

Syllabus of Module

6. Sustainable Manufacturing

Lecturer: Ing. Jakub Antoň, MBA

Module Annotation

The European Union is increasingly emphasizing the reduction of carbon footprints and corporate environmental responsibility. Currently, the Czech Republic ranks among the EU member states with the highest CO₂ emissions per capita, largely due to the structure of its domestic industry. The *Sustainable Manufacturing* module guides students through current challenges and opportunities associated with transitioning to more sustainable production processes.

The module focuses on practical strategies for effectively reducing the carbon footprint in manufacturing companies while simultaneously increasing productivity and economic returns. We will explain how targeted optimizations – often achievable with minimal investments – can lead to substantial savings amounting to millions of Czech crowns and reductions of CO_2 emissions by thousands of tons annually. The course includes an overview of methods and tools for monitoring environmental impacts and evaluating them efficiently, including available certification options.

Students will gain insights into the principles of energy audits, strategies for reducing resource consumption, waste heat utilization, production digitalization, circular economy practices, and emerging technologies that enable a shift toward greater sustainability. The module is built on real-life examples, concrete data, and case studies from the Czech industrial sector.

Module Objective

- Gain a fundamental understanding of energy-saving and other efficiency methods in manufacturing enterprises.
- Identify key processes with the highest operational costs and learn how to optimize them.
- Become familiar with tools and approaches for streamlining manufacturing processes with regard to both environmental and economic benefits.
- Understand the methodology for calculating a company's environmental impact and options for its reporting.
- Develop an understanding of certification processes related to sustainable manufacturing (e.g., ISO standards, ESG frameworks).
- Strengthen the ability to apply acquired knowledge in decision-making regarding strategic investments in sustainable solutions.

Literature

1. EL HALWAGI, Mahmoud M. *Sustainable design through process integration: fundamentals and applications to industrial pollution prevention, resource conservation, and profitability enhancement.* Second edition. Amsterdam, Netherlands: Elsevier, 2017. ISBN 978-0-12-809824-0. Also available at: <u>https://ebookcentral.proquest.com/lib/natl-ebooks/detail.action?docID=4942046</u>.

2. HAUSCHILD, Michael Z.; ROSENBAUM, Ralph a OLSEN, Stig Irving (ed.). *Life cycle assessment: theory and practice*. Cham, Switzerland: Springer, [2018]. ISBN 978-3-319-56474-6.

3. VERONIKA, Soukupová. *ISO a ESG pro udržitelný růst organizace*. Wolters Kluwer, 2023. ISBN 978-80-7676-797-3. Also available at: <u>https://www.bookport.cz/kniha/iso-a-esg-pro-udrzitelny-rust-organizace-14526/</u>.

4. REITERMAN, David. *Udržitelnost a ESG: přehled evropské regulace*. Praha: Wolters Kluwer, 2024. ISBN 978-80-7676-969-4.



Sustainable Manufacturing