



We create chemistry

BASF Rail 4.0

New opportunities in intermodal transport by
BASF Class Tank Containers & autonomous driving

Harald Schlegel – Dr. Thorsten Bieker

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Chemicals – a growth industry

Global annual growth rate of ~3.6%*



Agriculture



Health & nutrition



Energy & resources



Construction & housing



Consumer goods



Transportation



Electrical & electronics

Chemistry as enabler to meet current and future needs

~10bn



... people by 2050

70%



... of the world population will live in cities by 2050

50%



... more primary energy consumption by 2050


30%



... more food needed by 2050

Efficiency of the site depends on a reliable logistics



Road:
2,100 trucks daily 
32 % of transport volume

Pipelines: 2,850 km
Roads: 106 km
Rail tracks: 230 km



Rail:
400 rail cars daily 
26 % of transport volume



Inner waterways:
20 ships daily 
42 % of transport volume



Today: time consuming onsite rail process



22 hours

Lots of shunting activities - train building process at the hump is very time consuming

Building 40 internal trains per day
Delivery to 160 loading stations



Innovation: BASF Class Tank Container – a new container type



Classical rail tank car
70,000 Liter volume
64 tons payload



BASF Class Tank Containers
up to 73,000 Liter volume
66 tons payload



Standard tank container
25,000 – 36,000 Liter volume
25 tons payload

- High payload is important for the efficiency of the loading stations
- Removable tank is key for efficiency increase in onsite rail logistics

BASF Automated Guided Vehicle (AGV)

First AGV to operate on a shared infrastructure



Autonomous

Tele-Operated

Length

Payload

Accuracy

Transponder & Sensorics

Transponder, Sensorics & control room observed

16,5 m

78 t

± 3cm



Carrying wagon for rail transport of B-TC units



Marshalling yard

possible

Noise

78 dB (45') & 80 dB (52')

Length

15.15 m (45') – 17 m (52')

Weight

16.5 tons

Height

1.10 m (G1)

2018: fully automated process



Train with BASF Class Tank Containers



Full automated container storage yard



Autonomous onsite AGV transport



Frame makes loading without AGV possible

1 Hour

From ordering the tank until delivery at the loading station

Logistics Innovation

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

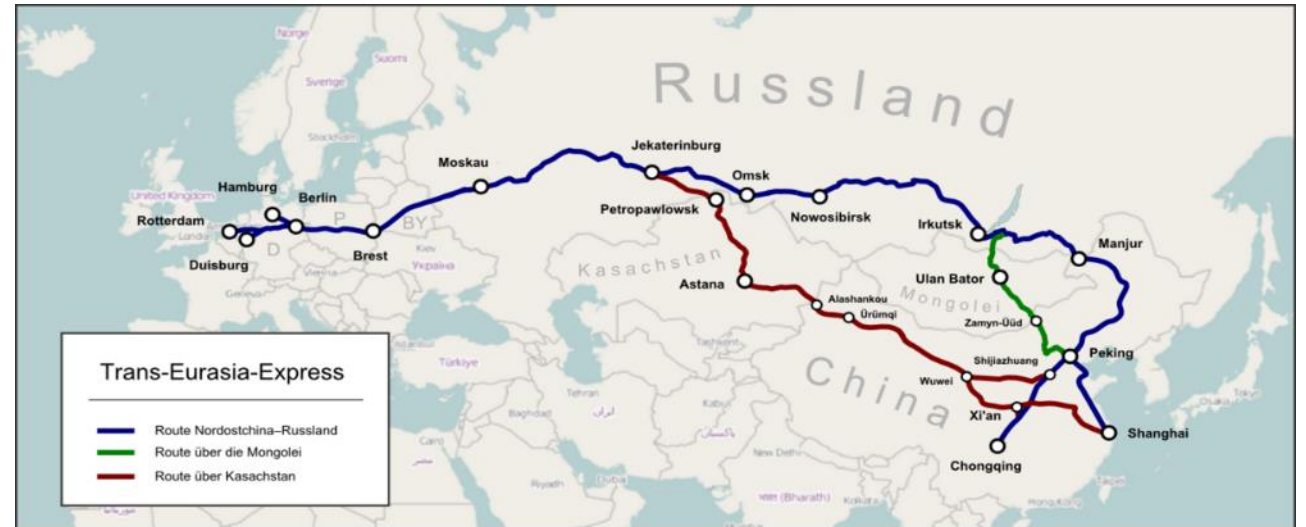
Opportunities in logistics

- Productivity increase of intermodal transport thru autonomous driving
- AGV: payload 78 tons



Opportunities in logistics

- BASF Class Tank Containers – a new segment in intermodal transport
- Transport optimization: opening new raw material supply opportunities





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