



# **Automation of Apparel Production**

Ing. Petra Komárková, Ph.D.

doc. Ing. Antonín Havelka, CSc.



# Requirements on student

- **Credit**
  - Elaboration and presentation of seminar paper
  - Participation in seminars
  - Passing tests (written + practical assembly of the pneumatic circuit)
- **Examination**
  - written + oral
  - condition for the examination - credit

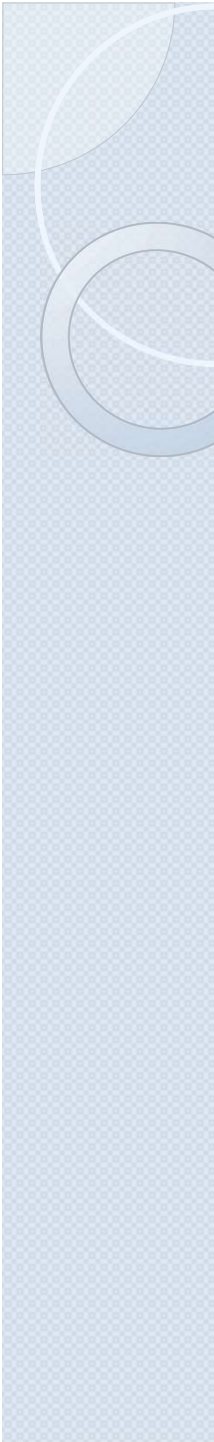
# SEMINAR PAPERS I. + II.

## Seminar papers:

- Deadline: **8<sup>th</sup> May 2024** – via e-learning
- Presentation date: **15<sup>th</sup> May 2024**
- The length of the seminar work is about 20 pages; its division must correspond to the structure of the thesis, including the formal arrangement and citation of the literature, etc.

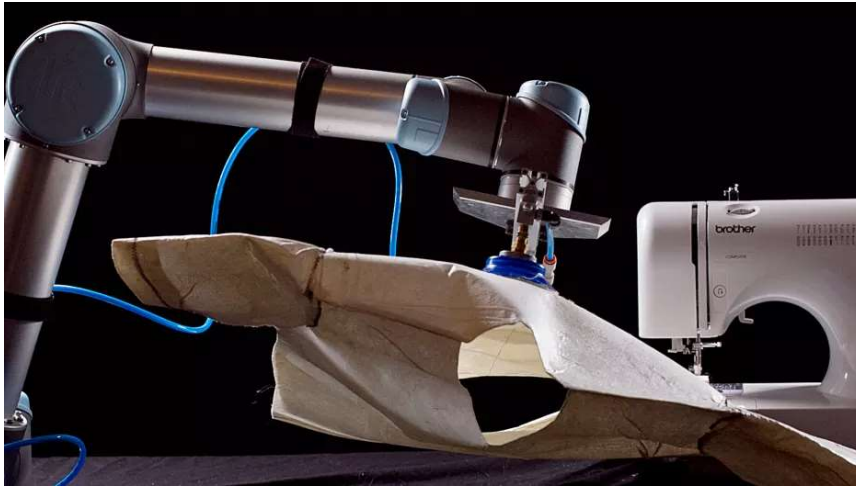
## SEMINAR PAPER I. - TOPICS

1. **Automated sewing machines** for clothing products (e.g. shirts, jackets, trousers, underwear, etc.) - select 1 type of product and **describe the automation elements** of individually selected sewing machines.
2. **Automated sewing machines** for technical products (e.g. automotive airbags, car seat covers, etc.), **describe automation elements** of individually selected sewing machines.

- 
3. **Automated ironing machines** used in industrial clothing production. **Describe automation elements.**
  4. **Air cushion transport** in clothing production.  
Basic principles, possibilities of use in clothing production.
  5. **Automatic handling** in clothing production using industrial robots and manipulators.  
Basic principles, properties, applications.
  6. **Automated equipment for cutting of fabrics in clothing manufacture.**  
Automated spreading machines. Automated cutter. Use of vacuum in this field.
  7. **Conveyor systems** in apparel production.
  8. **Finished goods warehouses** in apparel production.  
Possibilities of their automation.
  9. **Own topic**  
In agreement with the teacher.

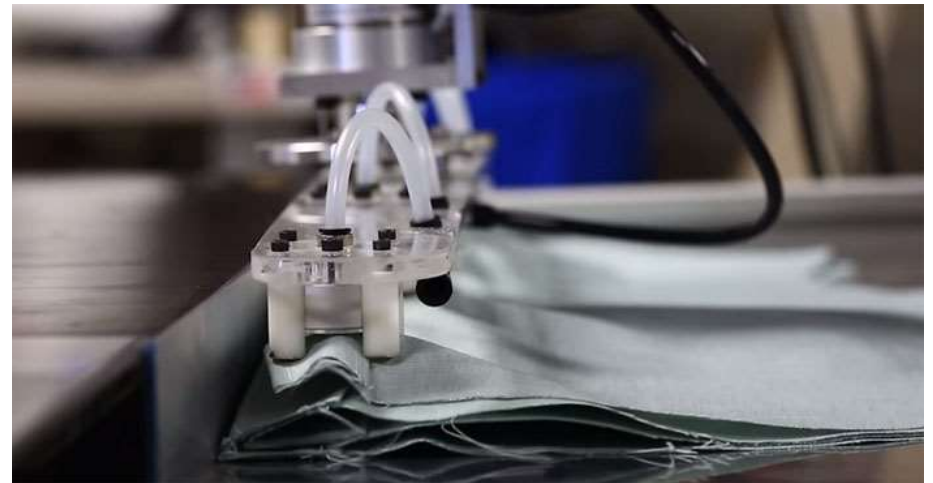
## SEMINAR PAPER II. - COMMON TOPICS

- **Future of automation in clothing industry.**



*Rina Raphael. Is This Sewing Robot The Future Of Fashion?. [online] Dostupné z: <https://www.fastcompany.com/3067149/is-this-sewing-robot-the-future-of-fashion>*

*Device Plus. SewBot Is Revolutionizing the Clothing Manufacturing Industry. [online] Dostupné z: <https://www.deviceplus.com/trending/sewbot-in-the-clothing-manufacturing-industry/>*





# MECHANIZATION

- **Mechanization** is the process of changing from working largely or exclusively by hand or with animals to doing that work with machinery.
- Process to use machine to do something that used to be done by hand;
- For elimination hard work in the presence of worker.
  
- **Machine**
  - Mechanic equipment produced by man (human) for simplification and acceleration human labour.



# AUTOMATION

- **Automation** creates and applies technologies to produce and deliver goods and services with **minimal human intervention**.
- The implementation of automation technologies, techniques and processes improves the efficiency, reliability, and speed of many tasks that humans previously performed.
- Automatic, as opposed to human, enables an operation or control of a process, equipment or system, or the techniques and equipment used to achieve this most applied to computer (or at least electronic) control of a manufacturing process.
- **Elimination of humans' hard work and** brain work of humans.
- Replacement of human workers by technology as a system in which a workplace or process has been converted to one that replaces or minimises human labour with **mechanical or electronic equipment**.
- To implement automation in the production process, the **condition** of complete or **complex mechanisation** must be met.

# Reasons for Automation

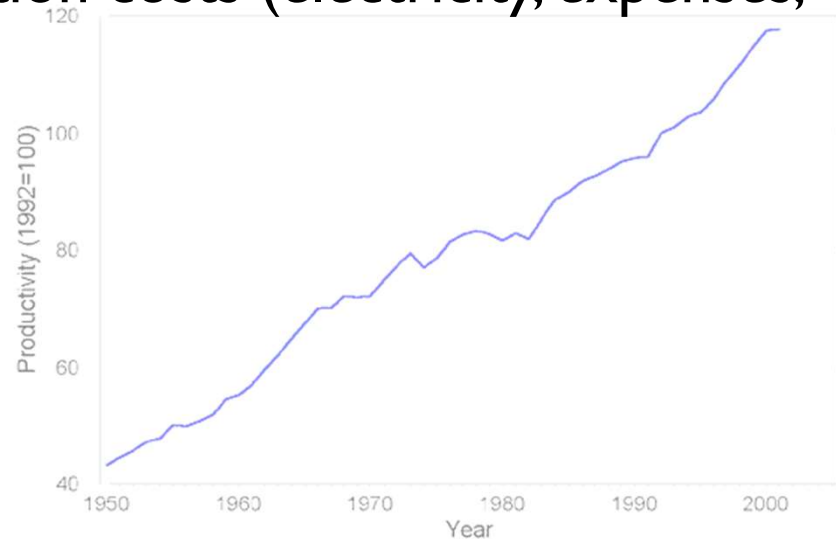


1. Increase labour productivity
  2. Increasing the economic benefits of work
  3. Humanization of human labour
  4. Elimination of dangerous work of workers
  5. Elimination of unhealthy work (heat, humidity, chemical industry, radioactivity...)
  6. Quality of work
    - elimination of workers' faults
    - machine automation can obtain higher-quality production
  7. Robots can perform a complicated activity (assembling)
  8. Workers are not able to work as fast for some operations (parts of computers)
  9. Workers are not able to do as much work
- The contribution is mainly in the economic, technical and, last but not least, humanization areas.

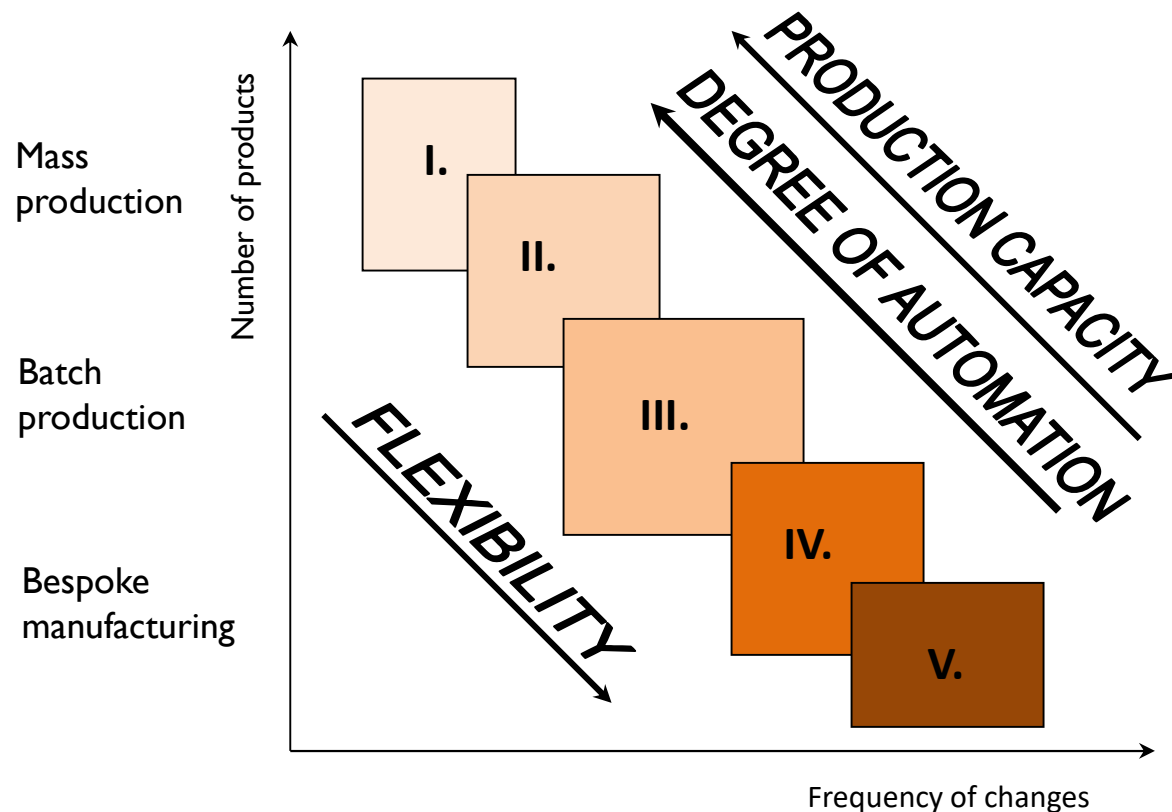


# Aims of Automation

- increasing work productivity
- increasing work quality
- increasing the flexibility →  
→ research x production x sale
- decreasing the production costs (electricity, expenses, energy ...)
- humanisation of work



# FLEXIBILITY AND DEGREE OF AUTOMATION



- I. Fully automated production lines
- II. SPECIAL SYSTEMS - Partially automated
- III. FMS = Flexible Manufacturing Systems
- IV. Mechanized individual workplaces
- V. Conventional production - Workplaces with manual work



# Effectiveness of Automation in Manufacturing Process

## Sewing Process

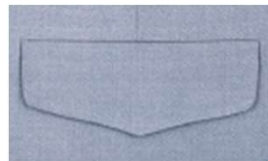
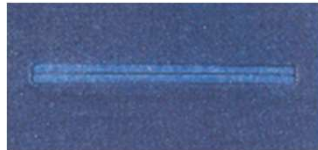
1. changes in particular technological operations
2. application of new modern materials
3. changes in product design
4. application of high-efficiency machines
5. Improvement of logistic and transport systems
6. automation of the whole technological process

The solutions mentioned in points 4 and 5 are mainly used for automation in the sewing process.

Increasing the sewing machine efficiency depends mainly on applying modern drivers at sewing machines.

# Degree of Automation

1. Operating of machines
2. Automatic regulation
3. Automatic control of machines



# Automation in Clothing industry –

## *examples and videos*

- Automatic sewing department -  
<https://www.youtube.com/watch?v=XsZ8JUjBBI>
- T-shirt sewing robot - <https://www.youtube.com/watch?v=qXFUqCijkUs>  
<https://www.youtube.com/watch?v=oeSu9Vcu0DU>
- Autoseam – automated sewing machine -  
<https://www.youtube.com/watch?v=IGUhlfjqQmQ>
- Richpeace – new automatic sewing machine -  
<https://www.youtube.com/watch?v=k8OA7shE3S0>
- Auto cutter - <https://www.youtube.com/watch?v=II3vQ6lCpEw>
- Pfaff – Automatic sewing machine for darts -  
<https://www.youtube.com/watch?v=8FXBLID4BRg>
- Modern sewing machines -  
<https://www.youtube.com/watch?v=QWObKUlr69k>
- Embroidery machine - <https://www.youtube.com/watch?v=-ERjsXA259I>  
<https://www.youtube.com/watch?v=jiBVAnm7YXE>