

Precision Manufacturing for Precision Medicines

Continuous Manufacturing for 21st Century Drugs



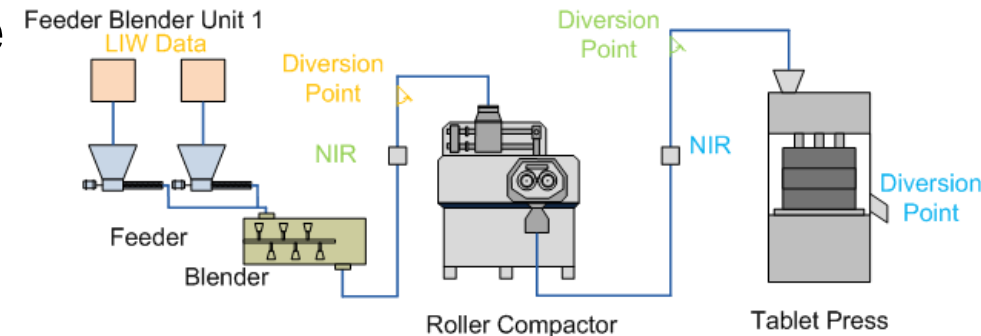
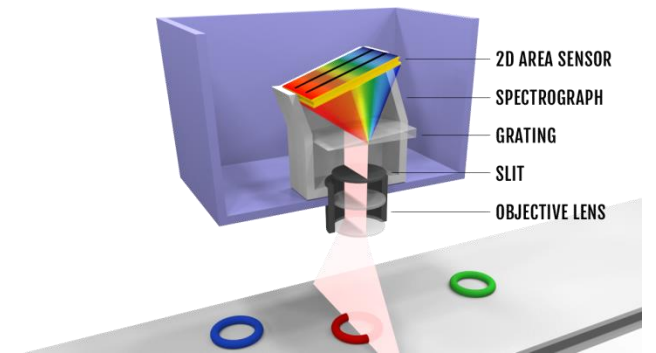
research
center
pharmaceutical
engineering

Prof. Johannes Khinast
Graz University of Technology, Austria
Research Center for Pharmaceutical Engineering



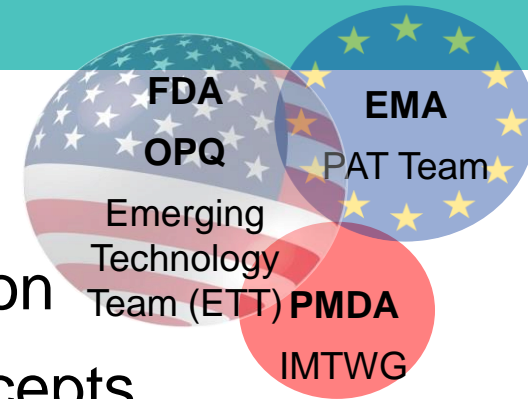
Advantages of Continuous Pharmaceutical Manufacturing

- **Higher quality** through in-line process control & advanced technology
- **Reduced scale-up** effort and faster development
- **Individualized** manufacturing (printing, etc.)
- Less floor space and investment **costs**
- Higher **flexibility** and **agility**
- Speed-up of the **supply** chain
- Flexible **decentralized** manufacturing is possible
- Faster reaction to **pandemic events**
- Lower **environmental** impact
- A source of high-tech **jobs** in Europe



Challenges: The Need for Research and Training

- **Sensing:** novel sensors for quality control
- **New PAT solutions:** impurities, coating thickness, 100% inspection
- **Process models and control:** advanced and robust control concepts
- **Interfaces:** OOS handling, buffers, process start-up, shut down
- **Batch definition:** better regulatory science and use of science in filings
- **Material science:** better understanding of material properties and predictive science via molecular-level and multi-scale modeling
- **Continuous bioprocessing:** novel approaches and technology
- **Training:** workforce skills needed for CM



Thank You

