Manufacturing Excellence Initiative
Concept & Methodology

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“Let’s LANXESS again” – a three-phase realignment program has been defined

1. Business & administration structure competitiveness
   - Consolidate BUs and GFs with similar business models
   - Improve customer and market focus and leverage synergies
   - Develop leaner administrative structures by restructuring and adjusting business models

2. Operations competitiveness
   - Manufacturing excellence:
     - Analyze and adjust asset base
     - Evaluate mothballings and site closures
     - Implementation of operational best practices
   - Commercial & supply chain excellence

3. Portfolio competitiveness and alliances
   - Evaluate portfolio options to better balance the company set-up
   - Consider alliances to improve competitive access to raw material e.g., for rubber businesses
   - Improve market access e.g., through marketing alliances

No time wasted: Effective process of change management initiated in April 2014 remains on schedule
The LANXESS manufacturing network includes 47 production sites in 17 countries with 9,300 employees.

The analysis is focused on improving the effectiveness and efficiency of our processes.

<table>
<thead>
<tr>
<th>Cost position</th>
<th>Costs*</th>
<th>Addressable cost items</th>
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</thead>
<tbody>
<tr>
<td>Total cost</td>
<td>~€6.8 bn</td>
<td>Personnel expenses</td>
</tr>
<tr>
<td>Manufacturing costs</td>
<td>~€2.5 bn</td>
<td>Energy costs</td>
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<td>Raw materials</td>
<td>~€4.2 bn</td>
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<td>Material consumption</td>
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<td>Logistics and information</td>
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<td>Other costs**</td>
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80% of manufacturing costs fall within the scope of the analysis.

* Data based on LANXESS P&L 2013 (Annual Report)
** Other costs mainly consist of production, technical and infrastructure services
**Current manufacturing network is lacking in harmonization and transparency**

<table>
<thead>
<tr>
<th>Plant &amp; site structure</th>
<th>Processes</th>
<th>KPIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plant structure defined by legacy</td>
<td>• Lack of standardization of processes on a global scale</td>
<td>• Clear top down targets regarding manufacturing performance missing</td>
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<tr>
<td>• Site development according to BU interests</td>
<td>• Non-harmonized processes at BU and plant level</td>
<td>• Lack of transparency on overall manufacturing performance</td>
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<tr>
<td>• Added complexity through acquisitions</td>
<td>• Different approaches to optimization and continuous improvement</td>
<td>• No harmonized KPI-system and definitions</td>
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<tr>
<td>• Limited technical standardization in new plants</td>
<td>• Limited exchange between BUs on best practices</td>
<td>• Absence of LANXESS-wide manufacturing reporting</td>
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<tr>
<td>• Various site concepts and organizational set-ups</td>
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**Plant & site structure**
- Clear top down targets regarding manufacturing performance missing
- Lack of transparency on overall manufacturing performance
- No harmonized KPI-system and definitions
- Absence of LANXESS-wide manufacturing reporting

**Processes**
- Upfront data analysis: initial screening for site potential and agreement on sequence
- Build and train site transformation team
- Comprehensive site check
  - Validation of site specific potential

**KPIs**
- Site implements agreed measures
- Start continuous improvement process
- Gap closure tracking per site
- Bottom-line impact and increased competitiveness
Applied methods and tools in line with industry standards

### Subjects of screening

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Organization</th>
<th>Maintenance</th>
<th>Quality &amp; yield</th>
<th>Energy</th>
<th>Site logistics</th>
<th>Assets</th>
<th>Processes</th>
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<tbody>
<tr>
<td>HSEQ Performance</td>
<td>Span of Control Layer Analysis</td>
<td>Maintenance / Reliability</td>
<td>Raw material efficiency</td>
<td>Energy Consumption</td>
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<td>Capacity Utilization</td>
<td>Process Maturity</td>
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### Methodology to improve energy efficiency

**Data transparency**
- Process description
- Process parameters
- Process utilities

**Flows**
- [t/h]
- Temperatures [°C]
- Pressures [bar]

**Losses identification**
- Part load
- Inefficiencies
- Missing integration

**Improvements**
- HSE (CO₂, VOC, etc.)
- Energy reduction
- Capacity increase

**Measure** → **Control** → **Improve**

- Specific energy consumption vs. utilization
- Energy Check
- Value Stream Analysis
- Maturity Grade
- SMED
- LEAN, Six Sigma

- FTE Analysis
- Roles / Duties / Know-How
- Functional Work Place Analysis
- Performance metrics (KPIs)
- Six Sigma
- Visualize CIM & KPIs
- Lean, Six Sigma

- Minimum Energy Consumption
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- Minimum Energy Consumption
- Value Stream Analysis
- Maturity Grade
- SMED
- LEAN, Six Sigma
Precisely planned workflow and timing

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Site briefing</th>
<th>Site appraisal</th>
<th>Final GCP*</th>
<th>ME** rollout</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSE</td>
<td>Send agenda, scope &amp; required contacts to site</td>
<td>Screening &amp; training</td>
<td>Evaluation</td>
<td>BU &amp; site commitment to final GCP*</td>
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<tr>
<td>Organization</td>
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<td>Interviews &amp; workshops</td>
<td>Verification</td>
<td>Gap closure projects</td>
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<td>Quality, yield</td>
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<td>GCP*</td>
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<td>Assets &amp; Processes</td>
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4 weeks before appraisal  2 - 4 weeks “on site”  3 - 6 weeks

Timeline

* GCP: Gap closure plan
** ME: Manufacturing excellence

Priority of the rollout will be given to Performance Polymer sites

<table>
<thead>
<tr>
<th>Manufacturing excellence project plan overview – indicative</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
</tr>
<tr>
<td>Upfront data analysis</td>
</tr>
<tr>
<td>Pilot 1</td>
</tr>
<tr>
<td>Pilot 2</td>
</tr>
<tr>
<td>Site 8</td>
</tr>
</tbody>
</table>

Depending on complexity, the on-site project time will be between 2 – 4 weeks
LANXESS’ goal is to achieve best in class manufacturing excellence

- Establish continuous improvement culture
- Improve HSEQ performance
- Optimize manufacturing costs

Safety first!

LANXESS
Energizing Chemistry

Xact
Health Safety Environment
Abbreviations

**Performance Polymers**
- BTR  Butyl Rubber
- PBR  Performance Butadiene Rubbers
- TSR  Tire & Specialty Rubbers
- KEL  Kelian Elastomers
- HPE  High Performance Elastomers
- HPM  High Performance Materials

**Performance Chemicals**
- MPP  Material Protection Products
- IPG  Inorganic Pigments
- FCC  Functional Chemicals
- RCH  Rhein Chemie
- RUC  Rubber Chemicals
- ADD  Rhein Chemie Additives
- LEA  Leather
- LPT  Liquid Purification Technologies

**Advanced Intermediates**
- AII  Advanced Industrial Intermediates
- SGO  Saltigo

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