

Smart Brass Forging

By Danilo Fagnani

MECOLPRESS started their activities in Brescia (Italy) more than 50 years ago, in 1969, providing solutions for the hot brass forging industry. MECOLPRESS then widened its portfolio including hot forging steel, aluminium, titanium, and special alloy applications. MECOLPRESS is now offering the most modern technologies available for mechanical (HEAVY family), hydraulic (ME Family) and screw driven (TDS, FPN family) presses.

The region of Brescia, located East of Milan, is generally considered the cradle of brass production, at least 20% of the total world production is firmly located here. The Brescia region is still able to compete with Chinese brass manufacturers (35% of the brass total world production) even if the production costs are not comparable in terms of manpower, energy and etc... The secret of this success is the know-how of the full brass production chain, industrially started from the 19th century, from melting process passing through forging then achieving the final product completion. MECOLPRESS was born and built in this interesting and dynamic environment, participating and contributing to solve the main challenges of brass producers (Smart Brass Forging).

These challenges are cyclically recurring in the market, and they can be summarized as follows:

- raw materials availability and costs;
- high variability in the market for parts from the peaks of high demand to small lots with frequent parts changeovers;
- difficulties to find the necessary manpower, from highly skilled operators, to maintenance technicians, to standard operations workers;
- availability to grant the best products quality reducing the non-compliant ones;
- reduction of the energy consumption approaching the green economy transition.

MECOLPRESS is supplying to the market the most powerful hydraulic presses (ME family) offering horizontal\vertical coring performances achieving:

- flash-less forging;
- reduced part material thicknesses;
- deeper and deeper punch coring penetration.

These features drive achieving parts with less weight and avoiding any further downstream process as trimming. ME hydraulic presses family (more than 60 units supplied from 2010) has standard sizes:

- 100 to 500t as die closure force
- 30 to 350t of punch coring force

The coring punches have independent movement guiding and optimizing the flow of material inside the die's cavity. The punches forces, speeds, displacement sequences can be flexibly implemented in the HMI operator panel depending by the products to be forged (Smart Brass Forging). One of the four horizontal punches can be orientable (without losing coring force!) with the variable angle from 0 to 45° allowing sloping coring for the parts.

The ME family hydraulic presses grant production performances that, depending by the equipment size, can reach up to 30 cycles per minute and they allow to forge multiple parts per stroke, throughout of some thousands of parts per hour is easily achievable. This will allow to complete productions lots in shortest time even if they are relevant in the number of parts to be reached. If the market conditions are changing and the market moves to lower number of parts per lot with frequent shifting between the products, the quick dies changing system will allow to dramatically reduce the down time. The fully automatic tools locking\unlocking and the servo-moved supporting arms allow one operator to accomplish the change in the quickest time (about 15-20min), in the complete safety conditions and without the help of any tools (Smart Brass Forging).



Mecolpress ME Next Generation series hydraulic press hot forging EG coring tool

The MECOLPRESS policy to reserve relevant stock of spare parts for all the presses that have been supplied is a key point to avoid unwanted down time in case of maintenance of the equipment.



Mecolpress ME Next Generation series hydraulic press outstanding parts weight reduction

MECOLPRESS is developing all of the control software for the presses: CALIPSO (Smart Brass Forging). This user interface is based on a touch screen model, it is very easy and intuitive, and it has been developed in several different languages; it allows any end user operator to work with continuity on the press and it does not require any particular skills or knowledge. Many functions have been simplified as input parameter requests to reduce the human factor effect in the press working conditions. CALIPSO defines and controls automatically all the ME family presses operations, from raw material loading up to forged parts unloading. The main parameters of each product receipt are saved in the internal memory, and can be easily retrieved for future production and transferred to customer MES\MRP. The press has an Ethernet OPC-UA connection module that grants this function as well the remote teleservice assistance by the MECOLPRESS technicians.

The MECOLPRESS R&D department is able to define the optimized process parameters and/or the best die geometry through FEA software which allows them to analyze both material flow and forging force. This on-demand service is appreciated by customers who are searching for a reliable supplier.

ME hydraulic presses can be paired with all types of furnaces: billets, bars, natural gas, electric induction, keeping in mind that the reliability on the heating temperature, the billet weight tolerance and the material metallurgical microstructure properties are key parameters to grant effective flash-less process success.

High production capacity, flexibility to switch from one product to another and high equipment reliability vanish if the forging process is not under full control. CALIPSO software is leading the game supporting the customers to control, with minimal effort. The forging forces, punches displacement parameters and sequences, billets temperature, and so on can be monitored in the maximum\ average values or continuously during the working cycle. The desired thresholds can be set in the system to monitor the trends of the parameters and if any mismatch is found, the parts can be diverted automatically to the dedicated collecting box for further checking.

MECOLPRESS is fully committed to be an effective part of the green transition of the industry, reducing the energy consumption, pollution emission, and media consumption. This application shall not decrease or compromise the outstanding powerful performances of the ME family presses. CALIPSO and in-house engineering are the main characters of this target:

- hydraulic auto-adaptive regenerative function circuits;
- ECO mode for working pressure optimization;
- actuators optimized geometry;
- flexible set up of the operating pressure;
- AC frequency converters\variable flow hydraulic pumps;
- CALIPSO software that learns from experience optimizes the working parameters without relevant operator required intervention (Smart Brass Forging)



Mecolpress ME Next Generation series hydraulic press main view

These points collaborate to reduce the energetic consumption up to 50% in comparison with standard technology presses.

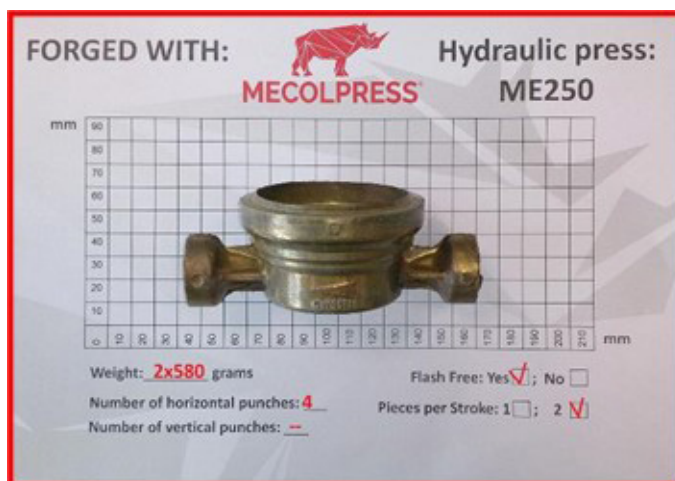
The dies lubrication system, very important in the flash-less forging, is using innovative pipe to pipe technology supplying alternative air and oil flows just with the needed quantities. All the dies lubrication parameters are set into the control software and up to 30 points can be reached; they can be integrated into the dies or with external nozzles. The proper pumps are installed on the machine bottom to collect all the remaining quantity of oil avoiding any overflow. The press lubrication is selective and only the components active are reached by the media, proper collecting box avoid leaking. No more waste of fluids!

The innovative suction hood embedded in the press structure collects the emission very close to the sourcing point, decreasing any possible spread into the environment and granting the best cabinet inside view of the process to the operators.

As all MECOLPRESS products, the ME series fulfills the most severe international safety standards and can be produced in compliance with North American and Canadian ones.



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Mecolpress ME Next Generation series hydraulic press four parts flash less hot forging examples