**ROBOT DIE WELDING**

**Advantages and results**

Robotic technology is capable to reduce costs for dies and tools of forging production and bring the “old” die welding regeneration technology to the next level.

Tooling costs is traditionally number two of three in almost any forging plant production costs; High cost of die tooling is not nearly the single problem of press forging plants management. Unexpected failures, short service life and low endurance are other sources of major concern.

Dies repair by welding is one the most effective solutions. The advantages of this solution are obvious: regeneration of impression that allow not only improving die endurance, but also increase overall service life of die blocks.

There are two classical approaches for surface build-up repair: manual welding with the use of stick welding or semi-automatic welding and semi-automatic welding deposit with the help of auxiliary devices and machines. Both approaches have disadvantages.

Basic deficiencies of manual welding deposit are low efficiency and full dependence on welder’s expertise. Pores, insufficient penetration, excess of welded material or lack of material can be discovered only by machining ofdie impression, and corrective actions are costly and time-consuming.

The key solution to resolve above mentioned deficiencies of weld repair is the usage of welding robots. This new technology successfully combines existing method and advanced software.

**Technologysummary:**

1. Preparing a die for build-up.
   Elimination of worn layer (hot cracks and other defects) from the dieimpressionby manual gouging.

2. Laser Scanning.
   3D scanning of obtained surface after gouging. No high precision is needed, so 3D scanning and data processing for subsequent operations takes only minutes. Using scanned surface and 3D model as master data, programmer can make up executive program for robot with the help of special software.

3. Welding.
After the program is ready and the die is heated to required temperature (normally 400 °C) the Welding itself can be done.

During welding process, robot operators need to monitor only few parameters and make sure slag is removed when needed and wire changed at request

   Here heat treatment is similar to any other operations for weld repair works: die tempering and stress relief is performed to achieve required structure and hardness of a new layer.

Robotized build-up operations also give some possibilities:

1. Repair of dies with various configurations.
   Applying different build-up strategies allows to “rise” template sides and to build up surfaces with minimum consumption of costly material. The use of rotary tables and guide rails for robot facilitates unlimited repair in terms of dies size.

2. Tooling modification.
   The need to keep up with modern tendencies leads to numerous modifications having to be made to products and components. Robotized build-up technology offers various opportunities for prompt modification of existing tooling and rebuilding of out-of-date dies.

3. Selective deposits of material.
   Method of layer-by-layer build-up and high precision permit using different materials application to certain die areas with precise and repeatable approach.
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Specialized in forge die welding facility with 5 welders and 4 robots dedicated to forging dies regeneration

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