

# Selected Chapters from Textile and Single-purpose Machines

*Use of standards, unification and standardization and the influence of the type of production on the structure of a single-purpose machine*



# Content

- Unification and standardization
- Influence of the type of production on the structure of single-purpose machines
- Use of standards



# Basic terms

## What is a standard?

- Uniform, relatively invariant and binding feature, regulation or regulation of properties, factors and activities, eg in production and their combinations.

## What is unification?

- Unification of the design solution, allows interchangeability of individual components, assembly groups or subgroups.

# Unification

Example of use:

Coolant container - VW Group



# The use of standardized components in the design of single-purpose machines

*What does the above use bring?*

- Higher technical level of the product
- Predefined product parameters from the manufacturer
- Low price (mostly mass / mass production)
- Availability (delivery within 24 hours for some parts)
- Customer service (cooperation with supplier - helpdesk)
- It is necessary to adapt the construction to the standardized component
- When modifying an existing solution - usually an enormous price increase

# Rationalization in construction to design single-purpose machines

## **Constructional rationalization**

- Trying to unify similar parts
- Formal similarity
- Similarity of semi-finished products and materials
- Similarity of construction elements

## **Technological design**

- Minimum cost of production
- Adapting the shape of the product for the simplest machining
- Ensuring easy assembly and access to individual parts - ie easy replaceability

## **Advanced methods**

- Utilize, as far as possible, all possible methods leading to the improvement of technical standards and acceleration of product development and production



# Production of single-purpose machines

## Important aspects in the production of single-purpose machines

- to take into account the selection of components for the number of machine pieces produced, but also the production cadence of the machine
- economic balance sheet: buy or produce a certain part - on purchase - already limited by the shape of the product designed / supplied by another manufacturer
- dimensioning components - estimate VS accurate calculation / FEM
- calculation - again leads to profitability
- choice of frame system - extruded profiles / welded / casting / molding  
..... depends on the type of production

# Types of production

**Focused on volume of production**

*What basic types of production do you know?*

one-off/ small series / serial / mass  
production



*Can you explain by yourselves a difference between these forms of production?*



# One-off (custom-made) production - features

- Typically produce **smaller quantities** kinds of products (but sometimes many different variations according to needs).
- For the one-off production is typical that **logistic-movements** of semi-finished products among workplaces **are not tightly defined**.
- The **production** sequence **is irregularly repeated** or not at all.
- Its main feature is the technological kinship production facilities (Technologically same or similar machinery are concentrated in one place of workshop (lathe, milling machine, grinder, welding machine, assembling, and others)).



# Significant advantages of the one-off production

- *Flexible manufacturing process*
  - quantitative and temporal flexibility
  - easier to accommodate differential range of production
  - faster implementation of new products
  - possibility of implementation changes during a production process
- *Better utilization of production capacities of the machinery*
- *Simple assure the operational production facilities*
- *Manual production values - "every product is original,"*
- *Often one worker produces the entire product*



# Significant disadvantages of the one-off production

- Need of specialists

- costs
- hire

- Cadence of production

- usually lower in comparison to

- Quality

- significant differences in quality.....

*WHY??*

*Human factor*

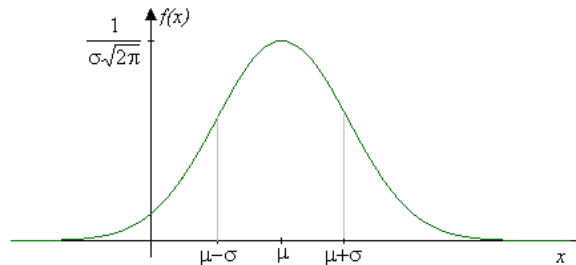
- Costs of the final product

*LOWER OR HIGHER AND WHY?*

- Example

one off (batch) production:

<https://www.youtube.com/watch?v=XKGak-4yh-8>



# Mass (Series) production- features

- Is the production of **large quantities of the same products**,
- Using **standardized interchangeable parts and components** (also called modules).
- Key players: **modern technology, machines, robots, assembly lines...**
- Requirements: very precise production planning and management, including related logistics, this is very often provided by computers and specialized software.



# Advantages of mass (series) production

Commonly in mass production and its technological processes, automation is getting more and more into the foreground. There is an effort to automate not only the technological equipment, as well as other auxiliary operations in automation. **It is an attempt to replace manpower and eliminate human factors as much as possible.**

*Features of the mass production- potential advantages*

## 1. Increase the economic efficiency of production

- Increasing productivity and reducing labor costs
- Reducing material costs (energy savings, material, etc.)
- Assumptions of profit - the application of products on the market
- Full use of technologies

## 2. Increase the level of utility value of the product

- Improvement of the product quality
- The ability to respond quickly to shorten innovation cycles (flexibility needed)
- Reduction in the proportion of the human factor in the process

## 3. Humanization of work

- Reducing intensity and improving the quality of work
- Increasing work culture and improve the working environment



# Significant disadvantages of the mass production

- Inflexible (bounded) manufacturing process
  - individual production phases are more **difficult to convert or adapt to new conditions** - customer needs, products etc.
- Predominantly **higher energy consumption**
- Complexity (difficulty) of the process implementation, operation (and eventual abolition)
- **High cost of implementation of mass production** is feasible for larger firms, in addition to **longer-term plans for many years in advance**
- **If an error occurs in production, are potentially affected „millions“ of products.**
- With the risk of producing in large quantities of defective products is related to the longer time of preparation and testing, and **less flexibility in response to detection and sorting out of problems** (even given the complexity of the process)
- Example: <https://www.youtube.com/watch?v=XDzN2wvrssU>



# Example of a standard

ČSN 01 4960



ZAPICHY

CSN 01 4960

Заточки

Recesses

Rozměry v mm

Tato norma stanoví vnější a vnitřní tvary zápichů, které usnadňují obrábění rotačních a rovinných ploch nebo které se použijí z funkčních nebo jiných důvodů.

## I. VŠEOBECNĚ

1. Přehled tvarů zápichů je uveden v tab. 1.

Tab. 1

Označení tvaru	Vyobrazení	Použití
D		sousední válcové plochy téhož jmenovitého rozměru, avšak s různými mezními úchytkami nebo s odlišnou drsností povrchu, a to u hřídelů i děr; vhodný i pro jmenovité průměry málo odlišné
E		přímochařá vedení se sklonem stěn 55°

Pokračování

Nahrazuje ČSN 01 4960 z 2. 5. 1968

Účinnost od:  
1. 4. 1976

00153



# ČSN

- ČSN is a protected designation of Czech technical standards
- ČSN was also the official designation of Czechoslovak state standards (from 1964 to 1991)
- creation and issuance of ČSN is currently provided by: Office for Technical Standardization, Metrology and State Testing.
- In the past, there were:
  - Centrally published industry standards (abbreviation ON)
  - Business Standards (PN)



# ČSN and the meaning of its marking

- a six-digit sorting number is placed after the letter of the standard (ČSN)
  - **the first two digits are separated** by a space and indicate the class of standards (00-99 indicates a broader economic field)
  - **the third and fourth digits** indicate the group and subset of the standards
  - **the last two digits** represent the serial number of the standard
- these standards apply in the Czech Republic

# ISO

- international Organization for Standardization
- Established in 1947 in Geneva
- ISO standards are valid worldwide
- It deals with the creation of international ISO standards and other types of documents (TS technical specifications, technical reports, etc.)
- ISO members are national standardization organizations representing standardization in the country

# Adopted European standards, do you know them?

- Adopted (harmonized) European standards (EN) are marked with the original designation, preceded by the abbreviation ČSN
- The standard can be labeled, for example, ČSN EN 12899-1, These standards are valid in the EU
- *The designation of accepted standards consists of the designation ČSN ISO and the number of the ISO standard*
- ČSN EN ISO \_\_\_\_: The standard is valid internationally
- According to European standards, practice is also introduced to designate a colon as the year of publication, eg: ISO 9001: **2001**

# Review

- What does unification mean in technical practice?
- What do you imagine under the term rationalization in the construction of single-purpose machines?
- What types of production do you know and list their features.
- What is a standard?
- What does the abbreviation ČSN mean?
- What does ISO stand for?



# Thanks for your attention

