

A modern approach to Quick-Change systems.

Abstract

Within the forging industry, the production line set up has not been considered an important topic since the beginning, but has become increasingly important as technology progressed and as efficiency became one of the primary concerns within the industry. For the purpose of this paper, we will define “machine setup”, or “quick-change”, the sequence of operations that are made after the production of the last part of job one and up to the first good part of job two. In order to achieve a better performance, the technology evolved from directly attached dies, usually bolted, to systems using interface elements such as plates or cassettes and, finally, to systems with hydraulic clamping devices. A modern approach to this practice, however, requires a more integrated view of the whole production line change. Forgers are used to process control logic and know very well how critical it is to have everything properly designed and specified before starting the forging operations. The very same concept applies to quick-change which, when carefully and appropriately designed, results in a process that can be controlled. Modern lines are complex and often consist of various machines which allow the material to go through multiple paths depending on necessities of each part. The first step would be to analyze the critical points of the line. These are the points which might require an adaptation to change production on to any part/machine of the line. The second step is an accurate planning of the tools and the procedures that are required to perform these tasks. The last step is the definition of the key roles of the subjects involved in the actual operations. Following this logic, it is possible to greatly improve the operational efficiency not only by shortening the machine downtimes, which is the biggest driver in the adoption of quick-change systems, but also by achieving additional benefits such as the ones analyzed in the following part. Properly designed tools allow for offline assembly and check in tooling shop, helping to identify and correct potential problems, even before the machine has finished working on previous job. Proper tools handling can be attained by dedicated devices which are currently mandatory for large machines, although their use should be considered for smaller ones as well. A consistent logical approach throughout the whole line allows for an easy training of the operators with huge increase in safety and proficiency; moreover, as all the critical decisions are planned beforehand, the risks of errors that might cause damage to the equipment are greatly minimized. In addition, a modern quick-change system improves forging operations accelerating the performance of the production tests, at the same time allowing adjustments to be made during the normal runs. The correction of problems arising during the production activity is greatly helped by systems and procedures that enable quick inspection and changeover.

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