

Specification of Cold Radial Forging Machine

Forging equipment enabling to forge forgings as part of a single, fully automatic operation under cold conditions.

Parameter selection: machines matching the selection provided by the buyer. In Appendix 1a, Fig. of semi-finished products before and after a forging operation. The following are the minimum parameters:

- Number of forging hammers 4
- Max. forging force min. 1250 kN
- Max. start diameter of a blank approx. 55 mm
- Length of a blank min./max. 300/630 mm
- Length of a forged workpiece max. 950 mm
- Number of forging strokes approx. 1200/min
- Chuck head feed speed infinitely variable from 5-500 mm/sec.
- Hammer feed speed (diameter adjustment) infinitely variable from 0.1 - 8 mm/sec.

CNC Control

The control panel with a monitor to control the machine, program and display various production data, such as: feed rates, pressures, forging power, forging force, multi-channel oscilloscope. Machine operation and program handling are performed on Windows 7 (or later version) operating system.

Operator's Interface

For suitable support of the forging process, the software provides the following properties:

- control of the machine complete operation
- login dialog supporting the user's different priorities
- program management for loading, editing, and processing of forging programs
- displaying and editing of the machine parameters
- automatic operation displaying production data and machine data (choice of the extended-menu or reduced-menu display)
- manual operation with a detailed display of machine data
- displaying status messages and error messages with on-line support
- managing of forging tools with tool life management
- the function of machine self-start (configurable, e.g. for machine warm-up)
- the system support functions for fine-tuning and diagnosing
- supporting troubleshooting by machine status menus
- the oscilloscope function (configurable) for graphical real-time data display
- displaying of actual hydraulic and electric input- and output-values
- automatic diameter compensation in reference to forging box temperature
- automatic diameter compensation in reference to forging force (this ensures tight tolerances particularly with varying yield strength of blank material)
- automatic recording of operation hours for motors and pumps

- automatic recording of process data control file (configurable)
- automatic recording of message log-file (status- and error-messages)
- machine data acquisition

Screens should be supported in Polish.

Workpiece handling device

consisting of:

- a robot with 6 axes including a workpiece gripper as per Appendix 1a.
- a loading / unloading table

Spray unit - for automatically lubricating a blank diameter before forging.

Mandrel cleaning device - for automatically cleaning the forging mandrel after each resp. several forging processes.

Noise enclosure

Noise protection for the complete machine with sliding doors in the area of loading/unloading device, 2 ventilators (one for supplying fresh air and one for exhausting the air from the machine area)

Forging tools

Full tooling to carry out a forging process of individual semi-finished products as per Appendix 1a, i.e. forging hammers, driver chucks of a semi-finished product, mandrel guide, grippers for robot and handling device.

Assembly at the Manufacturer's

The machine and equipment will be assembled at the Manufacturer's works, then a functional test run will be required.

Pre-Acceptance

A pre-acceptance test run is provided at the Manufacturer's works in the presence of the Customer's representative.

For the Pre-Acceptance, the following types of barrels, agreed on mutually between the customer and the machine manufacturer, will be forged.

For the Pre-Acceptance, the Manufacturer will provide blanks corresponding to the desired quality of the forging process. The Pre-Acceptance will demonstrate functionality and capability of the forging machine to forge the aforementioned agreed on calibres. In the presence of the customer's representatives, five (5) pieces of each of the barrels agreed on mutually will be forged. As far as possible, the barrels forged will be measured and their execution will be accepted. The pre-acceptance test runs will be recorded and the protocol will be signed by both parties to the contract.

Training

In the course of the pre-acceptance test activities, the machine manufacturer will provide training in mechanics, hydraulics, electrics, electronics and software (a total of 6 trainees) It is assumed that the basic training will take seven (7) days. The Customer will delegate technicians for training.

One week of training at the time of starting the machine will be provided covering programming/operations and maintenance (Buyer Site – a total of 6 trainees).

Terms and Conditions of the Final Acceptance

For the Final Acceptance, the following types of barrels will be forged according to semi-finished product proposals as per Appendix 1a.

The blanks for the Final Acceptance will be provided by the Customer according to the Customer's drawing Appendix 1a. The Final Acceptance will demonstrate functionality and capability of the forging machine to forge the aforementioned types of barrels.

Between 10 and 20 pieces of each barrel as per production technology and Appendix 1a will be forged.

Measurements of the barrels forged will be made with measuring instruments supplied by the Customer (gauges and appearance acceptance). The Final Acceptance will consist in correctly forging five (5) pieces of barrels as per Appendix 1a, then the acceptance certificate will be compiled and signed by both parties to the contract. The guarantee period will begin from then on.