

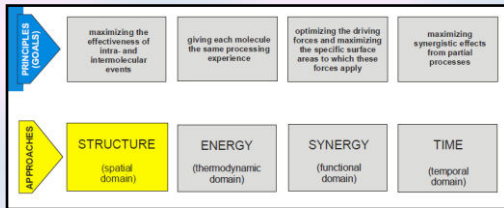
Process Intensification

Introduction:

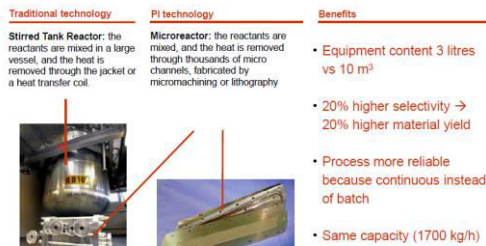
Process intensification (PI) consists of the development of novel apparatuses and techniques that, compared to those commonly used today, are expected to bring dramatic improvements in manufacturing and processing, substantially decreasing equipment- size/production-capacity ratio, energy consumption, or waste production, and ultimately resulting in economical, sustainable technologies.

Fundamentals of Process Intensification

1. PI with Structure Approach

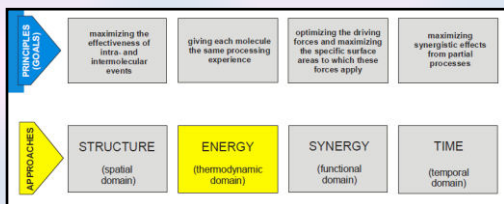


Example: Microreactor for manufacturing of a specialty product (DSM)



Photos courtesy of DSM and Forschungszentrum Karlsruhe

2. PI with Energy Approach

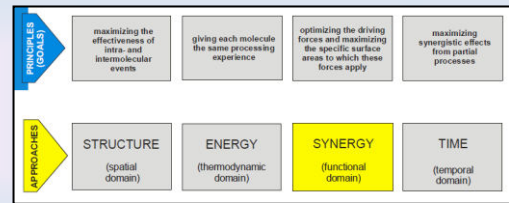


Example: High-Gravity Rotating Packed Bed for the production of hypochlorous acid (Dow Chemical)

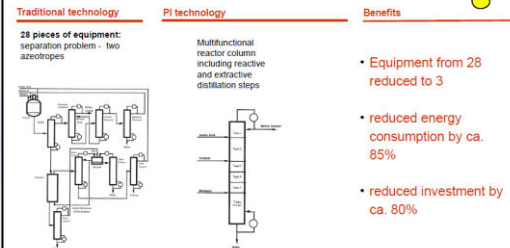


Photos courtesy of Dow Chemical Company.

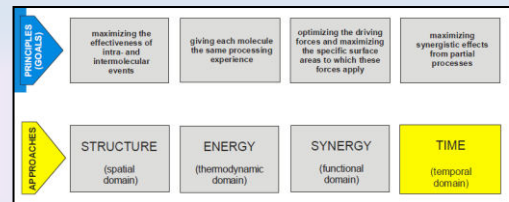
3. PI with Synergy Approach



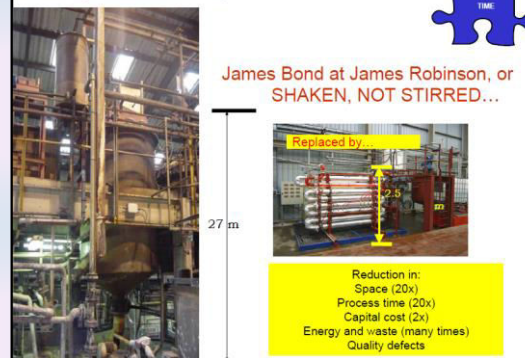
Example: Methyl acetate in multifunctional reactor (Eastman Chemical)



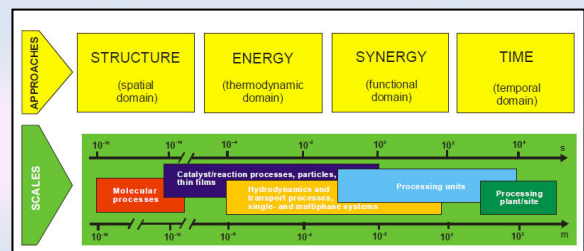
4. PI with Time Approach



Example: Oscillatory Baffle Flow Reactor



Different PI Approaches with its scale



Gujarat Cleaner Production Centre

ENVIS Centre on: Cleaner Production/Clean Technology

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