TOS Kuřim Production Program Getting Stronger

Sixty-kilowatt heads to become a standard soon

We are talking with TOS Kuřim Technical Manager, ing. Jan Sobola

■ **During our last interview in spring, you clearly indicated that TOS Kuřim was preparing a new concept of machine tools for production, and that the company had even some new prototypes ready. Could you, therefore, characterize technical designs and technological landmark in TOS Kuřim's production program?**

Yes, recently I have admitted that TOS Kuřim will come up with a quite new machine and, simultaneously, I have indicated that the company is developing a 60kW headstock, and a 60 kW milling head as a result. Development trend in efficient milling heads in our company has opened door to quite new industrial sectors, as is power engineering, construction machines, mining industry, etc.

FRUQ portal milling machines will soon get their 60 kW headstocks too

So far we manufactured FUQ, FRFQ, FFQA centres with maximum headstock output 30 kW. Currently we are assembling a new line of portal milling machines with travelling cross slide and moving table of FRPQ type, with a milling head of max. output up to 60 kW. A stronger headstock expends technological range of the machine.

The FRPQ milling centre is being developed with the assistance of the Czech Ministry of Industry and Trade (MPO) under the Impuls program. The machine development was completed last year, this year first prototypes are coming out, and next year a series production will start. The former application to the Impuls program was for single-headstock designs with a vertical headstock, two heads and with the moving table dimensions 2 x 6 m. Following marketing research and concrete negotiations with customers (first customer is quite certain now), the FRPQ machine project has expanded to two vertical headstocks and a table of dimensions 3 x 10 m, with a 24m long bed serving as a basis.

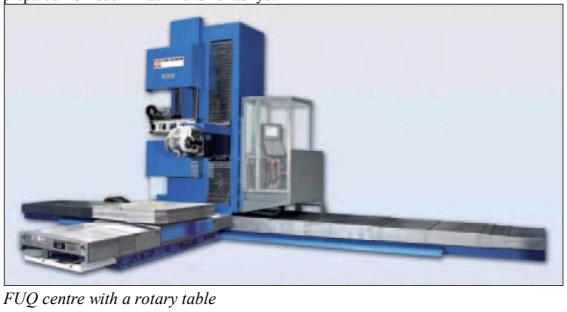
However, TOS Kuřim had not been prepared for such machine size as yet (especially as regards weight), therefore, a new workplace had to be built in the TOS Kuřim plant; this workplace will allow for assembling big machines. We presume that the demand for such heavy machines will still grow in the future.

We envisage broadening out the FRUQ portal milling machines in a similar manner, with max. output of headstock 30 kW going up to 60 kW. As the headstock output goes up, we also have to design and dimension the main working parts of the machine. For FRUQ, we envisage a max. travel in X axis 24,000 mm. in Y axis 5,800 mm, in Z axis 1,500 mm; max. table clamping surface is 4,000 x 20,000 mm. The so called *sixty* (FRUQ 60 kW) is also being developed with the assistance of the Czech Ministry of Industry and Trade (which means that the entire project is under strict time-schedule surveillance: design documentation must be completed this year, next year the prototype must be finished, with subsequent launching of serial production.

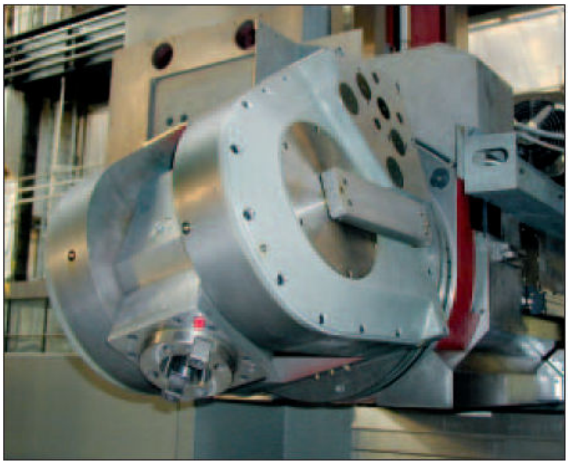
It is presumed that marketing research will show that TOS Kuřim will still include a line of FU heavy horizontal centres into its development range. As yet the FU line has had maximum headstock output 30 kW, and the coming line should be of 60 kW. Maximum travels in X/Y/Z axes are as follows: 20,000/1,500/4,500. The design will be ready in 2009, and the serial production will be launched in 2010.

■ **Do you consider the MPO Impuls Program, as regards development of new products, as the mainstay one, or do you take it as a certain facilitation of the necessary development process only?**

I would say that the governmental assistance is of cardinal importance for us. Financial contribution for the project in a given sphere is usually from 30 to 40%. This is not a negligible amount, no doubt; moreover, the MPO Project is being continuously monitored and supervised by the Ministry, consequently, the beneficiary of the assistance must meet the defined time limits. Eventually, the beneficiaries have to speed up the entire process of development and production of a new machine as a result. Since the entire project is based on a deadline: an exact deadline is set out for design completion, prototype production completion deadline as well as the deadline of final expert's opinion. Until the time the expert's opinion process starts, all tests must be run. All is determined by fixed time limits that are invariable. Provided you fail to meet one deadline, you automatically lose all benefits of a governmental-assisted project. For me, as a technical manager, the system strictly adhering to deadlines is of cardinal importance, because it acts as a whip saving nobody, and thanks to which the technical development, it proceeds even faster. Without a consistent adherence to the determined deadlines, the entire project would lag behind by half year at least, which would negatively impact the sales.



FUQ centre with a rotary table

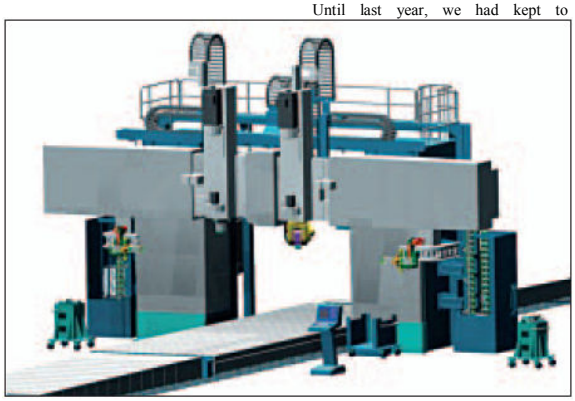


Exchangeable spindle head of TOS Kuřim production

■ **By how much has the development and launch of the new 60 kW milling machine production been cut down as compared with e.g. 10 years ago?**

This cannot be compared. We were developing no machines of similar size at all 10 years ago. We were developing machines of relatively smaller size (based on milling machine of FGS type or table milling machine of FC type) with the continuous time of design, production and assembly in the course of three years. Today, when the Ministry of Industry has declared to provide assistance (it is roughly during April to May), we are starting with design. Drawing documentation must be ready by the end of year, and the other year we have to start with production including assembly. Thus a sizable pressure is being developed to get ready with the design, models, technology,…etc.

■ **Are you offering to customers the resultant accuracy of the machine within electronic compensation?**



Portal milling machines with travelling cross slide and moving table of FRPQ type

There is a regulation in our company saying that a machine must have a precisely determined mechanical accuracy and within compensation it is possible to fine-tune exactly determined values only. Surely, the required resultant values of (high) accuracy can be achieved exclusively through electronic compensation (and some customers and producers do it so: they build a machine and then they fine-tune electronically to a measure), however, such machine, during its operation at the customer, is prone to change its mechanical parameters. During running-in of mechanical components (and after a certain wear), the machine has to be re-gauged in a sophisticated manner and to fine-tune the electronics again. We do not want this and we hold this principle: to achieve accuracy limits mechanically and to fin-tune slight nuances electronically only.

■ **TOS Kuřim has very good repute in the development of milling heads…**

Yes, it is something unparalleled within our republic and the something which drives us forward. TOS Kuřim started with the development of milling heads 20 years ago, and by the ongoing development the company, it has worked its way to the situation when we have three types of fixed milling heads available for performance of 22 kW, 15 types of exchangeable milling heads for performance of 30 kW and, currently, an assembly is underway of prototypes of three quite new exchangeable milling heads of maximum performance of up to 60 kW.

■ **How far has the machine design affected the increased output of the headstock?**

Until last year, we had kept to headstock parameters for serial production at 4000 rpm and 2000 Nm. Sizing of the entire drivetrain and milling heads corresponded to this, after all TOS Kuřim has been developing heads for approx. 20 years. Based on the research of the Eastern market, our new owner needs machines with slide rams of approx. 100 kW today. The whole development of new machines (see the text above) has been pre-dimensioned to manage 100 kW headstocks.

■ **By the way, are customers capable of operating the sophisticated CNC machines at all? Our information is that this starts to be quite a problem?**

Currently, a large series of machines manufactured in TOS Kuřim is being offered and implemented with the so called "technology". This means that we do not sell machines as such only, but that we supply the entire production technology; we equip a machine with a special workpiece clamping, specific tooling and technological program. In other words, we closely collaborate with tooling suppliers. As regards tooling, it is the customer who is of consequence, it depends on what experience he has with suppliers, how the tooling policy is managed within a company, etc. The entire demand of technology is given by the fact that a customer may not have programmers available at the start, has a lack of fully qualified staff in all positions; therefore, customers have several programs to be made in TOS Kuřim including subsequent fine-tuning.

■ **What manners of unification do you use in constructing special-purpose machines?**

Where technically acceptable, we assemble special-purpose machines from standardized nodes (headstocks, tables, travelling units). In cases where it is impossible, we develop a completely new machine as per customer's requirements. We focus on machines dedicated to certain concrete production technologies of late: for instance, manufacture of pivots and steering connecting rods for automotive industry. Last year we developed a vertical two-spindle FMVQ 36 centre for the need of serial production. This involves a high-performance production machine tool centre capable of doing a wide range of tooling operations. The machine was awarded with the Gold Medal at last year's IMT in Brno.

For absolute majority of our machines (universal and special-purpose) we provide the so called technological verification within which we manufacture for the customer the first e.g. 50,000 workpieces directly in TOS Kuřim. During this time, the customer will provide his own machine operators who, in the course of this technological verification, will get proper training. It is only after a test period with fifty thousand pieces made, that the new machine goes to the customer. This means a quite new approach than in the past when we had manufactured for a customer a certain volume of goods and the customer eventually failed to place an order for the machine saying that he had no skilled operators, no needed area to place the machine in, etc. Based on experience from this year's EMO Hannover, we are faced with a quite new topical development task: to apply hydrostatic lines into heavy machining centres. ●/kuc/