TRUCK FRAME COMPONENT MACHINING

The Truck Frame component is very a large casting of a complicated shape for a locomotive undercarriage which is manufactured in the Czech Republic for a company operating on the American market. This company, through a Czech company, enquired about a machine for comprehensive machining including a clamping fixture, technological program and tooling.

The Truck Frame is a complicated workpiece made of cast steel designated as CB 170.5.0 as per Material Data Sheet in which are sand, inclusions and porous flaws.

The customer's main objective and fundamental criterion was to machine components in a required quality and to achieve a machining time 18 hours and 36 minutes. The Truck Frame is a sophisticated component made of cast steel designated CB 170.5.0 as per Material Data Sheet in which are sand, inclusions and porous flaws. Considering all specified input conditions, one can say that this involves a very complicated machining in view of technology and the selection of tools in particular.

When the original solution of the Truck Frame machining technology was applied, the machining time was 162 hours including fine-tuning. The machining test was run in the company TOS Kuřim on the CNC gantry-type machining centre FRF 250.

The component was machined in three positions with tools set up in TOS from standard company stock. This means that no special tools were used. The final machining time of 80 hours was achieved at this first trial run . After calculation of the working cycle time, using the cutting conditions corresponding to progressive tools, it was inferred that the machining time could be substantially shortened, which was guaranteed to the customer who was interested to buy the FRFQ-type CNC machines.

Another stage of technological tests

Another stage of technological tests of the Truck Frame machining was held at the end customer on a newly supplied FRFQ 300 centre, length of table 16,000 mm, width 3,000 mm.

Initially, the component was machined in 3 working positions including re-clamping, on the basis of achieved results and following further adjustments, it was later possible to change over to machining in two positions only. The Iscar company joined the project in a significant way too; they supplied tools and the technicians of the company assisted atfine-tuning and determining cutting conditions. The resulting machining time achieved in this second round of tests was 40 hours, which still failed to satisfy the customer.

Other gradual steps were taken in program modifications, other test were run under new cutting conditions, idle times were eliminated to the maximum, for instance when the spindle was traversing over the workpiece and above all new special tools were put to use. The overall time of technological cycle, reached after all these modifications, was in the final result better than the originally offered 18 hours and 36 minutes.

The main reason of the striking improvement of time was a detailed reworking of the entire technological machining process including cutting the idle time down, modifications of clamping elements and, above all, using of progressive tools. The final result of this project proved the necessity of careful preparation and gradual testing of partial steps in fine-tuning of technology of similarly sophisticated machine units. Customer's satisfaction is at the end of this arduous process.

Lukáš Řepa

www.mmspektrum.com/071239

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