ADAPTIVE SMART PRODUCTION 2

Setting the ISO standards for fuel cell stacking process – Development of modular cleanroom based on ISO 14644

Pro²Future

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MOTIVATION & GOAL

The **focus** towards the Sustainable Development Goals and Circular Production is addressed by the ASP2 Project. At ASP2, the **goal** is to develop a resilient adaptive system of the **fuel cell stacking process** that must be integrated with the existing battery stacking process. The concept of **ISO standard cleanroom** for stacking process is also **prototyped** at the institute. In ASP2, we focus on:

- Development of **flexible handling technology** for gripping of BPP and MEA layers
- Analysing the **necessity** of a clean environment, i.e., cleanroom for the stacking operation
- Development of a **modular cleanroom** with ISO standards
- A **GUI** (Graphical User Interface) of **real-time monitoring** of cleanroom which also indicates the **control environment** of the filtering and high-efficiency blower system

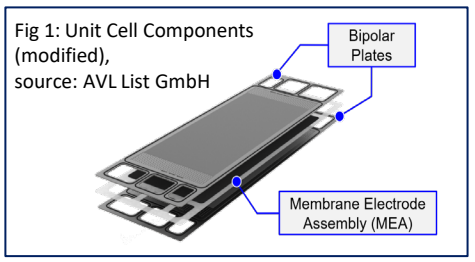

Fig 1: Unit Cell Components (modified), source: AVL List GmbH

Project FactBox

Project Name	**ASP 2**
Project ID	MFP II 4.2.3
Duration	24 Months

Area 4.2
Cognitive Production Systems

Project Lead
DI Dr. Markus Brillinger

APPROACH of STUDY

The basic approach is to **utilize** the data generated from the **sensory system** to enhance the stacking process via the developed user model.

- **3 sensory capsules** with **6 sensors in each capsule** record the data and displays it on a **GUI with real-time monitoring and control**
- Temp – ***°C***, humidity – ***%,*** pressure – ***Pa***, velocity of airflow – ***m/s***, light intensity – ***lux***, and particulate matter – ***µm*** are monitored.
- Through the GUI, **airflow** – ***m³/hr*** is controlled.

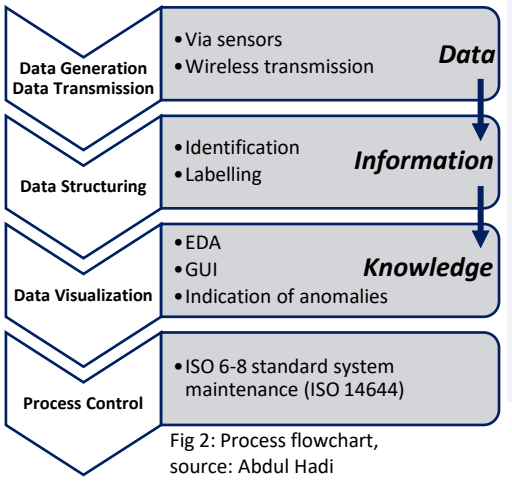

Fig 2: Process flowchart, source: Abdul Hadi

CONTRIBUTION

Scientific contribution
The provision of resource-efficient cleanroom technology (to ensure the longevity of fuel cells) and the adaptation of current handling technology (to ensure the greatest possible flexibility for new product designs).

Economic contribution
Cleanrooms are energy consuming spaces. Developing station-specific cleanroom could save over 70% of the energy costs.

SYSTEM ARCHITECTURE & PROTOTYPE DEVELOPMENT

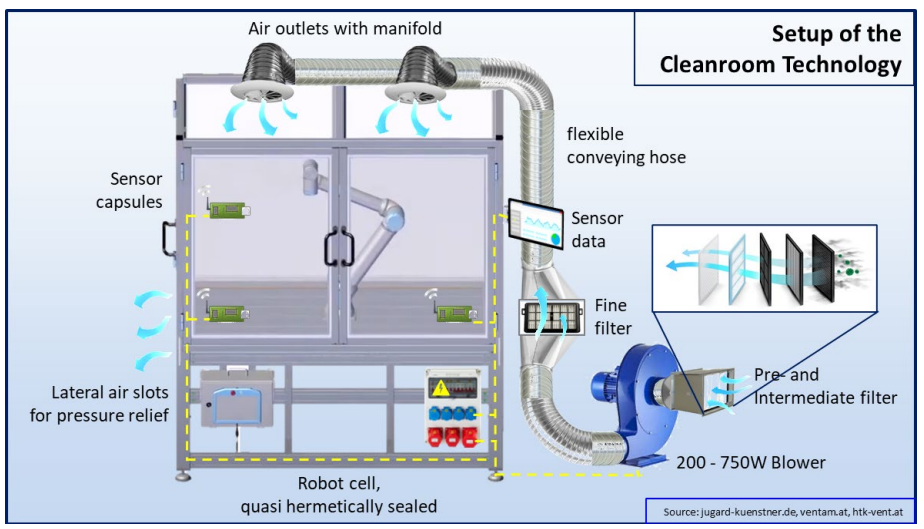

Fig 3: Cleanroom environment model, source: Bahle, Abdul Hadi

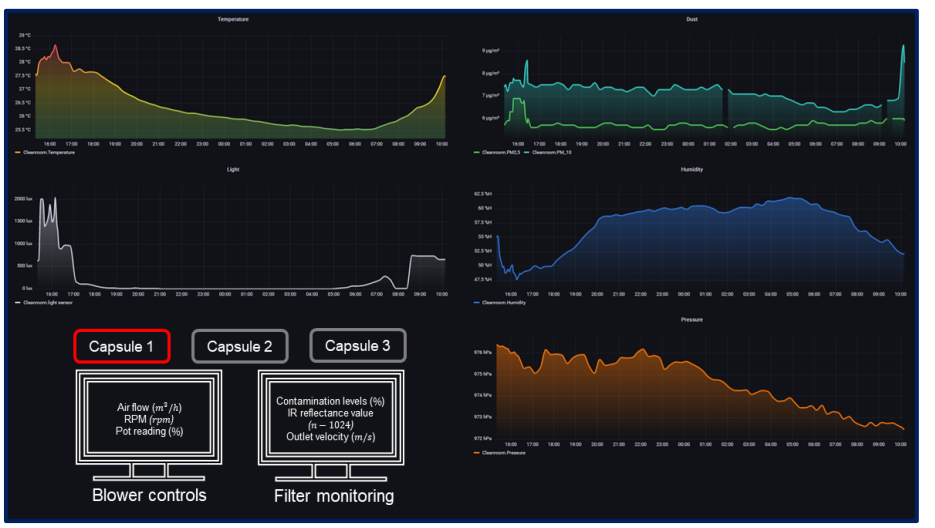

Fig 4: GUI and visualization environment, source: Abdul Hadi, Gashi

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Acknowledgement: This work was supported by Pro²Future (FFG, 881844) TU Graz, and AVL List GmbH.