Advantages of using Advanced High Strength and Wear resistance steels in Tippers and Trailers

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SSAB Special Steels

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In this presentation

- Principles
- Introduction to Hardox and Strenx
- Reference cases
- Economy aspects
- Your SSAB in India

Principles

Ljubljana wheel

5,150 BP

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$$\sigma_{allow} \sim \frac{\$}{CO_2}$$

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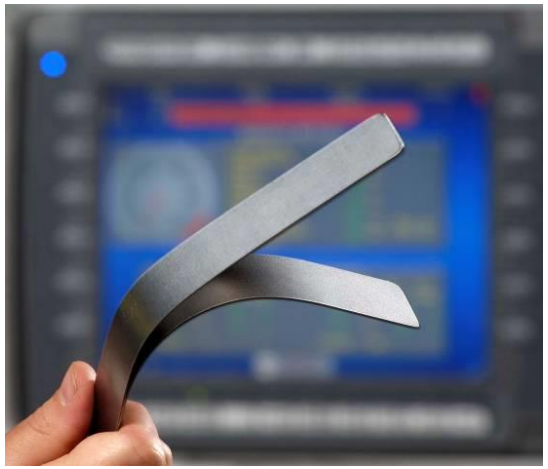
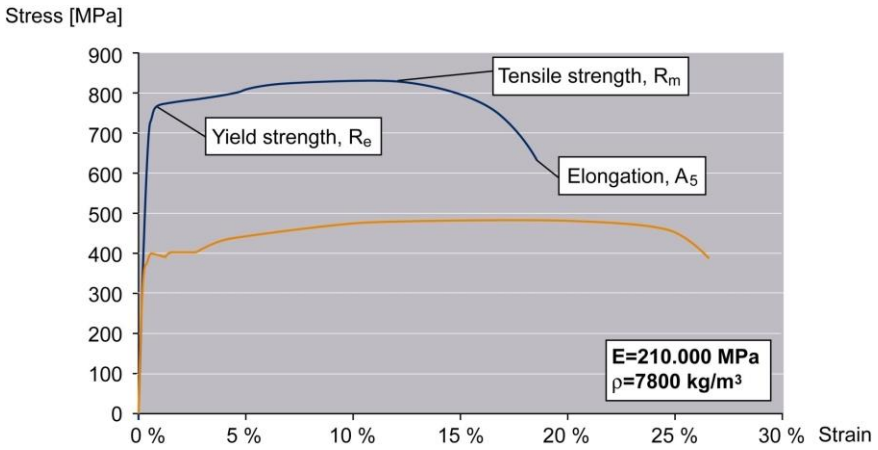
Steel vs Steel

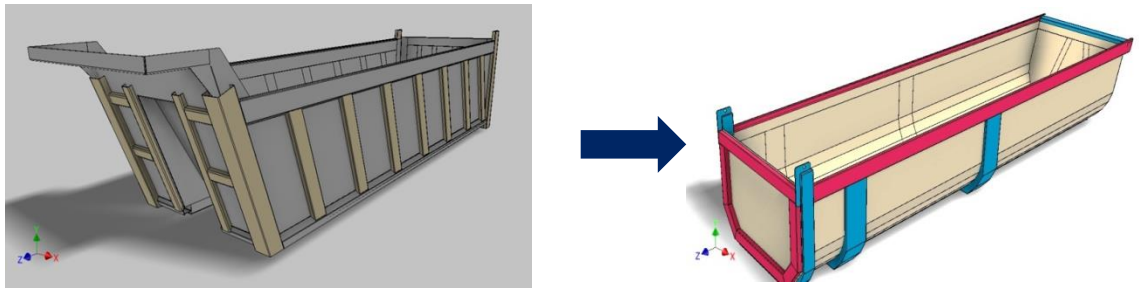
- Stronger & Lighter

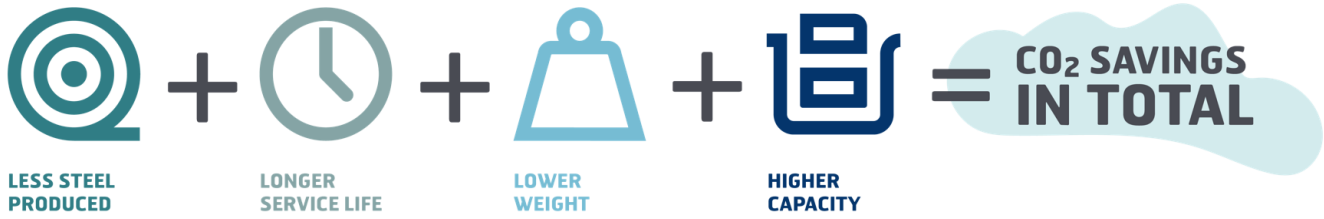




5,770 Kg 32 m3

3,000 Kg 34 m3





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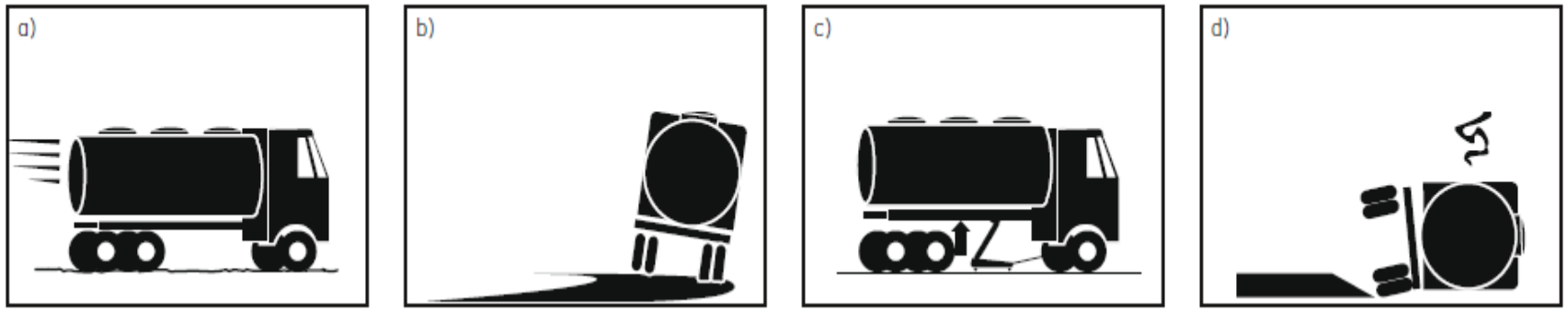
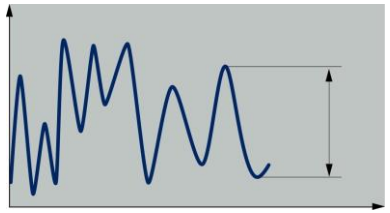
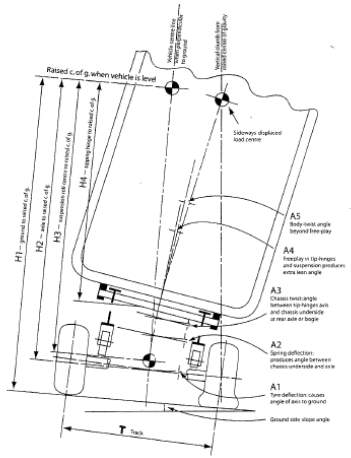
EXPRESSWAY

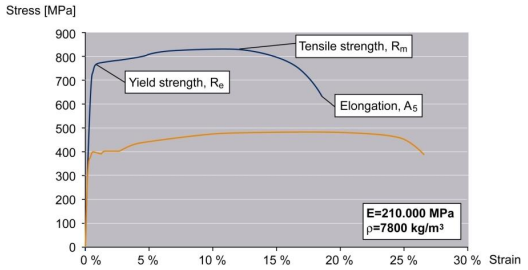
Different performance requests

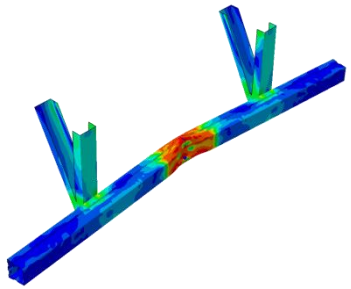


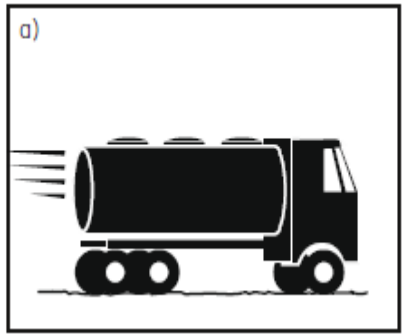
Fatigue Stability Elastic behaviour Ultimate strength



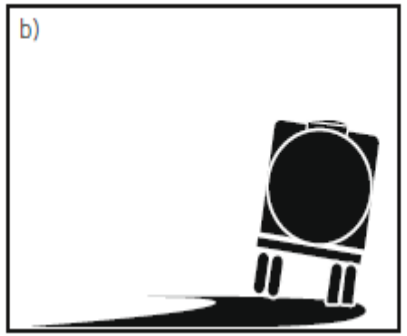




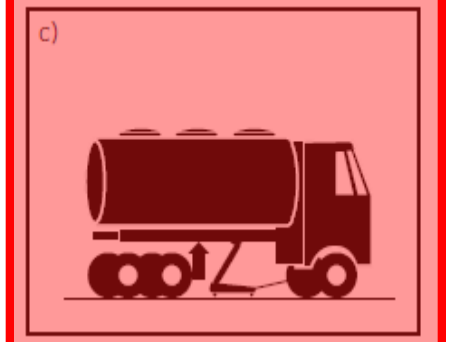




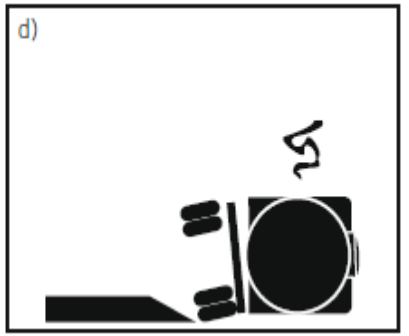
Fatigue



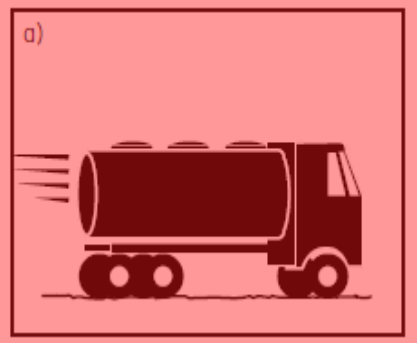
Stability



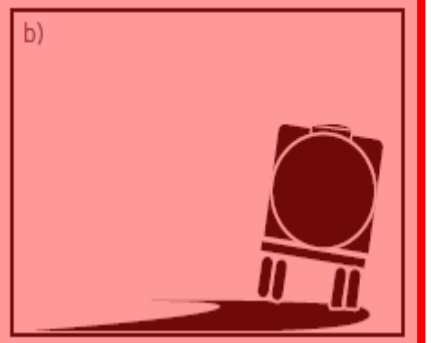
Elastic behaviour



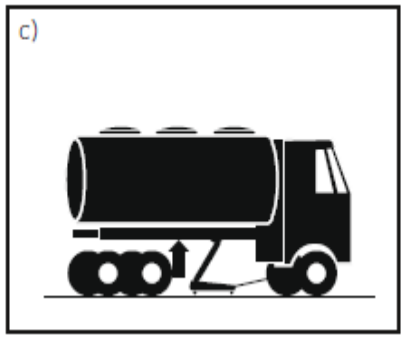
Ultimate resistance



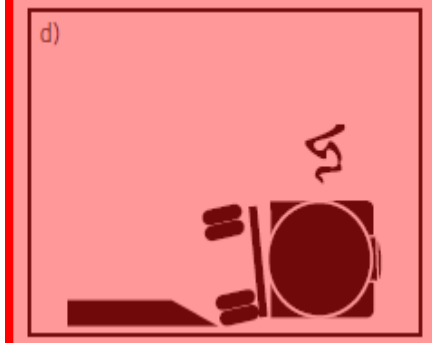
Fatigue



Stability



Elastic behaviour



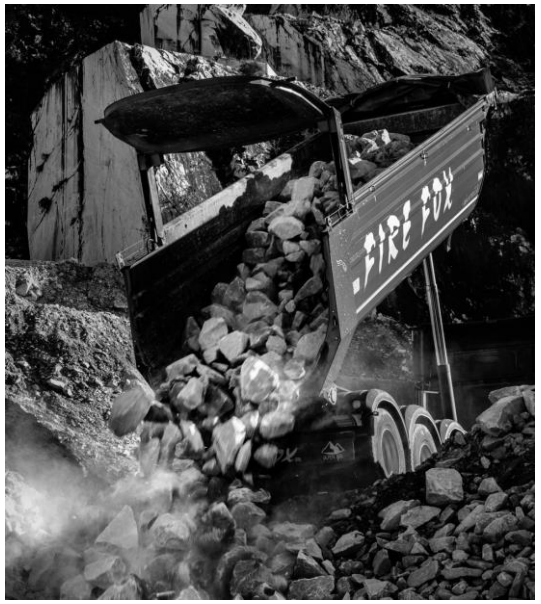
Ultimate resistance

Introduction to Hardox® and Strenx®

Introduction to Hardox® and Strenx®

► HARDOX® IS AN EXTREME WEAR FIGHTER

- Longer service life
- Made for the most challenging abrasive environments
- High yield and tensile strength
- Reduced production, maintenance and repair costs
- Tough on impact
- Uncompromising through-thickness hardness



► STRENX® MEETS YOUR CHALLENGES

- A WIDE RANGE OF HIGH-STRENGTH, HIGH-PERFORMANCE STEELS
  - From 600 to 1300 MPa
  - Thickness 0.7 to 160 mm
  - High impact toughness
  - Excellent workshop properties
  - Superior consistency backed up by Strenx® guarantees for flatness, thickness and bendability
  - Available as hot-rolled plates, coils, sheets and as cold-rolled sheets and coils
  - Tubes and open profiles in different shapes, thicknesses and strengths

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Introduction to Hardox® and Strenx®

- Hardox® wear plate
  - There is only one producer of the Hardox® wear plate → SSAB.
  - Only Hardox® wear plates meet the very high level of product properties and customer value (outstanding precision, smooth and flat surface, excellent impact resistance, predictable lifetime and uniform wear), guaranteed by SSAB.

Confirms HARDOX

SSAB

Introduction to Hardox® and Strenx®

- Hardox® 450 CR
  - Hardness= 425-475 HB
  - Thickness= 0.7-2.10 mm
  - Longitudinal test, typical impact energy Charpy V 10x10 mm test specimen= 50J/-40 °C
- Hardox® 450
  - Hardness= 425-475 HB
  - Thickness= 3.2-130 mm
  - Longitudinal test, typical impact energy Charpy V 10x10 mm test specimen= 50J/-40 °C
- Hardox® 500Tuf
  - Hardness= 475-505 HB
  - Thickness= 4-25.4 mm
  - Same bending recommendations as Hardox® 450
  - Longitudinal test, typical impact energy Charpy V 10x10 mm test specimen= 45J/-40 °C

1.5 mm drop-sides & 2 mm floor Hardox® 450 CR Fesan, Turkey

4 mm sides & 6 mm floor Hardox® 450 Atlas Al Shirawi, UAE

Under construction 8 mm (all) 23 cbm tipper Hardox® 500Tuf (upgraded from Hardox® 450) Atlas Al Shirawi, UAE

Introduction to Hardox® and Strenx®

$$t_{\text{high strength}} = t_{\text{mild steel}} \cdot \sqrt{\frac{R_{e,\text{mild steel}}}{R_{e,\text{high strength}}}}$$

- **Strenx® 700 CR**
  - Yield Strength= 700 MPa
  - Thickness= 0.7-2.10 mm

Strenx® 700 CR 2 mm Cement Bulker Güven Makina, Turkey

Front and rear dishes are Mild Steel

- **Strenx® 960 CR**
  - Yield Strength= 960 MPa
  - Thickness= 0.7-2.10 mm

Rear Under-run protection

- **Strenx® 700 MC**
  - Yield Strength= 700 MPa
  - Thickness= 2-10 mm

Trailer Chassis

New Suspension Link Design

Lighter and better dynamic performance

- **Strenx® 960 MC**
  - Yield Strength= 960 MPa
  - Thickness= 3-10 mm
  - lifting and load handling applications when fatigue stress is the main design principle

Advanced trailer chassis

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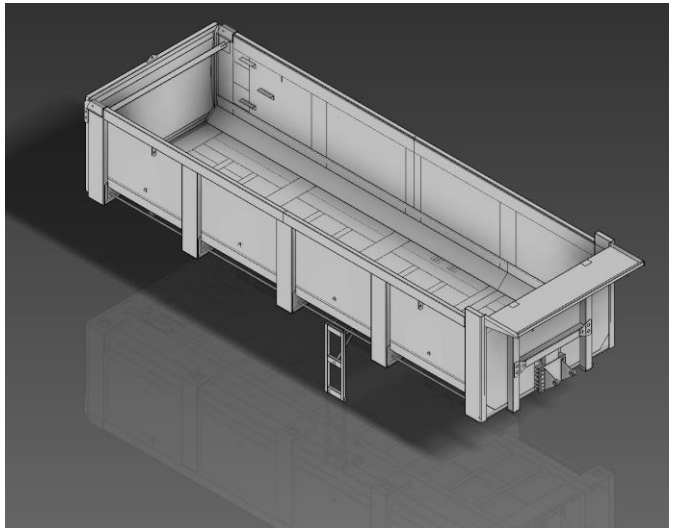
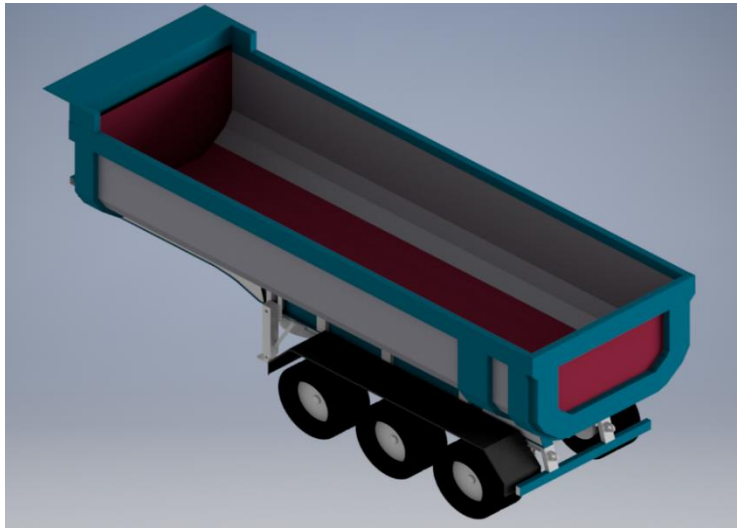
Reference Cases

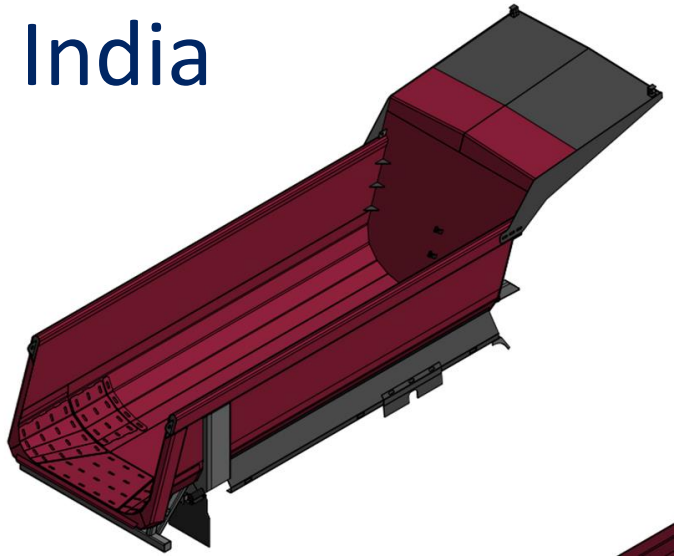
28 m³ Tipper, India





- Material: Hardox® 500 Tuf & Hardox® 450.
- Max. Load: 35 tons.
- Body Weight= 2200 kg (30% weight reduction).
- Innovation: reducing the weight to increase the payload and improve service life by increasing wear and dent resistance.

U.Flex Tipper Scania/SSAB, India



- Full Hardox 450 Body
- Water filled volume 20.3 m^3
- Heaped volume 22.1 m^3
- Max payload 36 ton
- Body+subframe+wet kit 5700 kg

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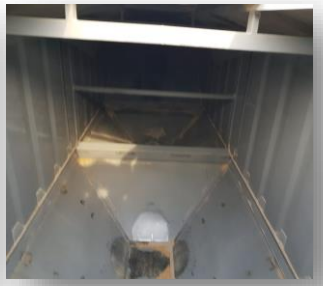
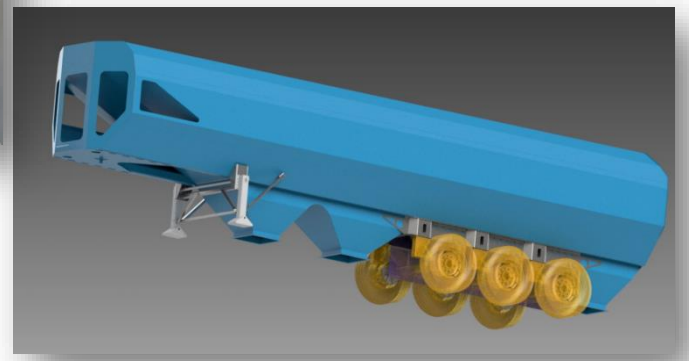
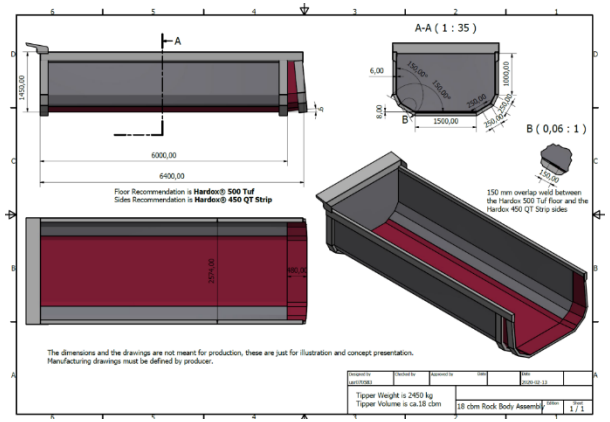
50 m³ Grain Carrier Trailer, Saudi Arabia
SSAB Services PDE





- Material: Strenx® 700MC
- Max. Load (wheat): 32 tons
- Body Weight + Subframe Weight = 4589 kg (35% weight reduction)
- Innovation: reducing the weight to increase the payload
- Future Plan: upgrade to Strenx® 960MC

18 m³ Rock Body Tipper, Saudi Arabia



- Material: Hardox® 500 Tuf & Hardox® 450
- Load: 300-500 mm diameter rocks (basalt)
- Body Weight = 2450 kg (20% weight reduction)
- Innovation: Utilization of the much higher dent resistance of the Hardox® 500 Tuf as well as increasing the wear service life by more than 40% compared to the mild steel tipper.
- 10 tons savings in $C0_2$ emissions & 2521 liters fuel savings over lifespan.

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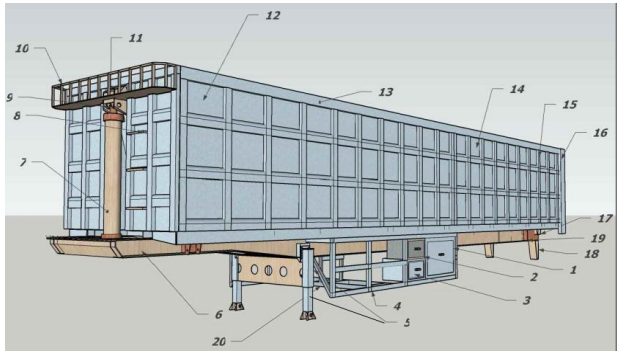
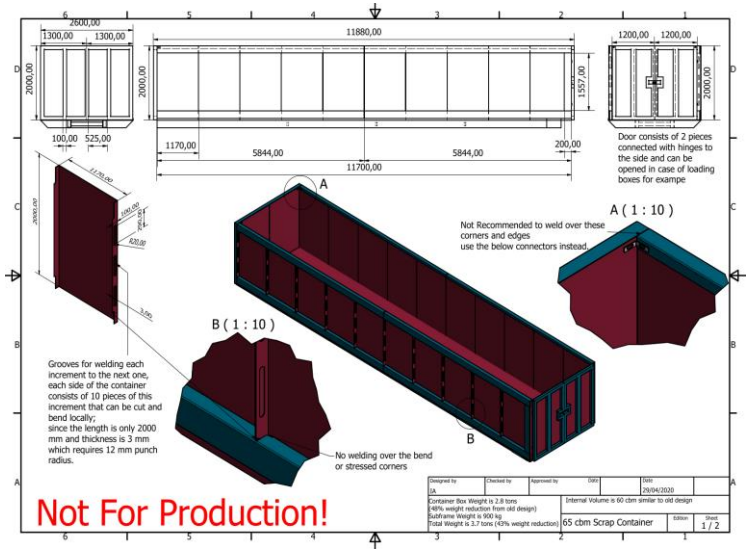
65 m³ Scrap Container, Saudi Arabia

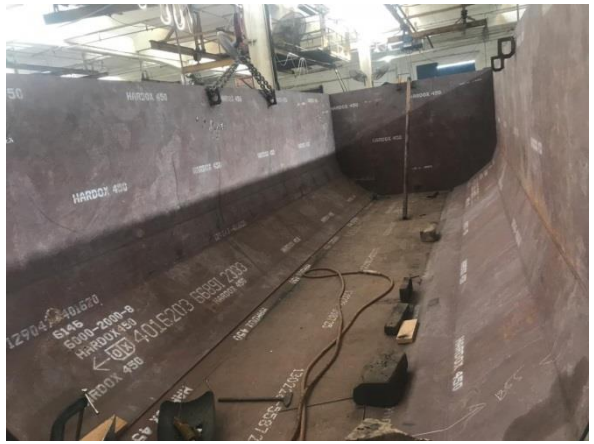
- Material: Hardox® 500 Tuf for floor and sides in 3 mm.
- Volume= 65 m³
- Body Weight = 2800 kg (48% weight reduction).
- Innovation: huge weight reduction, increased payload, much better production process and efficiency as well as easy production in house without outsourcing requirements.





18 m³ Tipper, Pakistan

- Material: Hardox® 450 for floor and sides in10 & 8 mm, upgraded from mild steel 10 mm floor and 10 mm sides.
- Body Weight = 2500 kg (10% weight reduction).
- Project targets 120 tippers for government project.
- Innovation: 10% weight reduction as well as 35% increase in service life.



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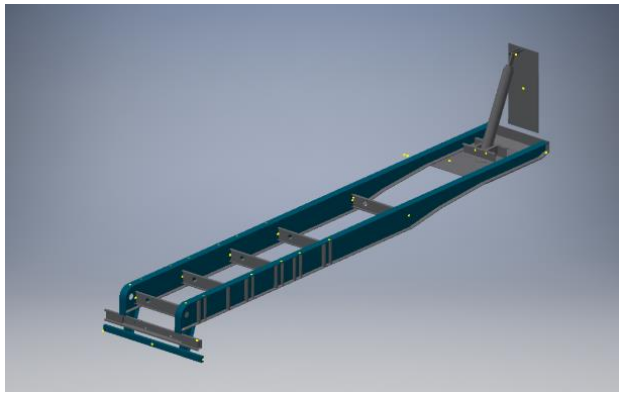
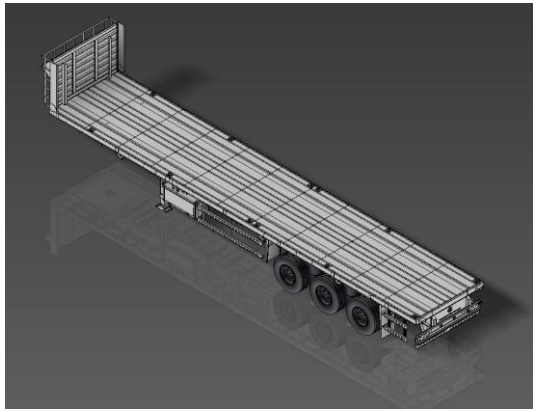
80 tons Lowbed Trailer, Kuwait

- Material: Strenx® 700MC.
- Max. Load: 80 tons.
- Weight Reduction= 21%.
- Innovation: reducing the weight to increase the payload and performance as well adapt chassis stiffness to off road conditions.
- Future Plan: upgrade to Strenx® 960MC

40 tons Flatbed trailer, Saudi Arabia





- Material: Strenx® 700MC
- Weight = 1128 kg (29% weight reduction)
- Innovation: reducing the weight to increase the payload and performance
- Future Plan: upgrade to Strenx® 960MC

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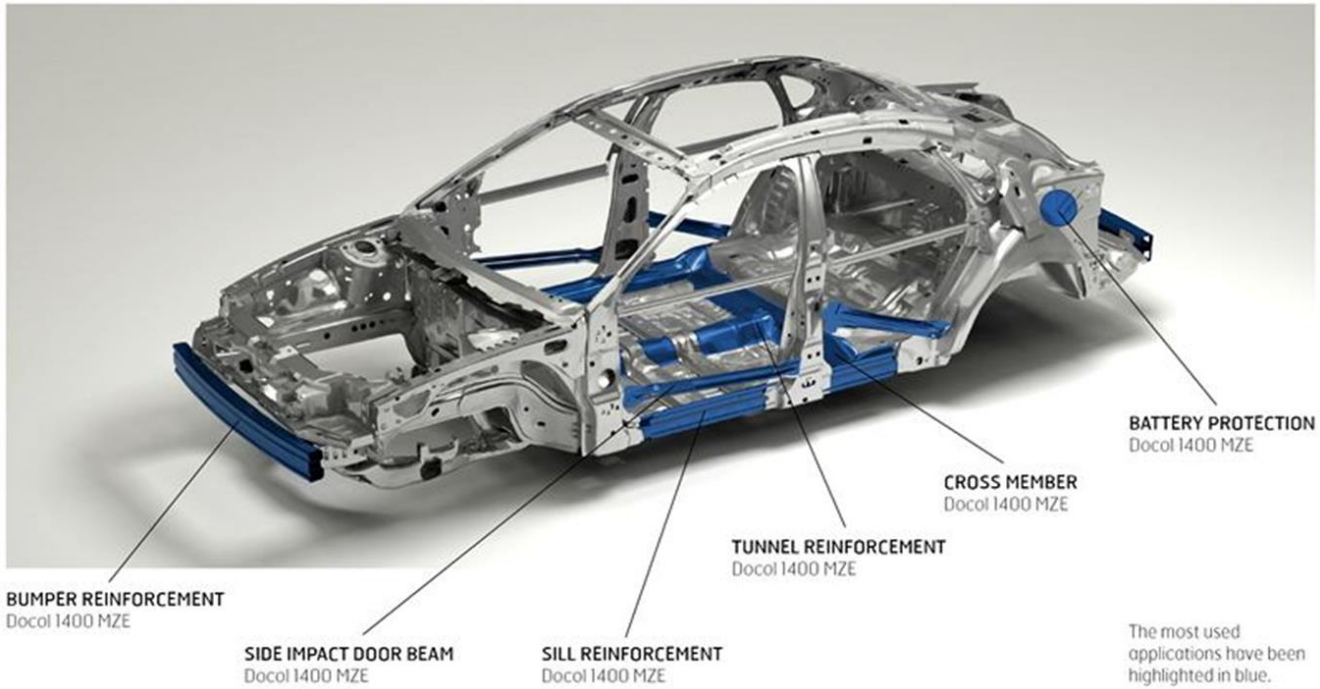
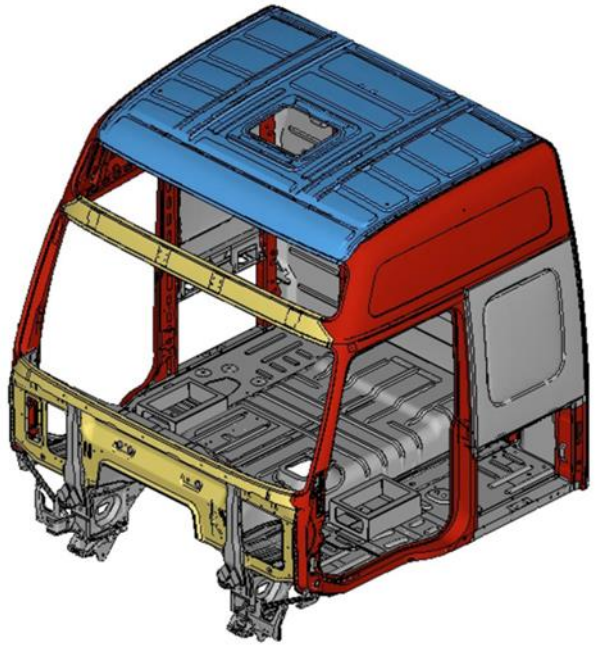
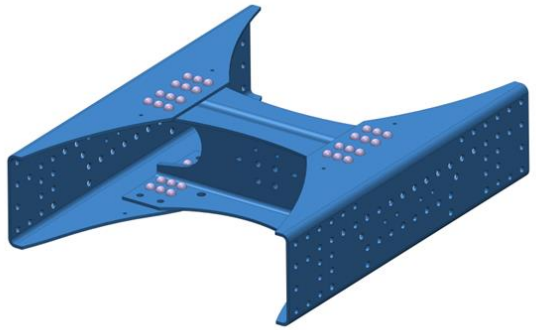
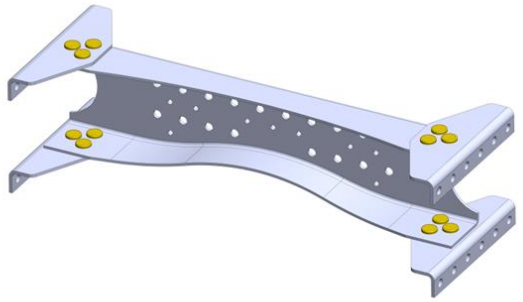
Opportunities

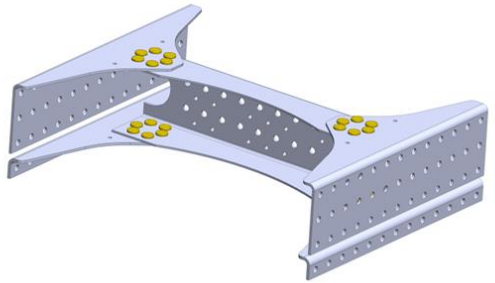


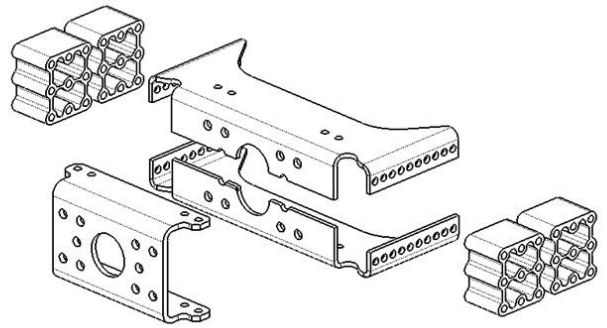


Opportunities

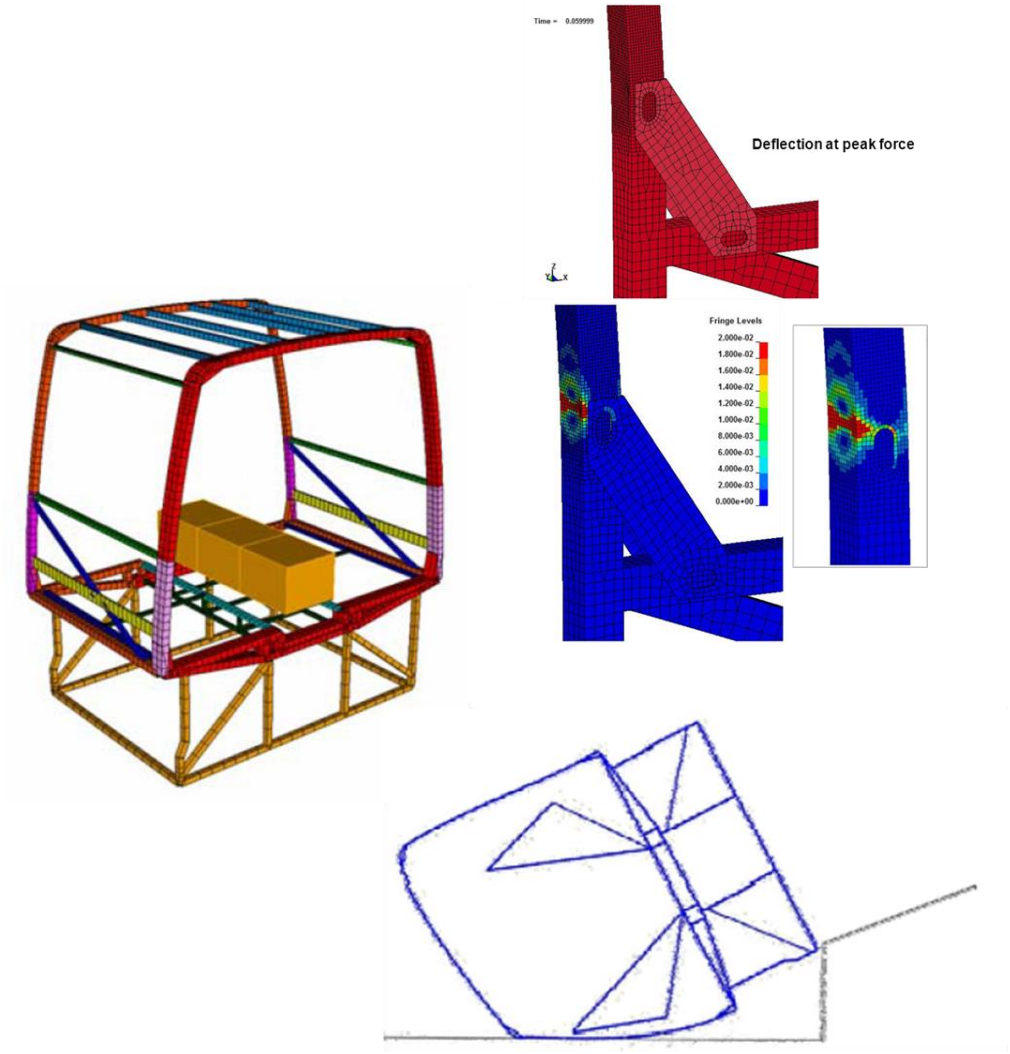


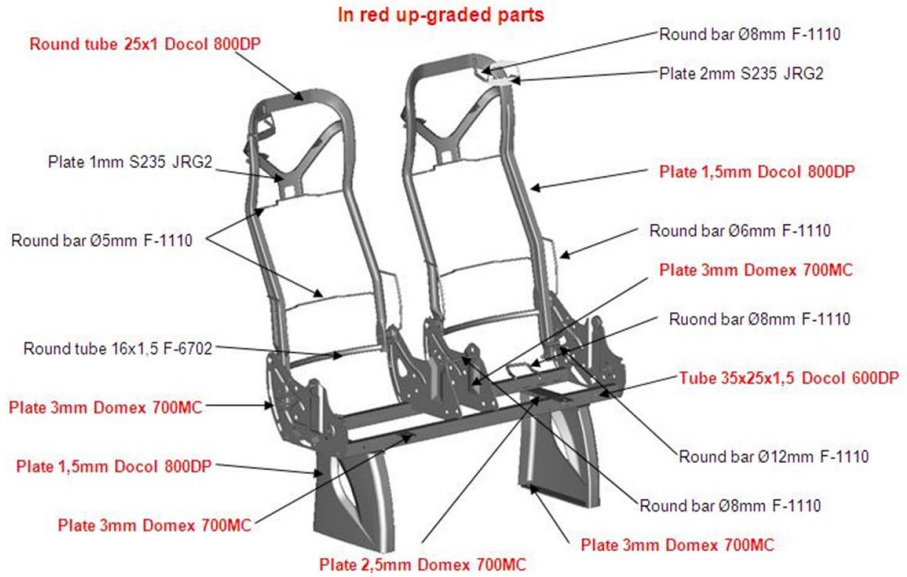






Opportunities





Economy aspects

New paradigmes for the Indian Transport Industry

- More professional logistic operators
- More specialized logistic solutions
- Mindset evolution: from COST to Investment and Return On Investement
- Before: focus on cost (cheap) → Now: focus on performance and result
- Safety
- **Environmental responsability**

“Skip every 10th trip”

SEMI-TRAILER SCRAP BOX

This semi-trailer scrap box was designed to become super light, using laser welded sidewalls with integrated top beam and floor made of Hardox® 450. In addition, Strenx® 700 was used in the trailer chassis. This means a total weight reduction of 3 tons compared to similar solutions of standard design. This increases the load capacity by approximately 10%.

CO_2 SAVINGS
50 tons/lifetime

CO_2 PAYBACK TIME
1.6 years

FUEL REDUCTION
14 800 l/lifetime

Taking **24** cars off the road for a year

CO_2 SAVINGS

LESS STEEL PRODUCED

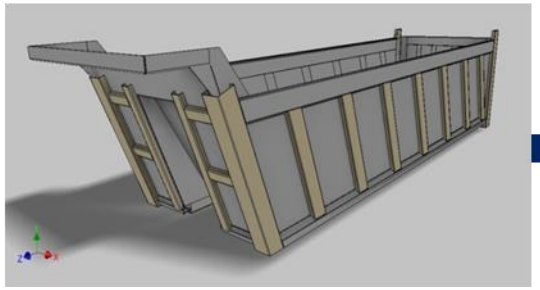
LONGER SERVICE LIFE

LOWER WEIGHT

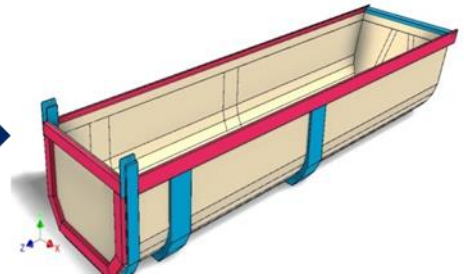
HIGHER CAPACITY

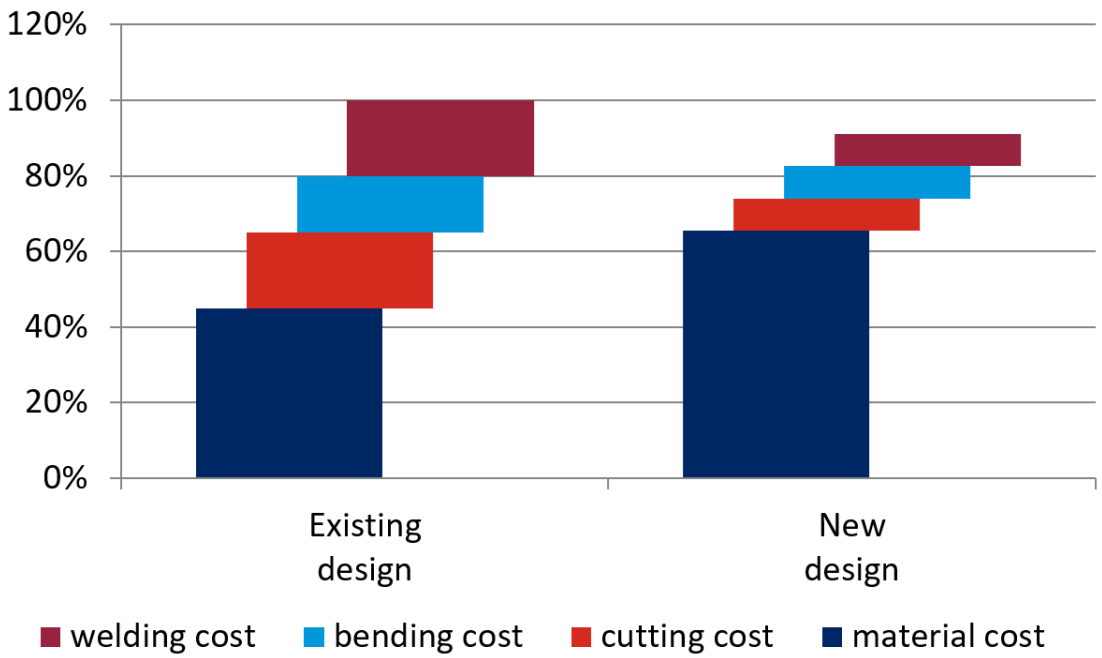
	CALCULATION DATA
Fuel consumption, fully loaded	40 litres/100 km
Fuel consumption, without load	33 litres/100 km
Machine usage per year	100 000 km/year
Distance with maximum load	50 %
Service lifetime	7 years
Maximum payload (before upgrading)	30 800 kg
Gross weight (fully loaded)	46 800 kg
Weight of original parts	8 220 kg
Weight of upgraded parts	5 220 kg

5,770 Kg, 32 m3



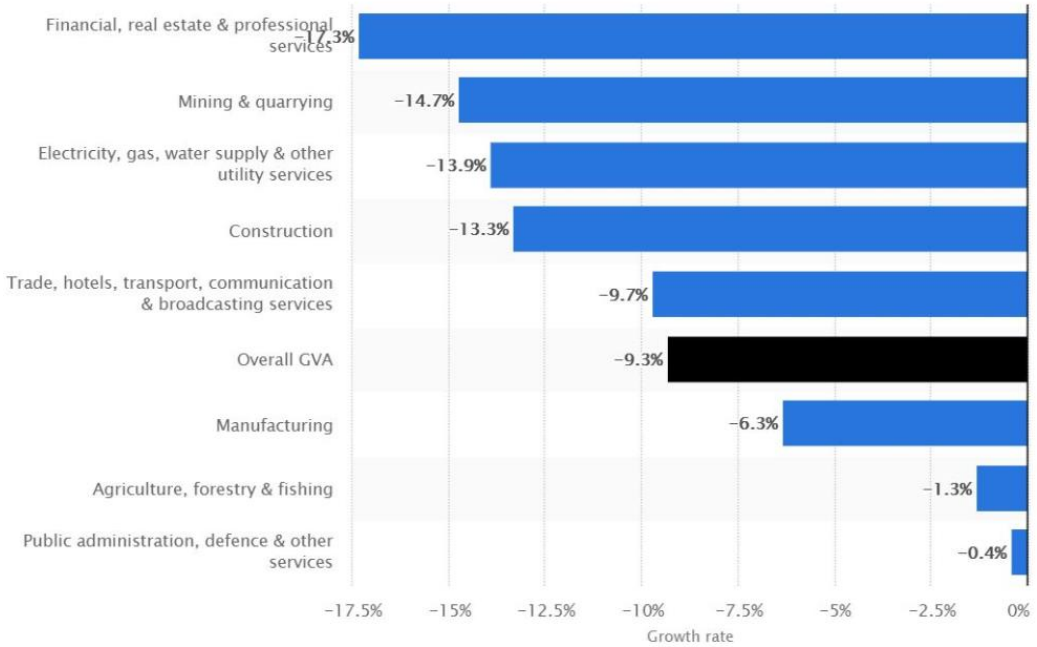
3,000 Kg, 34 m3

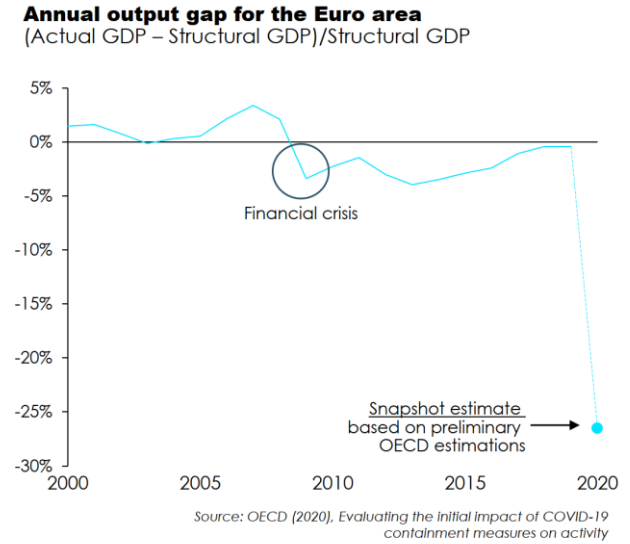


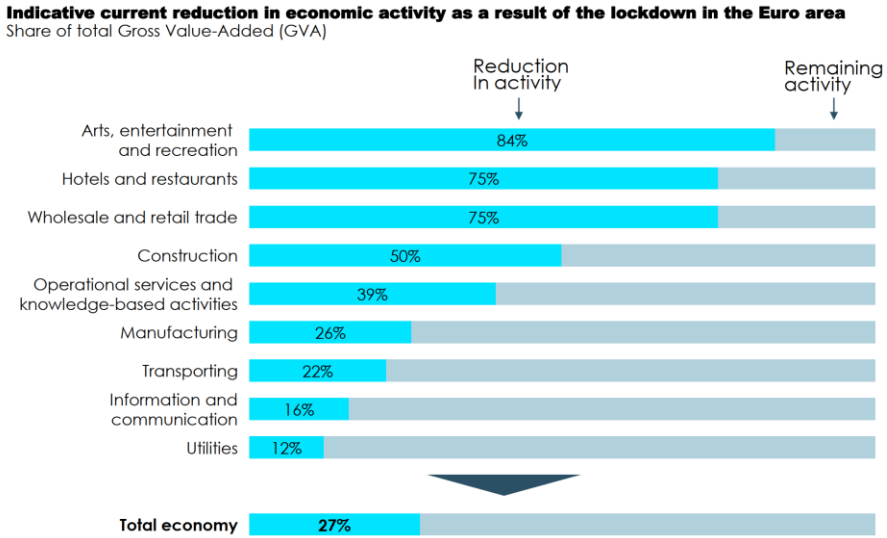


Estimated impact from Covid-19 on India April-June 2020 by sector Gross Value Added (GVA)

Estimated impact from Covid-19 on India April-June 2020 by sector Gross Value Added (GVA)







Economic Consequences of the Covid-19 Pandemic (Copenhaguen Economics)

Our homework

- Time → Think
- Do not read Economy Reports
- Opportunities
- To be focused on **Added Value** and competitive products
- Prioritize performance during the **Product Life Cycle** (PLC)
- Pay attention to **hidden costs** (extra manufacturing, un-necessary complexity, down time and maintenance, un-necesary weight...)
- Higher quality & performance → higher second hand value

- For SSAB → **Customer's business in focus**

Your SSAB in India

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