Operations

Optimize workflows, use materials, energy and water efficiently and monitor and control processes to reduce costs and improve productivity and quality.
Making Your Operations Future Ready

• Strive for manufacturing excellence to save costs and revive your business
  • Data-driven
  • Higher productivity
  • Lower defaults
  • Reduced use of materials, energy and water
  • Reduced generation of waste, effluent and emissions
Lean Manufacturing

Lean - a systematic approach of elimination of waste so every step adds value for the customer

1. **Identify Value**
   - Think about the end customer and what they deem valuable

2. **Map Value Stream**
   - Layout all steps within your process and get rid of those that don't add value

3. **Create Flow**
   - Figure out ways to make the valuable steps more streamlined in a tight sequence to provide the end customer with as much value as possible, quickly

4. **Establish Pull**
   - Create more demand from your end customers, so they're looking for the product rather than you having to push it on them

5. **Strive for Perfection**
   - Make it a hobby to always think of ways to eliminate waste and standardize the processes through SOPs, so there is continuous improvement

- **Visualize factory**
- **Service and maintain equipment**
- **Decongest workstations & storage areas**
- **Optimize work flows and space utilization**

Lean Manufacturing

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## Minimization of 8 Wastes

<table>
<thead>
<tr>
<th>Defects</th>
<th>efforts caused by rework, scrap and incorrect information</th>
<th>Transportation</th>
<th>unnecessary movements of products and materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overproduction</td>
<td>production that is more than needed or before it is needed</td>
<td>Inventory</td>
<td>excess products and materials not being processes</td>
</tr>
<tr>
<td>Waiting</td>
<td>wasted time waiting for next step in a process</td>
<td>Motion</td>
<td>unnecessary movements by people (e.g. walking)</td>
</tr>
<tr>
<td>Non-Utilized Talent</td>
<td>underutilizing people’s talents, skills and knowledge</td>
<td>Extra Processing</td>
<td>more work or higher quality than is required by the customer</td>
</tr>
</tbody>
</table>
Optimise Workflows

- **5S**
  - **Sort**
    - Keep only necessary items in the workplace
  - **Set in Order**
    - Arrange items to promote efficient workflow
  - **Shine**
    - Clean the work area so it is neat and tidy
  - **Standardize**
    - Set standards for consistently organized workplace
  - **Sustain**
    - Maintain and review standards

- **Single Minute Exchange of Dies** for Quick change over (starts at end of last good product and ends with first good product of new batch)

- **Kanban** an agile project management tool that visualizes work, limits work-in-progress, and maximizes efficiency (or flow)

- **Cellular Manufacturing** for families of parts within a single line or cell of machines operated by machinists who work only within the line or cell

**Standard operating procedures** are written, step-by-step instructions that describe how to perform a specific activity

- **5S Standardisation:** Standard Operating Procedures (SOPs) fine-tune to ensure best efficiency and productivity of process
- Gets work force to involve and contribute to self-assessed feedback and changes that they will drive and feel responsible for
Resource Efficiency

- **Material Productivity**
  - Selection and efficient use of **materials**
  - Sourcing and efficient use of **water**
  - Selection and efficient use of **energy**

- **Energy Productivity**

- **Water Productivity**

- **Waste Intensity**
  - Reduction and safe disposal of **waste**
  - Reduction and treatment of **waste water**
  - Reduction and control of **air emissions**

UNIDO, 2015
Resource Efficiency

- Input Change
- Good Housekeeping
- Better Process Control
- Equipment Modification
- Technology Change
- Production of Useful Byproduct
- On Site Reuse & Recycling

Resource Efficient and Cleaner Production

UNIDO, 2015
Data Driven Industrial Automation

- **Industrial automation** uses control systems & information technologies for handling different industrial processes & machineries to reduce human intervention.

  - Basic automation with sensors and switches connected to VFD, PLC etc to control one machine/process at a time following pre-set programmes.
  - Advanced automation involves autonomous (through artificial intelligence) and connected (through Internet of Things) systems.
    - Ability to predict and correct machine performance and health for early detection of safety issues and machines and maintaining maximum efficiency at all times.

- Reduce costs & human error
- Improve quality
- Enhance efficiency

www.b3cmsme.org
Data Driven Automation: Industrial Automation

**Resource Planning & Sourcing**: On-demand decentralized manufacturing and blockchain projects works on complexities of integrating suppliers.

**Machining, Production & Assembly**: Modular equipment and custom machines like 3D printers enables manufacturers to handle greater demand for variety.

**Quality Assurance (QA)**: computer vision finds imperfections, and software and blockchain tech enables quick identification of problems.

**Transport & Supply Chain Management**: Telematics, IoT, and autonomous vehicles brings greater efficiency and granularity.

**Operations Technology Monitoring & Machine Data**: IT stack and platforms powering future factories first through basic digitization, and further with greater predictive power.
Continuous Improvement

- Instill systematic
  - Problem definition and quantification
  - Root source and cause diagnosis
  - Solution selection and implementation

- Through team work, potentially supported by analytical tools
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Manufacturing Excellence

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