerated above, at additional cost. After inspection by Tymac, customer will be notified of these additional costs and will amend the purchase order to reflect these changes before we proceed with the work.

A complete set of schematics and a manual must accompany the machine or will be provided at an additional cost.