Excellence in operations: Smart supply chains
Dr. Andreas Backhaus
Senior Vice President, European Site Logistics Operations
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We develop new supply chain solutions to increase our efficiency

Operational excellence
Operational excellence improves our plant availability and efficiency

Site logistics operations
Dynamic site logistics enable agility in delivering our products

Digitalization
Digitalization enhances our technology footprint

New supply chain solutions
1. BASF Class Tank Container
2. Tank container storage yard
3. Automated Guided Vehicles
Ludwigshafen efficiency depends on reliable inter- and intra-site logistics

<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>Details</th>
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<tbody>
<tr>
<td>Road</td>
<td>2,100 trucks daily</td>
</tr>
<tr>
<td></td>
<td>32% of transport volume</td>
</tr>
<tr>
<td>Rail</td>
<td>400 rail cars daily</td>
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<tr>
<td></td>
<td>26% of transport volume</td>
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<tr>
<td>Inner waterways</td>
<td>20 ships daily</td>
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<tr>
<td></td>
<td>42% of transport volume</td>
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<tr>
<td>Pipelines</td>
<td>2,850 km</td>
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<tr>
<td>Roads</td>
<td>106 km</td>
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<tr>
<td>Rail tracks</td>
<td>230 km</td>
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</tbody>
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4-5 million tons handled on site per year
The current intra-site rail bulk process is rather slow

- Every day railcars need to be strung together into 40 trains, delivering railcars to 160 loading stations
- Train building process at the hump is very time consuming and complex
- High amount of shunting activities lengthens the process further
Three distinct measures increase the process efficiency

1. **We innovate:** BASF Class Tank Container – a new container type

Classical rail tank car
- 70,000 liter volume
- 64 tons payload

BASF Class Tank Container
- up to 73,000 liter volume
- 66 tons payload

Standard tank container
- 25,000-36,000 liter volume
- 25 tons payload
Three distinct measures increase the process efficiency

2. We build: Fully automated BASF tank container storage yard

Storage capacity of 2,000 twenty-foot equivalent units with a maximum stacking height of six containers

Accessibility via two cranes spanning across three railroad tracks and eight loading bays

Compliance with highest safety standards allows the storage of a wide range of chemicals
Three distinct measures increase the process efficiency

3. We develop: New Automated Guided Vehicle (AGV) transport system

AGV at a gross weight of 110 tons with a payload of 78 tons distributed across 32 wheels

Intermodal switch between regular rail carrier and AGV ensures fast deployment on site

Tele-operated control stands allow monitoring and vehicle operation even if transponder lane is blocked
The revamped process is faster and more flexible at reduced cost

- Fully automated yard as de-coupling point between external and internal transport
- Fast and flexible onsite transport with Automated Guided Vehicles
- Noise and payload optimized rail wagons for external transport

~ 1 hour
Further opportunities arise by scaling these developments

- Concept can be implemented independent of site location
- Extension of the current implementation scope will lead to further operational excellence savings
- BASF Class Tank Containers – potentially a new segment in intermodal transport for all industries