

New trends in the design of machine tools

Petr Zelený – Production Machines I

06.12.2013

New trends in the design of machine tools

- **Utility properties of machines,**
- **Technical trends,**
- **Non-technical trends.**

Utility properties of machines

- High **precision** of machines achieved on products,
- High **quality** of achieved surfaces,
- Large **production output** in short or long term,
- **Reliability** functional and also in quality,
- **Economic efficiency** for investment and utility,
- **Respect** for the environment.

Technical trends – Technology and usefulness

- Manufacturers of machinery and tools are more and more perfectly presenting technologies, applications, and specialty and **top workpieces**.
- Customers are increasingly more interested in the outcome and cost, not the way and method.
- The machines are offered in relation to the workpiece **material (titanium, stainless steel, composites)** and the **industrial sector (aviation, energy ...)**, for which they are intended, not as the size and performance series.

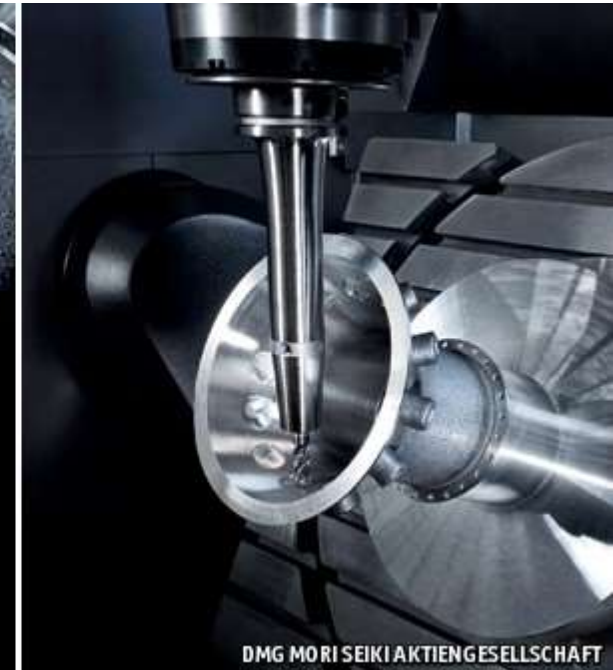
Technical trends – Technology and usefulness

- Future competitiveness of manufacturers of machines is built on the **technology and application** capabilities and the ability to provide a maximum of good and for user convenient customer support machine utilization.
- **Minimizing the significance of machine operators** in all ways. Growing importance of the topic of "intelligent manufacturing" - optimized and less dependent on the human factor.

Technical trends – Multifunctionality - complex machining / manufacturing „Complete machining“

- Not intensity to specific details (acceleration, speed, power), but it is preferred **multifunctional machines**. Growth multifunctional machines and their ability to fully implement **multi-processing** is a very important trend. This is related to higher demands on the efficient use of these machines and the increasing demands on the construction of these machines and their components.
- In one workspace to implement multiple operations and machining, minimizing errors caused by re-clamping, **integrate manufacturing functions**.

Technical trends – Multifunctionality - complex machining / manufacturing „Complete machining“



Technical trends – Multifunctionality - complex machining / manufacturing „Complete machining“

- Minimize the risk of the user that the machine will not work, **the pressure on universality**, large ranges of parameters, upward pressure on the quality and accuracy in a large machine, performance in small machines.



Technical trends – Category cheap, branded of machines

- They are offered and expanded category cheap machines from major manufacturers (small machines). The machines are characterized by small custom configuration options (mass-produced) and less luxurious control systems, but machines **have everything necessary** for high-quality machining and often quite **wide at the base accessories**. They're also **5-axis machines**. A new solid group segment of the market. Meets the requirements of 95% for 59% of the price.

Technical trends – Design

- **Evolution has taken place in the design**, aesthetic and functional quality of design and implementation of manufacturing machinery has undergone tangible boom. Quality design, ergonomics and aesthetics and craftsmanship in the field of new and more expensive of machines **becoming the standard**.
- Design helps
 - Uniform level of visual communications company in the market
 - Strengthening its position in the market
 - Increasing the competitiveness of manufacturers
- The specific role of design of machines
 - The formation of work environment for operator
 - Increasing operator productivity by suitable arrangement of workplace

Technical trends – Design

DMG/Mori Seiki

Pioneering design solutions

- Complex design of all type series
- Design *Dominik Schindler Solutions*
- New control panel with the system CELOS



Technical trends – Design



Technical trends – Design

CELOS
von DMG MORI SEIKI



CELOS
von DMG MORI SEIKI

Technical trends – System (complex) solutions

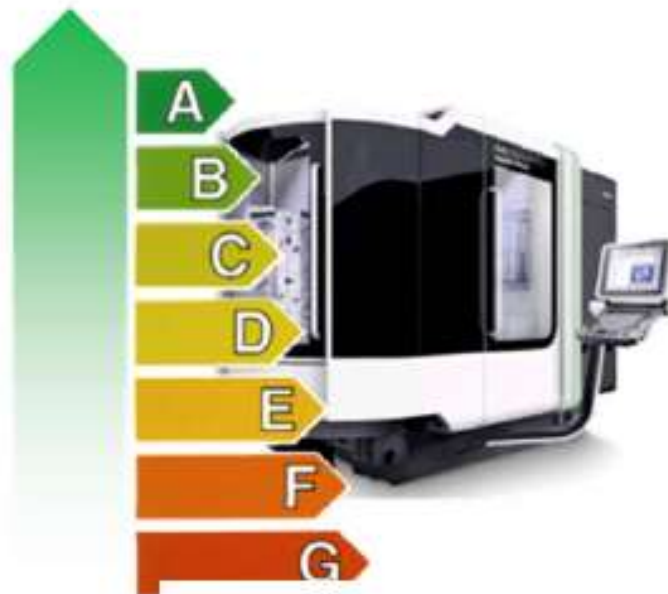
- Improving supply **automation** and manufacturing system solutions.
- Complex automation for large and heavy machinery.
- Large firms are able to offer and present sophisticated and integrated **manufacturing cells and systems** with a high degree of automation and information transfer, where the **machine itself is only one part of the whole system**.
- Manufacturer of machines either makes machines with low profit or **able to supply the entire manufacturing cells, including subcontracts**. The machine is the heart of production systems and OS manufacturers may be suppliers of entire projects.

Technical trends – Rationality and diversity

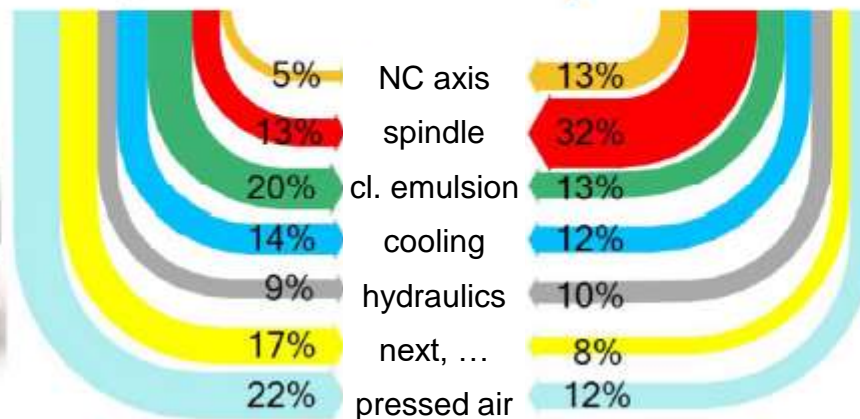
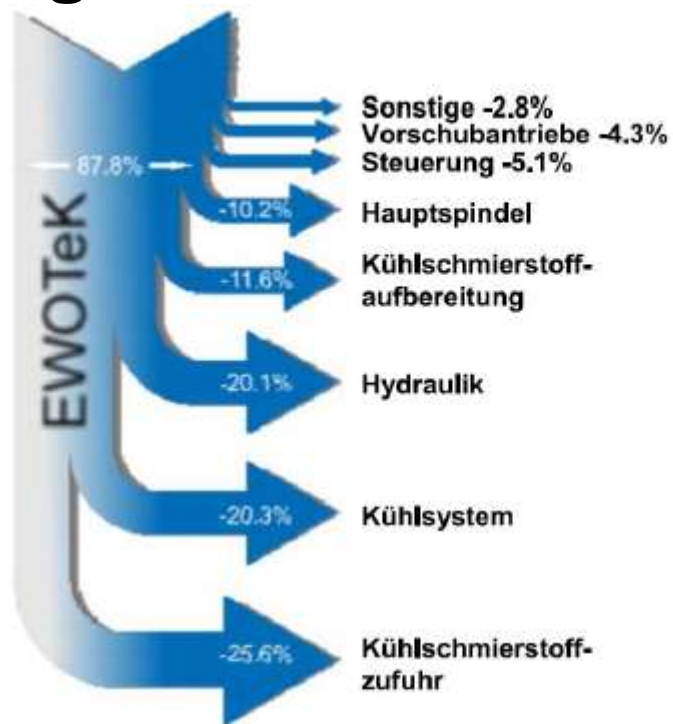
- Construction machines currently **not subject to any direct fashion trend** (linear motors, ultra high-speed spindles, parallel kinematics, composite materials, etc.), but it concentrates on a rational objective, namely the use of **technological equipment and supplies machining process**. This generally leads to a large variety of technical solutions and the optimization of building machines for their main purpose. It's kind of a trend **rational use of all technical means available, focused on the target**.

Technical trends – Ecodesign

- **The global trend** clearly leads to savings in energy consumption. A number of global manufacturers of machinery addressing the energy consumption of its machines strongly including monitoring.



Technical trends – Ecodesign



Non-technical trends - Financial Services

- Companies and groups appeal not only global service and declarations of global efficiency, but increasingly offering their own financial services and thereby strengthen their competitiveness.

Non-technical trends - Shortening delivery times

- In the future, pressure for quick delivery will lead to the need for larger inventories and capital tied up in the material. Otherwise it will be fair to compete with large producers of small and medium-sized machines.

Non-technical trends - Improved service

- Guarantee of service missions and the holding of a wide range of spare parts again leads to large proprietary finance and winning big companies.

Non-technical trends - Joining and creating groups

- There is a connecting companies and groups, similar developments in the automotive industry.
- It is likely that, especially for small and medium-sized machines there will be created only a few large global players.
- For large machines, special machines, machines with a high degree of customization will probably still work well small and midsize businesses.
- As a modern model appears to create businesses or groups, which include machinery manufacturing as one of the major segments, but like other segments have other engineering products in other fields (the trend of diversification of the portfolio).