

Gränges Capital Markets Day 2016



Today's agenda

- 1. Introduction
- **2. Group strategy and outlook** Johan Menckel, CEO
- Strong financial performance Oskar Hellström, CFO
- 4. Extending our lead in automotive Sampath Desikan, MD Gränges India

- 5. Growth opportunities in stationary HEX Claudi Martin Callizo, HVAC&R Manager
- 6. Leveraging a strong presence in China Colin Xu, President Gränges Asia
- 7. Customer case TitanX
 Matt Moore, VP Research Development & Engineering at TitanX Engine Cooling
- Conclusion
 Johan Menckel, CEO



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Gränges vision and business concept

Vision

 Transforming the world through innovative aluminium engineering

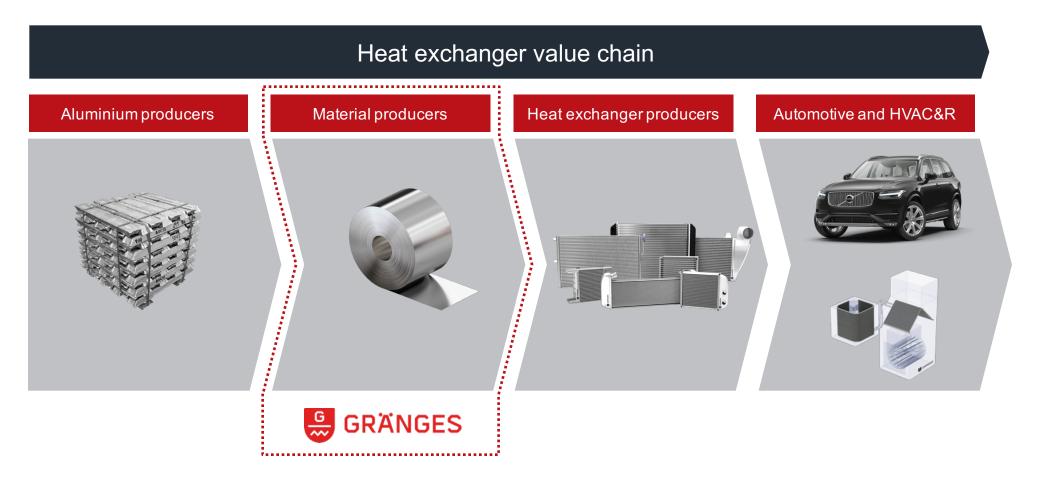
Business concept

 Gränges is a global aluminium company and the market leader in advanced materials for heat exchangers. We provide lighter and more designable solutions that increase economic efficiency and reduce environmental impact





Gränges is a global aluminium company specializing in rolled products for the heat exchanger industry

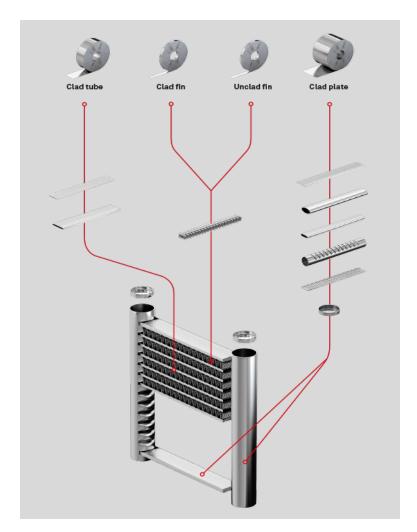








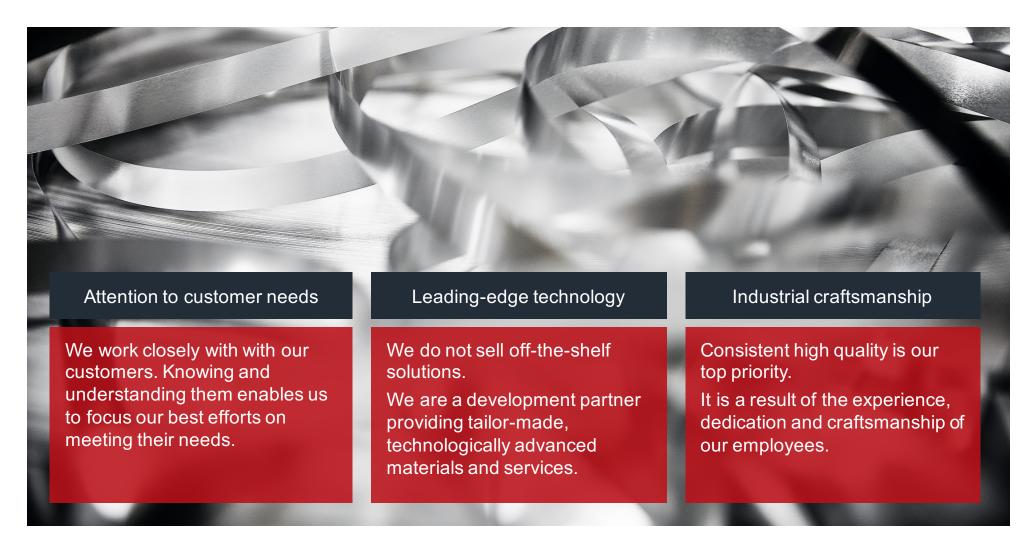
Multi-layer cladding adds unique properties and enables Gränges to offer tailored solutions







Gränges success factors





2020 goal and strategy

- Grow significantly above the market rate
- Become the market leader in all geographical regions
- Maintain good and sustainable profitability

Drive growth through innovation

- Lead the development of heat exchanger materials
- Offer the most advanced solutions
- Be the preferred partner for our customers

Create value from sustainability

- · Zero accident target
- Reduce waste
- Increase recycling
- Ensure diversity
- Be an attractive employer

Increase efficiency through continuous improvements

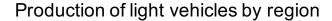
- Improve process stability
- Increase productivity
- Increase energy efficiency
- Improve metal management

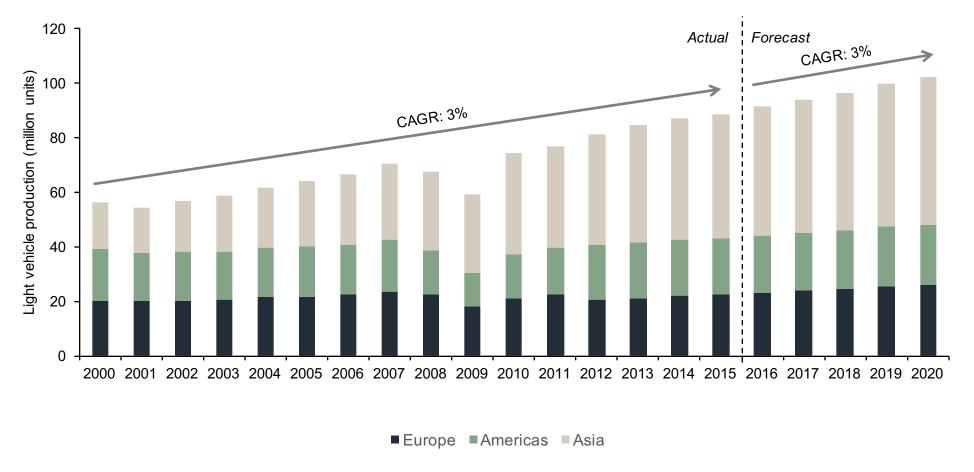
Grow presence through structural expansion

- Add production capacity in North America
- Increase production capacity in Asia
- Expand into adjacent market segments



Global production of light vehicles is expected to grow by 3% annually from 2016 to 2020







Drive growth through innovation

Accelerated expansion in HVAC&R

- Shift to aluminium and brazed technology
- Aluminium is used in less than 5% of global HVAC&R
- Increased focus on energy efficiency and lower CO₂ emissions



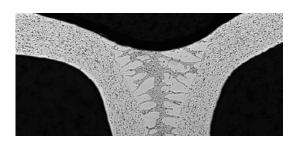
Heat exchangers for industrial applications

- Significant potential for brazed aluminium heat exchangers
- Market size ~4x market for HVAC&R applications



TRILLIUM® commercialisation

- TRILLIUM[®] is an alternative brazing process developed together with Sandvik-Osprey
- Perfect brazing joints without need to flux
- One of the most advanced technologies

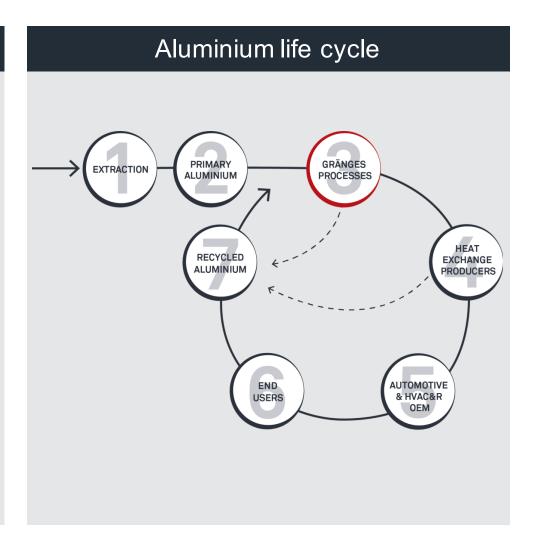




Create value from sustainability

Focus areas

- Safety first zero accidents target
- Recycling of aluminium
- Life cycle perspective
- Energy-optimised processes
- Diversity



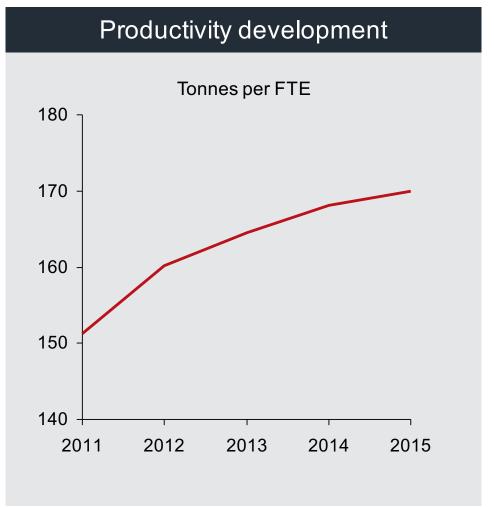


Increase efficiency through continous improvements

Focus areas

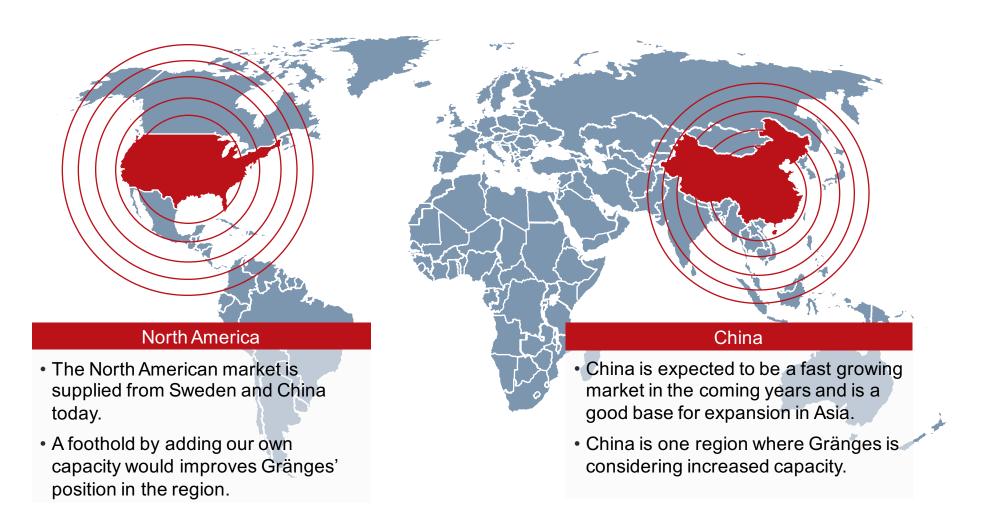
- Process stability
- Productivity
- Energy efficiency
- Metal management





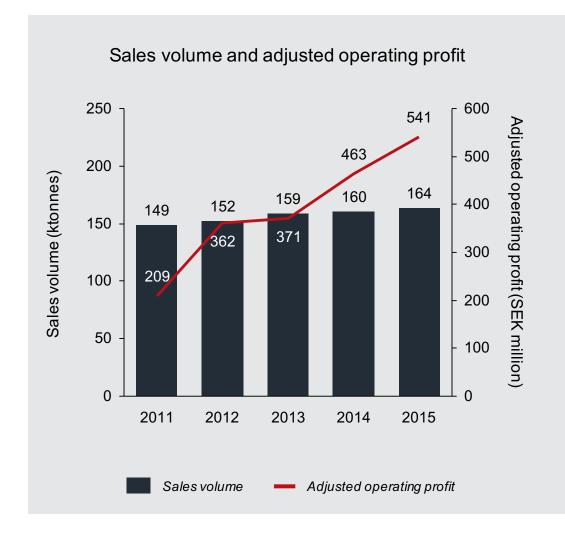


Grow presence through structural expansion





Key achievements in 2015



- A higher growth than the market
- Earnings and cash flow at new record levels
- Improved metal management
- Lower energy use per tonne
- Reorganisation and downsizing in our Swedish operations



Strong performance against targets in 2015







Trends set to drive Gränges' development

Higher living standards

- Increased demand for vehicles among first-time buyers in developing countries
- Many functions are becoming standard, like air-conditioning systems
- Safety is a driving trend that has increased demand for larger cars and SUVs

Reduced environmental impact

- Ambitions to reduce green house gas emissions
- Demand for lower weight and greater efficiency
- Larger car models require more heat exchanger material

Efficiency demands

 Need for reduced energy consumption and cost savings drives demand for efficient products in logistics and production terms



Well positioned for future growth

Our industry Our customers Our business Market-leading position A few large customers The automotive industry Global market The HVAC&R industry Strong presence in Asia High technical demands Technical leadership Niche in the aluminium Well-invested facilities industry Stable business model Potential for continued growth





Today's agenda

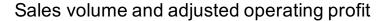
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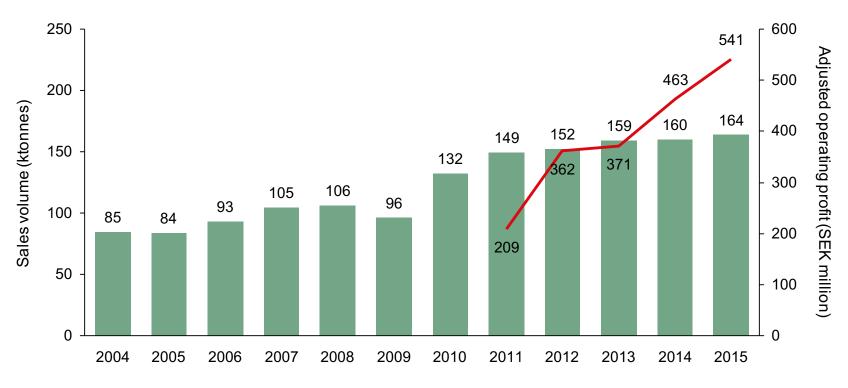
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Strong track record of growth and earnings improvement

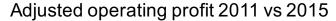


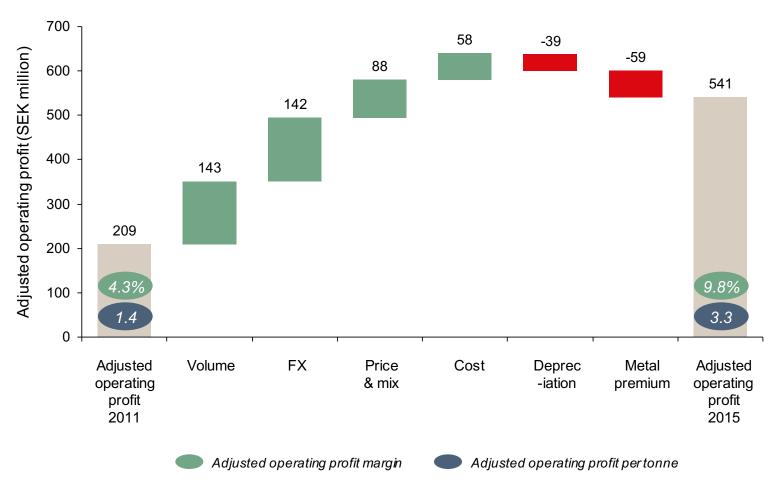






Earnings improvement driven by volume growth, price and productivity increase and FX tailwind

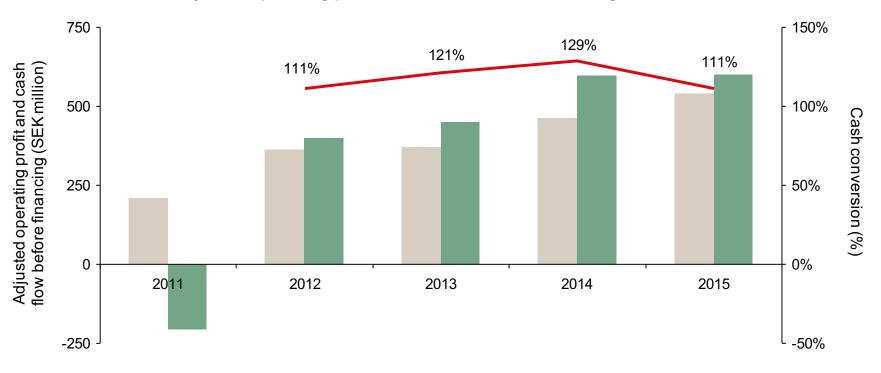






Improved earnings have successfully been converted into cash – cash conversion 118% from 2012 to 2015

Adjusted operating profit to cash flow before financing conversion



Cash flow before financing

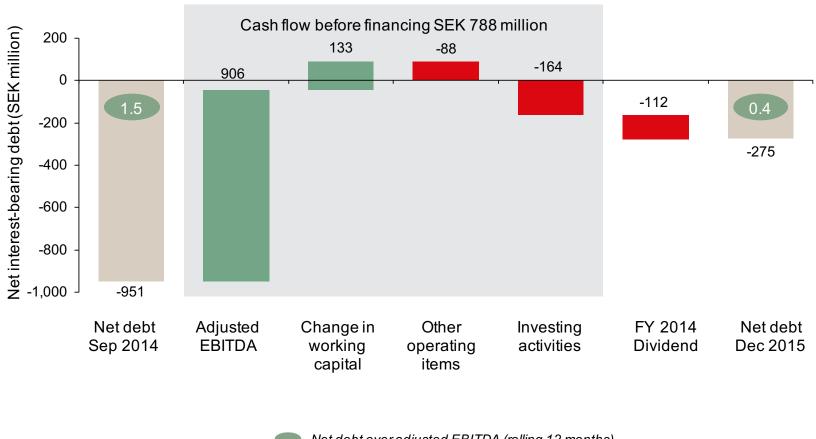
Adjusted operating profit

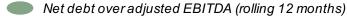


Cash conversion

Strong financial position with net debt reduced from 1.5 to 0.4 times EBITDA since the IPO

Change in net interest-bearing debt September 2014 to December 2015







The strong financial position provides flexibility while balancing business risk

Solid balance sheet for shareholder value

Risk management

- Exposure to automotive industry cyclicality
- Exposure to metal price fluctuations on working capital

Sustaining capex

 Sustaining capital expenditure to ensure operational excellence, increase productivity and reduce costs

Dividend

 Reliable and predictable dividend payments

Capacity for growth

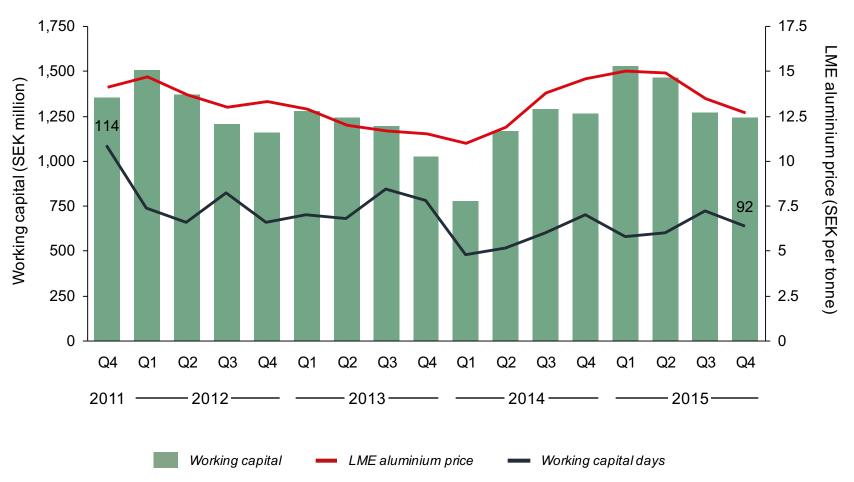
 Reinvestment in profitable organic growth and M&A

Short term Long term



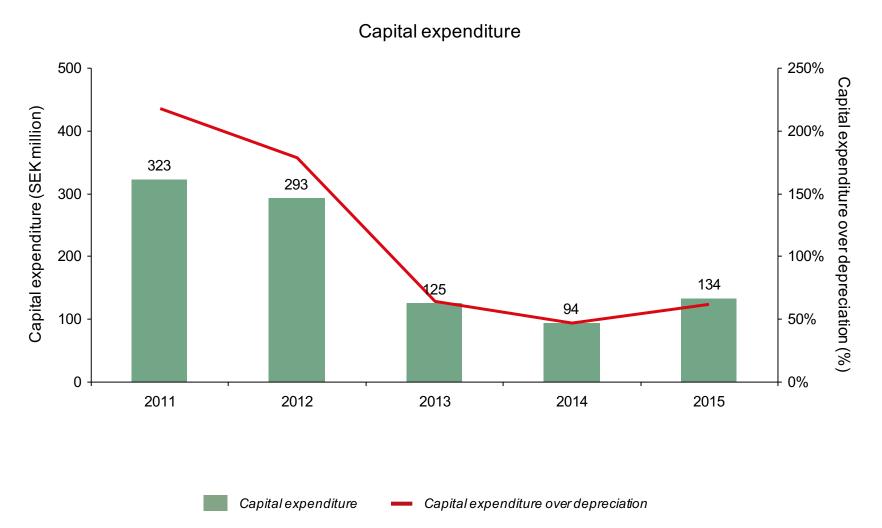
Working capital management remains a priority but fluctuations are inevitable due to metal price movements

Working capital and LME aluminium price





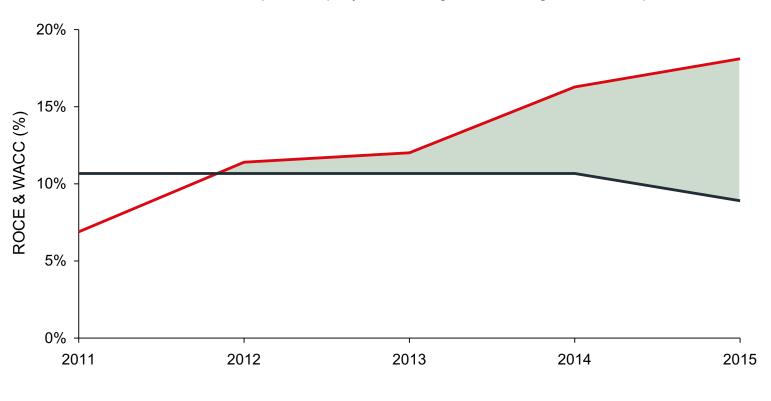
Little need for reinvestment in current facilities following the completion of a major investment programme





Track record of increasing value creation since 2012

Return on capital employed vs weighted average cost of capital¹⁾



ROCE

WACC





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Agenda

DRIVING FORCES

- Emission regulation
- Urbanisation
- Digitalisation
- Customer preferences

VEHICLES

- Low carbon liquid fuels
- Efficient and downsized internal combustion engines
- Hybrids
- Electric vehicles
- Fuel cell vehicles

THERMAL MANAGMENT

- Engine cooling and HVAC
- Power electronics cooling
- Battery cooling
- Cooling of electric traction motors
- Cooling of proton exchange membrane fuel cells

HEAT EXCHANGER MATERIALS

- Thinner
- Stronger
- More corrosion resistant etc
- Stringent quality requirements

VEHICLE MANUFACTURERS HEAT EXCHANGER MANUFACTURERS



Trends set to drive demand for advanced heat exchanger materials in automobiles

Emission regulation

Improved internal combustion engine, powertrain electrification

Urbanisation

Growing city population and small cars, policies to discourage private vehicles

Digitalisation

Internet connected vehicles, vehicle communication, autonomous driving

Customer preferences

More fuel efficiency, electrified power train

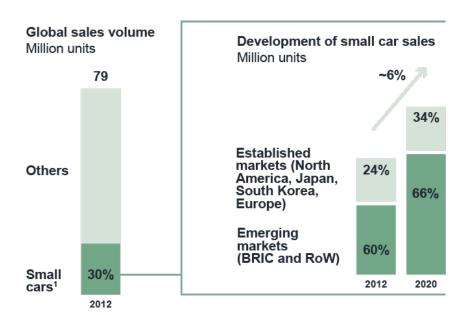


Digitalisation and urbanisation

Small cars with significant share

Strong growth of small cars in emerging markets

Internet connected cars on the rise



Global installed car base





Source: Carpark; McKinsey

Source: Carpark; McKinsey



Approaches to low carbon vehicles



Reduce carbon in fuel

- Battery electric
- Natural gas/biogas
- Plug-in-hybrid
- · Hydrogen fuel cells
- 2nd and 3rd generation biofuels

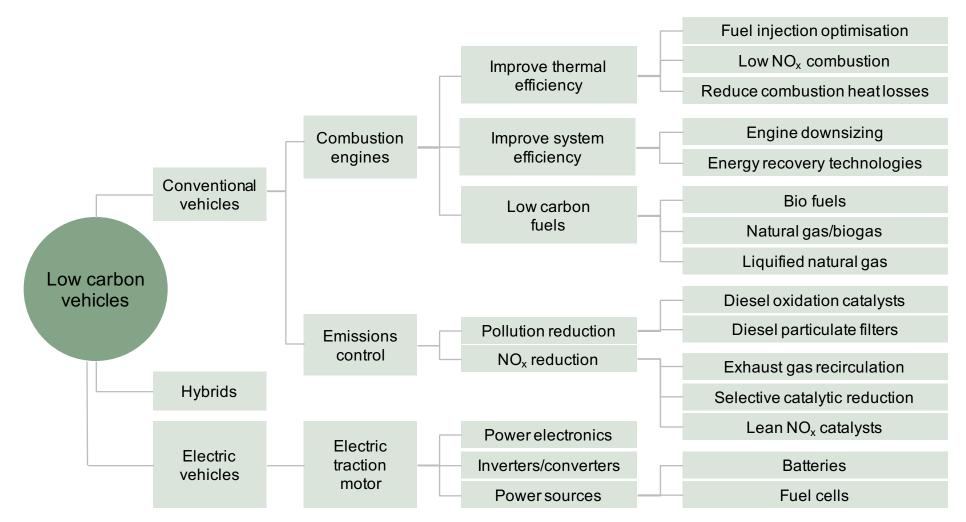
Improved vehicle energy efficiency

- Next generation combustion engine + heat recovery
- Downsized combustion engines
- Automated intelligent control
- · Combustion engine/hybrid
- Low loss transmissions & actuators

Low carbon vehicle

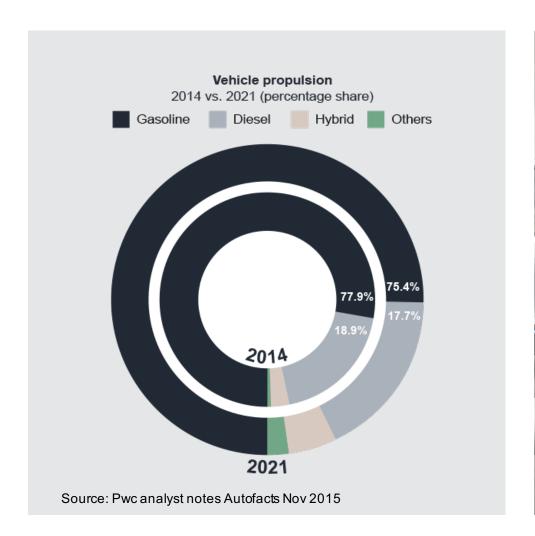


Emerging technologies for low carbon vehicles





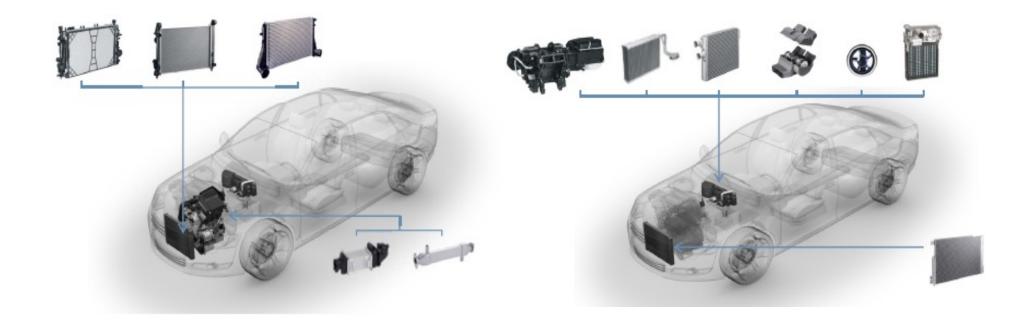
Powertrain options – gasoline and diesel engines will continue to dominate the automotive market







Heat exchangers in a conventional vehicle



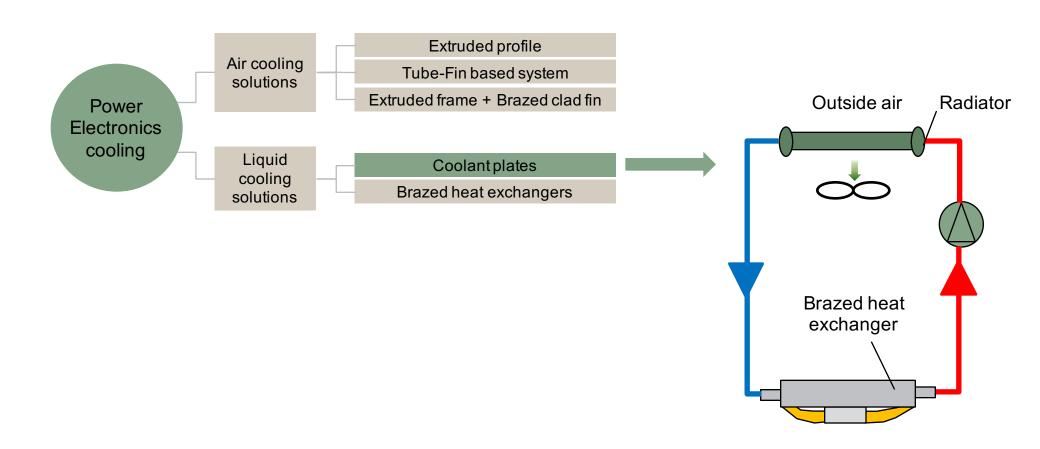






Power electronics thermal management

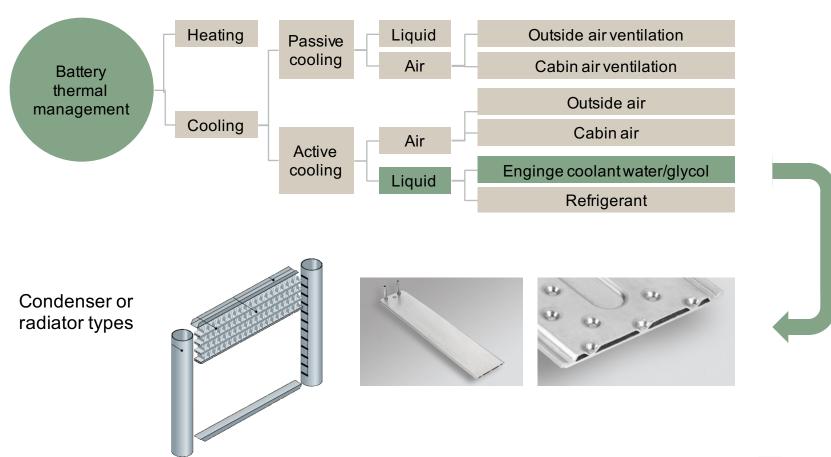
Power electronics components have to be maintained below 125°C for optimum performance



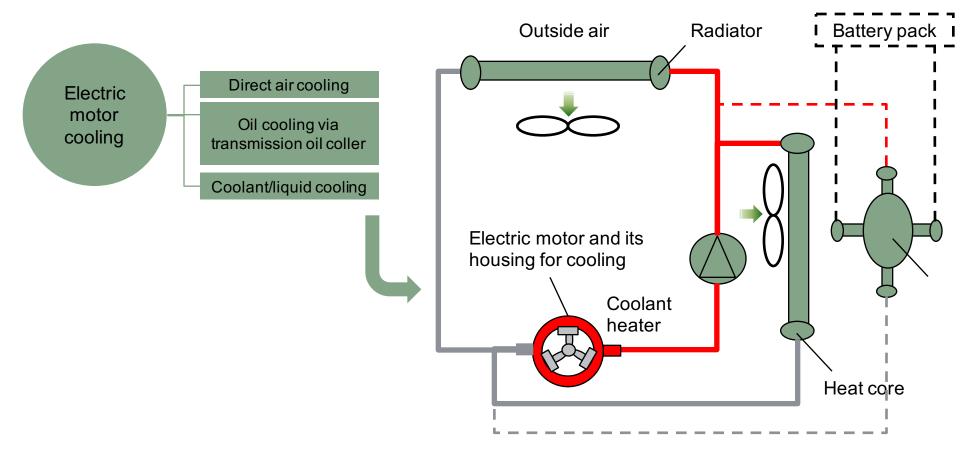


Battery thermal management

Battery temperature need to be maintained in the range 30–40°C with a maximum temperature non-uniformity 3–4°C for optimal performance



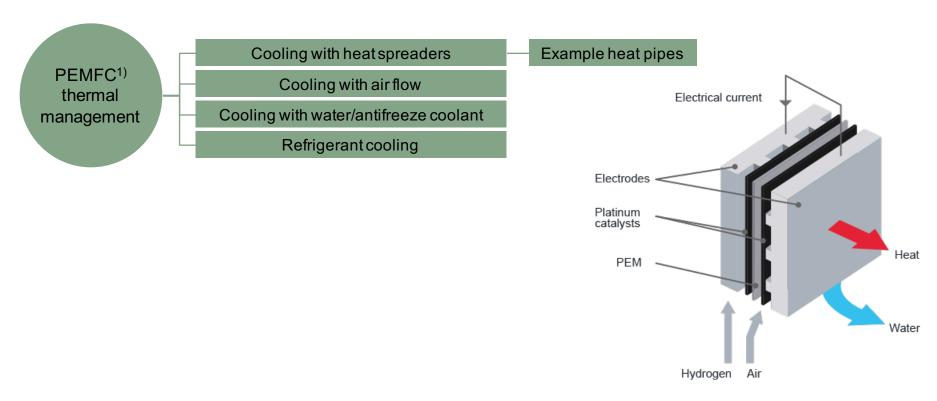
Electric traction motor cooling





Fuel cells and thermal management

PEMFC need to be maintained in the range 60–80°C small temperature difference between the stacks and ambient challenges design of thermal management system



Source: International Journal of Hydrogen Energy, Volume 37, Issue 3, February 2012, Pages 2412–2429



¹⁾ Proton exchange membrane fuel cell

Low pressure EGR systems

Aluminium heat exchangers in low pressure exhaust gas recirculation (EGR) systems require advanced heat exchanger materials – an illustrative example

- Indirect or water-cooled charge air coolers in combination with low-temperature radiator
- For both gasoline and diesel powered passenger vehicles
- Tube-fin designs
- Inside of tubes exposed to condensates from exhaust gas and wet and dry environment
- Outside of tubes and fins in contact with engine coolant
- Corrosive condensate chemistry stipulates a pH range as low as 2.8–3.5



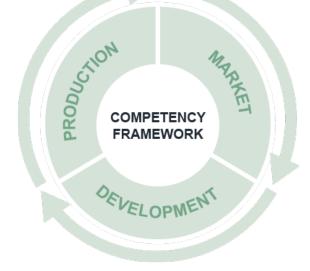


Gränges core competencies

Gränges develops, produces and markets advanced materials that enhance both production economy during the customer manufacturing process as well as the performance of the final products, the brazed heat exchangers.

- Hot rolling of clad materials
- · Precision slitting
- Continuous improvement

- Efficient and effective supply chain
- Customer intimacy



- Product and process design
- Customer's production processes



Gränges' products – heat exchanger materials

CORE COMPETENCIES

CORE PRODUCTS

END PRODUCTS

Build leadership in R&D – thinner gauge and advanced tube & fin products

Embed Gränges' core competencies in product + process designs & manufacturing

Through value selling and customer intimacy, build Gränges' brand share in the market



Summary

- Many advanced automotive technologies are being developed.
- 2. Advanced technologies often require complex thermal management systems which, in turn, demand advanced heat exchanger materials.
- 3. Gränges, with its core competence, is well positioned to develop advanced heat exchanger materials that meet market needs.





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Agenda

- Global HVAC&R market overview
- Conversion to aluminium heat exchangers
- Challenges and opportunities
- Outlook for rolled products in HVAC&R
- Gränges' offering in HVAC&R



HVAC&R definition

Heating, Ventilation and Air Conditioning

Comprises equipment and systems for the creation and distribution of environmental comfort – heating and cooling.



Refrigeration

Comprises equipment and systems for the creation and distribution of cooling for other purposes than human comfort.



HVAC market segments

HVAC

Markets served	Residential		Commercial		
Product segments	Room A/C (RAC)	Packaged A/C (PAC)		Central A/C (CAC)	
Example equipment/systems					e V
Areas of use	Bedroom, small office	< 18 kW (5 tons): hor > 18 kW: smaller to n commercial buildin	nedium-sized	Offices, stores, factories hospitals, airports	5,
Annual global production (units)	107 million	12.8 million		7.8 million	
Major OEMs	GREE Midea		n ols Di	Carrier LG DA GGREE Johnson Controls	
	US LG S∧MSUNG Panasonic	LENNOX		<u> </u>	NGES



World air-conditioning market is dominated by China and Asia-Pacific

- China is by far the largest AC market with 36% of global demand and 44% of world production.
- to growth are the North America market, South East Asia and India, while Europe is still struggling to recover from its recession.

The biggest contributors

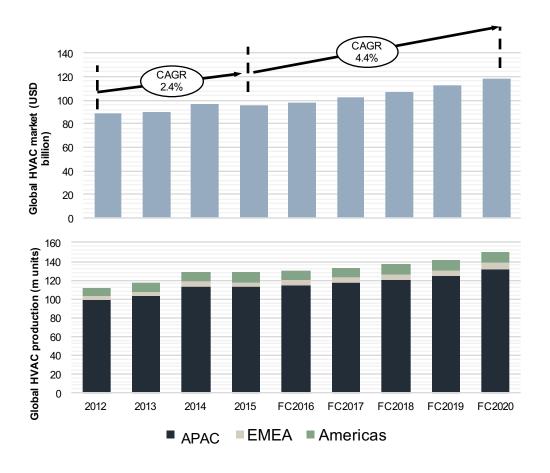
V. America 13.5 14.1 Japan '09-'10 '11 '12 '13 '14 '09 '10 '11 '12 '13 '14 C&S. America 09 '10 '11 '12 '13 '14 (ex. Japan & China) Residential air conditioners Commercial air conditioners

China

Source: JRAIA



Global HVAC market is expected to grow steadily at CAGR of 4.4% 2015–2020



Market growth drivers

- Growing population and industrialisation
- Increase in global construction expenditure
- Rising incomes of an expanding middle class, particularly in Asia-Pacific

Market trends

- Shift towards green technologies, pushed by legislation:
 - Energy efficiency standards (MEPS)
 - Refrigerant regulations
- Smart buildings

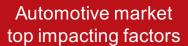
Market challenges

- Chinese slowdown
- European economy slow to pick up
- US uncertainty

Source: BSRIA, JARN, Gränges estimates



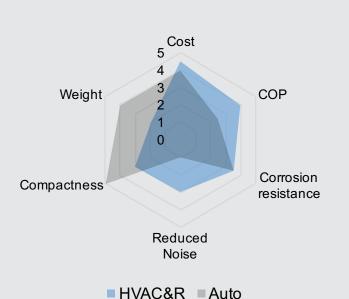
Potential for cost reduction and efficiency gains are the major drivers in HVAC&R



- 1 Compactness
- 2 Weight
- 3 Corrosion resistance
- 4 Cost
- 5 Thermal performance (COP)
- 6 Reduced noise

Design:

- Very homogeneous
- Detailed/complex design
- · Optimised for high-volume production



HVAC&R market top impacting factors

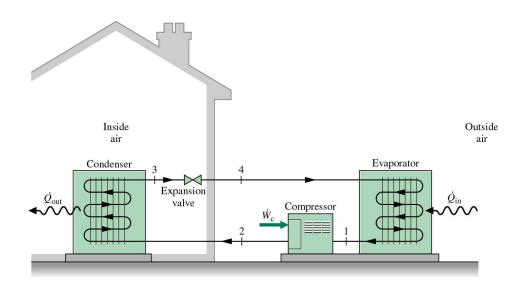
- 1 Cost
- 2 Thermal performance (COP)
- 3 Corrosion resistance
- 4 Reduced noice
- **5** Compactness
- 6 Weight

Design:

- Application dependent
- Standard/modular design
- Optimised for flexible production



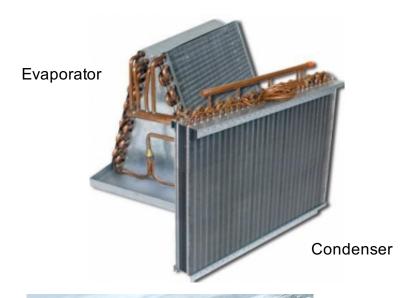
Traditional AC HEXs consist of copper tubes mechanically assembled into aluminium fins



Manufacturing cost breakdown

(For 10-15 SEER 10.5 kW residential split system)

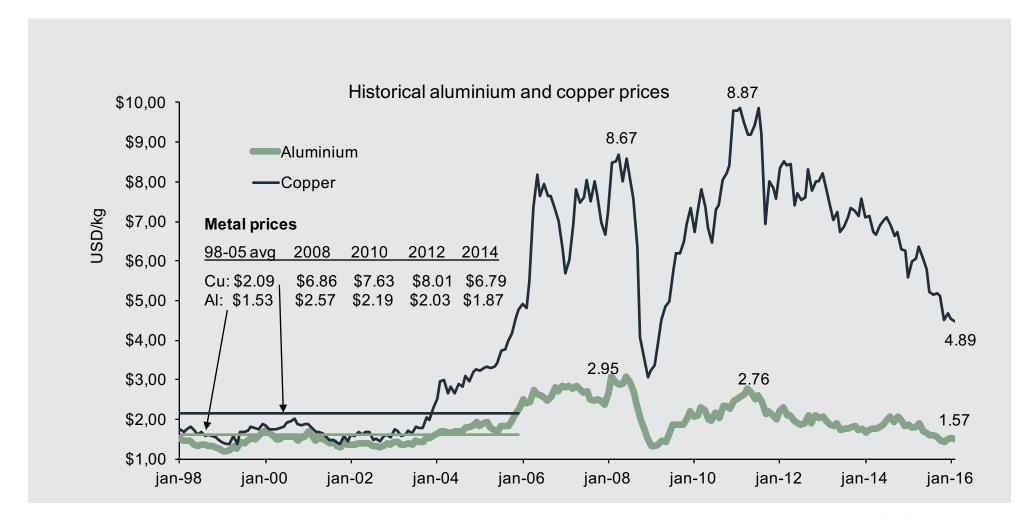
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	30%
	25%
	15%
	20%
	10%
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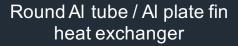
High and unstable price of copper triggered the interest in all aluminium heat exchangers

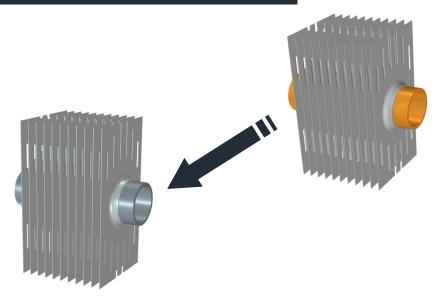




HVAC&R conversion to all aluminium HEX

Mechanically assembled





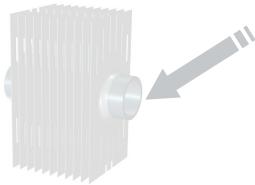
- + Lower cost of materials
- + Almost drop-in solution
- No benefit on performance



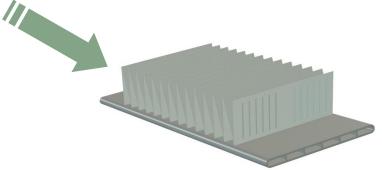


HVAC&R conversion to all aluminium HEX

Brazed aluminium technology



Brazed 'microchannel' heat exchanger

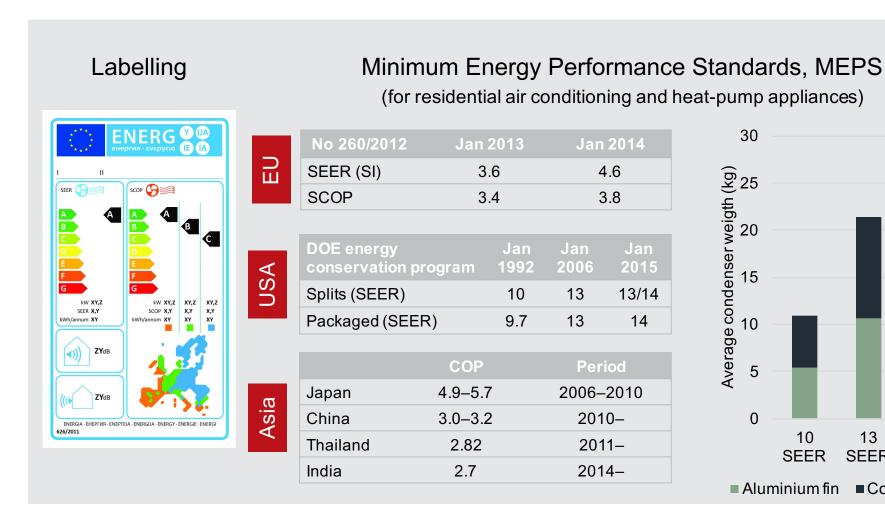


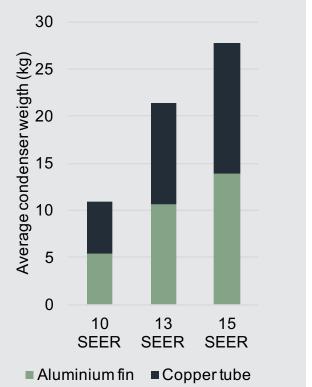
- + Lower cost of materials
- + Almost drop-in solution
- No benefit on performance

- + Lower cost of materials
- + Total system cost savings
- + Increased efficiency
- + Smaller size



More stringent energy conservation policies and regulatory measures for HVAC&R systems

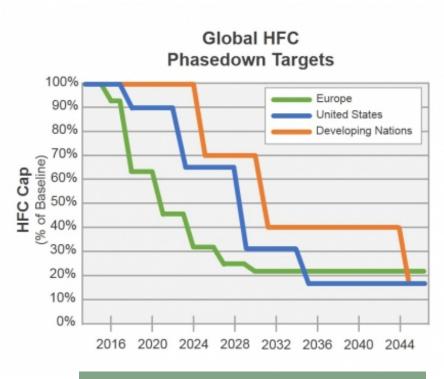






Phase out of harmful refrigerants affects HVAC&R equipment and component development

- The current generation of refrigerants and hydrofluorocarbons (HFC) have significant global warming potential (GWP) when released to the atmosphere.
- National refrigerant regulations limit the choice of refrigerant and refrigerant charge.
- Some of the alternative refrigerants are R32 (for residential and light commercial AC) and the family of hydrofluoroolefins (HFO).
- Natural refrigerants have also received a lot of attention, but these are typically either toxic (eg NH₃) or flammable (eg propane), so charge reduction is essential.



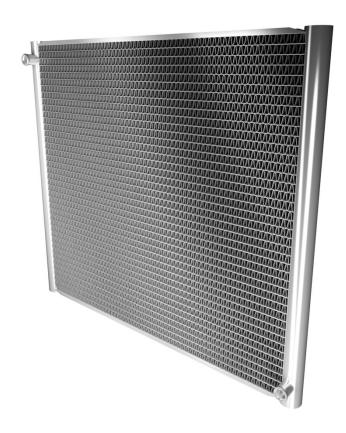
Heat exchangers are the single largest contributor to refrigerant charge

Source: DOE



Brazed aluminium HEX offer many other advantages compared with traditional RTPF coils

- Improved heat transfer performance
 - Provides higher capacity with same frontal area
- Lower pressure drop
 - Reduced energy consumption from the fan(s)
 - Less noise
- Refrigerant charge reduction
 - Reduced environmental impact
 - Compliance with regulations
- Compact design
 - Reduced footprint and weight
 - Costs savings (materials, logistics etc)
- Recyclable





HVAC&R systems are commercially available with brazed aluminum HEX for most applications



Residental room AC (single-split)



Packaged residential AC



Packaged commercial AC (rooftop)



Packaged commercial AC (liquid chiller)



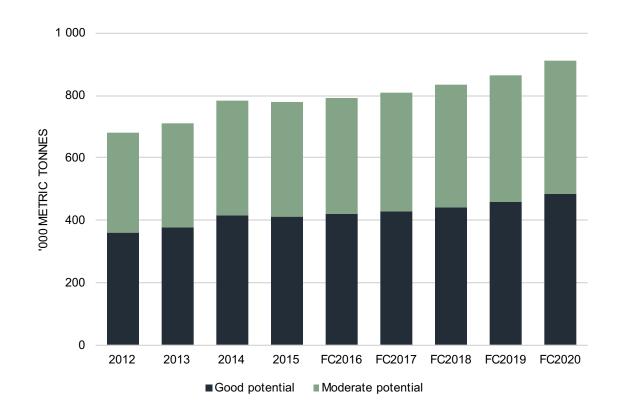
Transport refrigeration



Commercial refrigeration

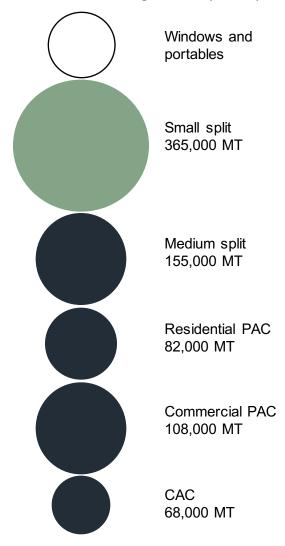


Global potential for brazed aluminium in HVAC&R



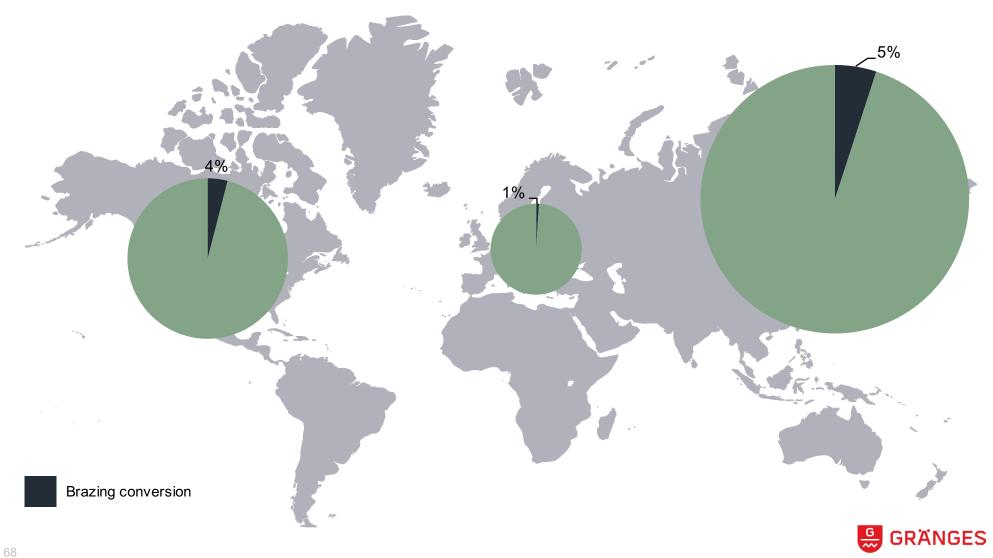
Source: Gränges estimates

Market segments (2015)

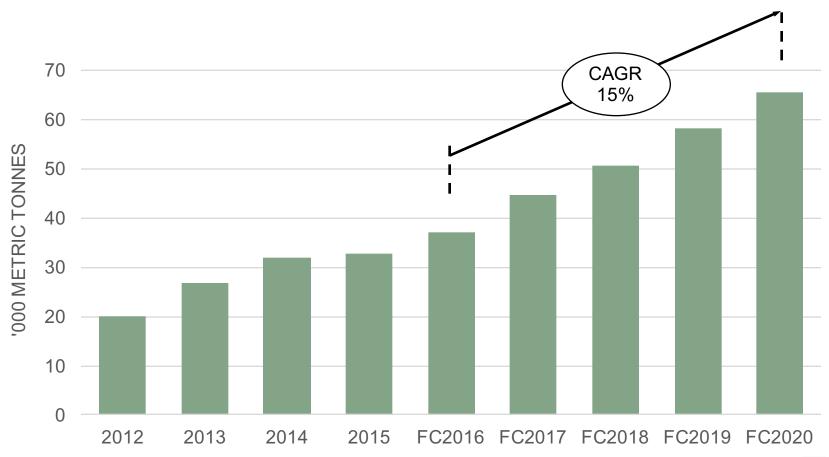




Conversion is estimated at less than 5%

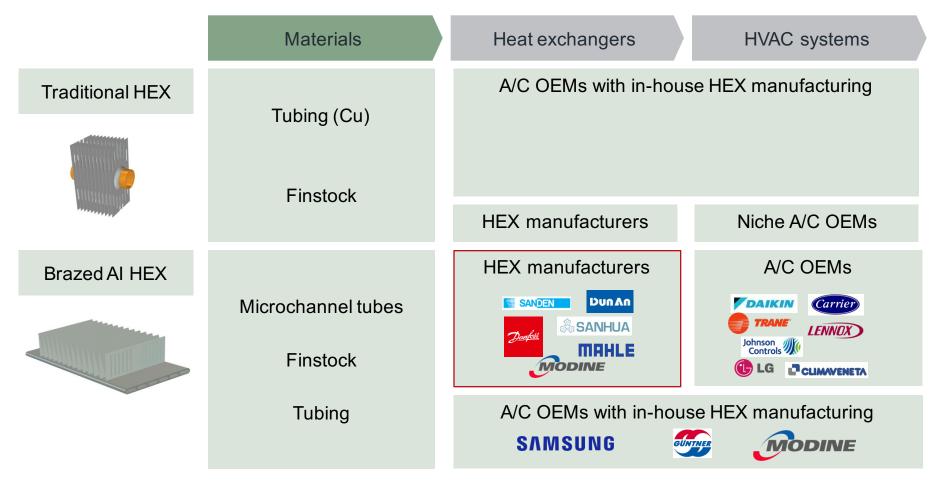


Rolled products for brazed aluminium HEX in the HVAC&R expected to grow at CAGR of 15% 2016–2020





Capital investment and technology knowledge gap are the main barriers to conversion





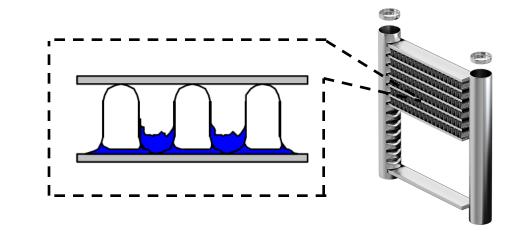
Two technology barriers being addressed

1) Evaporator design and lack of heat pump functionality

Due to the flat tube configuration and compact fin design, condensate tends to accumulate, leading to:

- Blockage of the air-flow passage
- Water-spray discharge (blow-outs)
- Unpleasant smell
- In freezing temperatures, complicated defrosting.

No universal design accepted, but several commercially available solutions.









Residential indoor unit (A-coil evaporator)

Residential heat pump



Two technology barriers being addressed

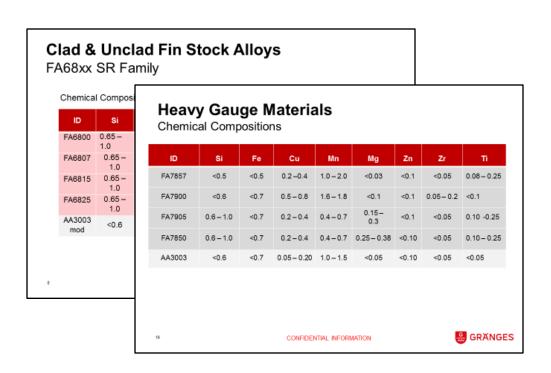
2) Corrosion



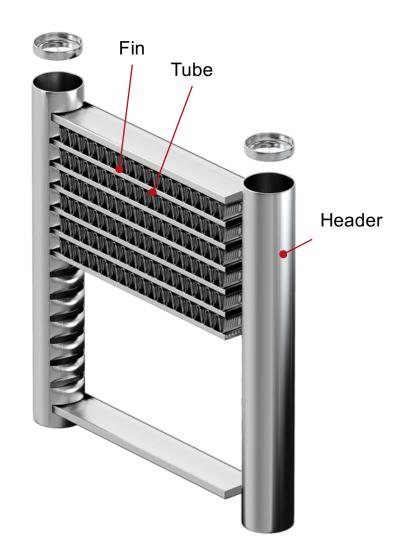


Gränges HVAC&R product portfolio

Standard system: Multiport extruded tube (MPE)

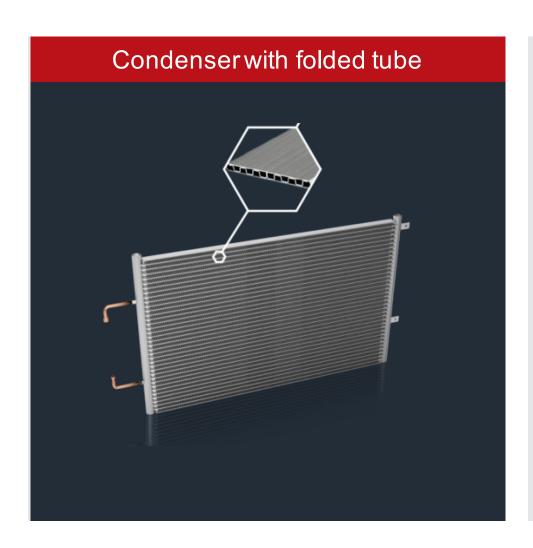


Alloy and material solutions for the HVAC&R market are similar to those for the automotive industry. Gränges is well positioned to capture growth oportunities in this segment.





Folded tubes replace extruded tubes for improved performance and cost efficiency



A folded tube is a multi-channel flat tube produced by precise rolled forming of an aluminium tube stock material.

Compared to MPE solutions, folded tube technology offers:

- Better performance and reliability
- Cost savings
- Superior corrosion resistance
- Stronger and more sustainable
- Greater freedom of design

Gränges has invested in a folded tube machine in Shanghai to support HVAC&R conversion to brazed aluminium products.



MULTICLAD® tube material

Gränges' patented solution for the most demanding applications, with high requirements on corrosion resistance and strength, is achieved by:

- A tailored interlayer which minimises any negative interaction between core and molten filler.
- An adequate corrosion potential difference between the surface and the centre, which prolongs the time to perforation by a lateral corrosion attack in near-surface regions.
- The core alloy has high manganese and copper, and adding some magnesium improves strength.





Summary

- The HVAC&R market is expected to grow, mainly driven by the increase in global construction expenditure. Higher demand for rolled products for brazed heat exchangers in the HVAC&R industry, however, is driven mainly by the increasing adoption of brazing technology.
- Potential for energy efficiency gains and cost reduction are the main drivers for conversion to brazed aluminium technology. The initial capital investment and a technology knowledge gap have delayed the acceptance of this technology in the HVAC&R market.
- The total potential for brazed aluminium material in the HVAC&R is similar to the total market size for rolled products used in brazed aluminium heat exchangers in the automotive industry. However the conversion rate is below 5%.
- Gränges Multiclad® folded tubes replace extruded tubes offering cost savings, excellent thermal performance and superior corrosion resistance.





Today's agenda

- 1. Introduction
- 2. Group strategy and outlook Johan Menckel, CEO
- Strong financial performance Oskar Hellström, CFO
- 4. Extending our lead in automotive Sampath Desikan, MD, Gränges India

- 5. Growth opportunities in stationary HEX Claudi Martin Callizo, HVAC&R Manager
- 6. Leveraging a strong presence in China Colin Xu, President Gränges Asia
- 7. Customer case TitanX

 Matt Moore, VP Research Development &
 Engineerings at TitanX Engine Cooling
- Conclusion
 Johan Menckel, CEO





Agenda

- Gränges Asia
- The automotive market in Asia
- Drivers for the Chinese automotive market
- New products and solutions



Gränges Shanghai

- a modern, well-invested and well-maintained plant



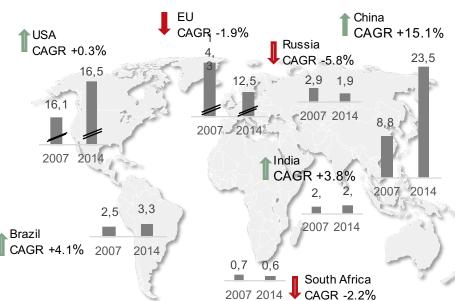


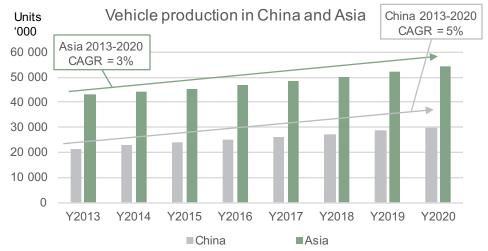
Gränges has successfully established its position in Asia by growing with the Chinese automotive market



China will continue to be the most important market for Gränges due to its size and growth potential

New car sales worldwide 2007 and 2014 (m units)





Source: IHS

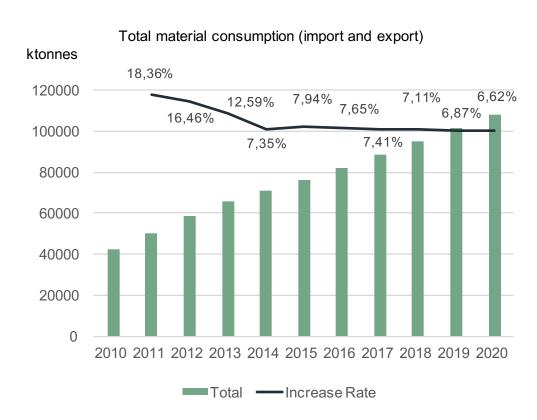


Source: CAAM



China's growing aftermarket is expected to spur sales of heat exchanger materials

- Competitive Chinese aftermarket producers of heat exchanger materials compared with rest of Asia
- A more competitive domestic market pushes for export trials
- Increased installed base of vehicles in China is driving replacement needs



Assumption:

- 1 Aftermarket radiator, condenser and evaporator replace rate: 5%, 2%, 1%
- 2 Aftermarket export rate of increase, radiators, condensers and evaporators (2015 2020): 5%
- 3 Aftersale radiator, condenser and evaporator average weight: 2.2kg, 1.1kg, 0.9kg
- 4 Parallel flow evaporator rate: 2017, 5%; 2018, 10%; 2019, 15%; 2020, 20%.



China's new vehicle market development is positive long term, even with uncertainties

Optimistic growth outlook driven by:

- Country GDP growth ~7%
- Increasing urbanization boosting mobility needs
- Higher incomes and low auto penetration
- Strong SUV sales growth of 30-40% a year
- Low- to mid-range sedan models to benefit from tax-cut policy
- New energy efficient vehicles to be a key focus
- Still room for extra stimulus policy

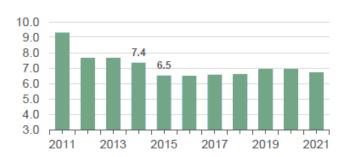
Uncertainties and restrictions

- Car restriction policies in big cities for worsening traffic and environments
- Weak commercial vehicle demand in economy transformation
- Possible new business models with changing consumer behaviour
- Growth of the used-car market
- Shifting car-buying criteria going bigger, tradeing up, regional differences, security etc



Growth drivers in China's light vehicle market

Real GDP growth (%)



Potential auto consumers

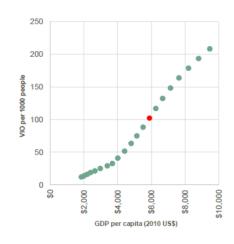


Source: IHS



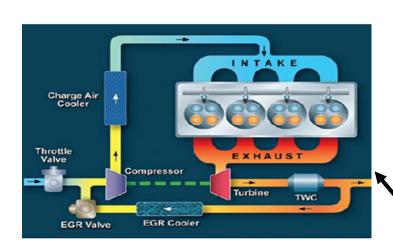


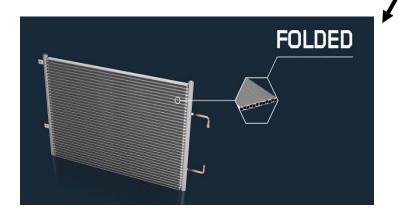
Vehicle penetration path (2001–2021)

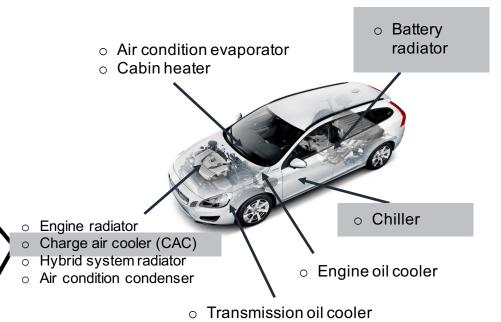




Highlights of future Chinese auto market growth



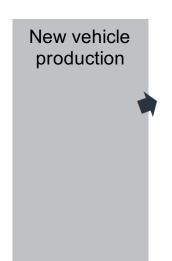




- CAC equipped volume growing quickly in passenger vehicles, especially in SUVs, driven by higher emission standards. Penetration rate is estimated to grow from 18% in 2014 to nearly 60% in 2020.
- Government has set ambitious target on elctrified vehicles, which is a strong driver on battery cooling heat exchangers.
- Folded tube substitutes MPE tube in condenser, and welded tube substitutes MPE tube in truck CAC, expanding brazed aluminum HEX market size.



China is becoming a more competitive market



JV brands

- Complete offering and also go down to low-price models
- Prioritise cost improvement
- Develop mega-platforms
- Tend to unite conventional relationship with tier 1s



- Catch high spot rapidly (SUV)
- Maintain cost advantage
- Upgrade technology and improve brand image
- Develop operation and SC



Global HEX producers

- Diversify customer base
- Leverage technologies
- More M&A to consolidate the market
- Develop low cost suppliers

Chinese HEX producers

- Penetrate to JV brands
- Pace up for higher technology standards and system solutions
- Focus on improving operation
- Actively work on cost reduction



Dealers (export)



Increase sourcing from China for competitive quality and cost



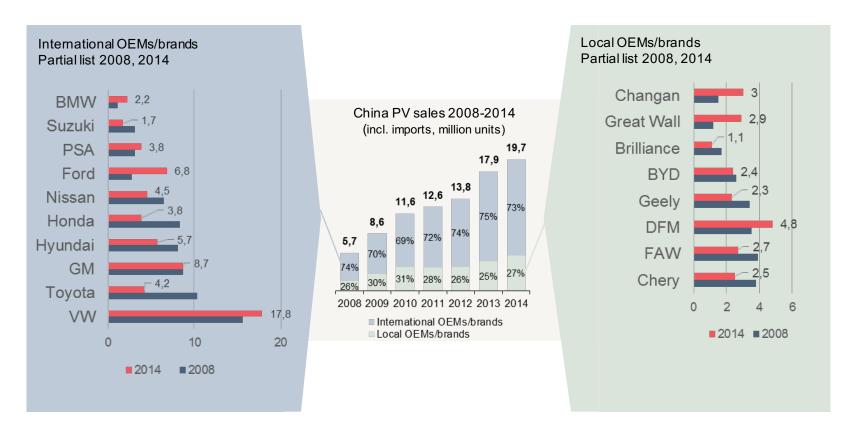
- For some, sourcing is restricted
- Big variety in quality/standard

Chinese after market HEX producers

- Generally low ROA and focus on export
- Strive for quality and cost improvement while carefully manage cash flows



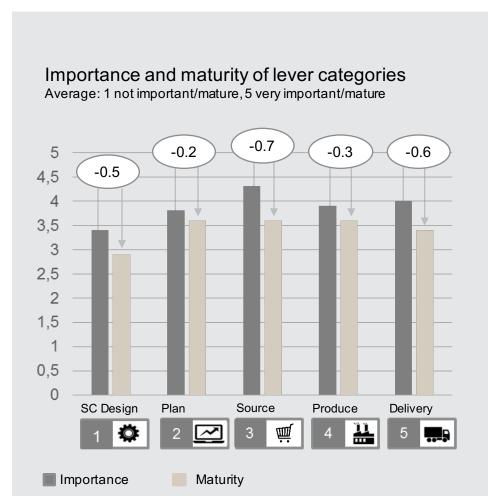
Major brands and competition landscape in the Chinese passenger vehicle industry

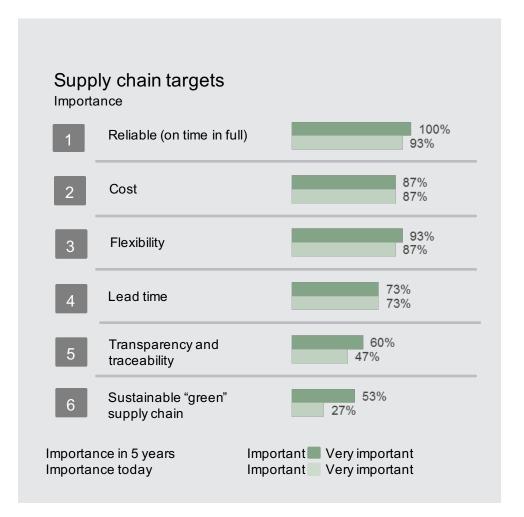


Source: CAAM, LMC, Gao Feng analysis



Purchasing criteria in Chinese passenger vehicle industry

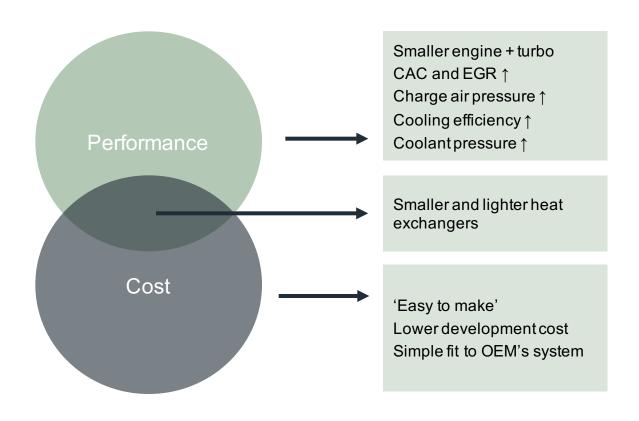




Source: Roland Berger



Technological evolution driven by greater competition and tougher demanding environment standards



- Gauge ↓
- Strength ↑
- Formability ↑
- Brazeability ↑
- Property consistency ↑
- Corrosion resistance ↑
- Enabling heat exchanger design and validation
- Troubleshooting in manufacturing



New offerings in the pipeline

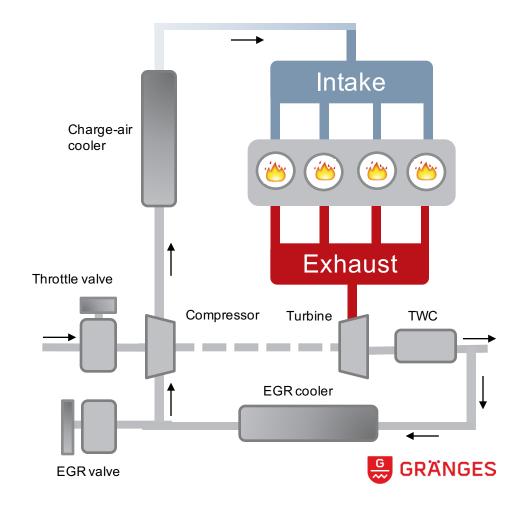
	Design change	Challenges	Gränges development areas
Radiator	~15-30% down B/W tube → ?	Corrosion test std ↑ Cleanness after brazing ↑ Strengthen requirement ↑	Low-cost solutions Multi-layer cladding (MLC) Flux-free or TRILLIUM®
Condenser	MPE → Folded tube ~25% down	Corrosion test std ↑ Brazing difficulties ↑	Folded tube + MLC TRILLIUM®
CAC	MPE → Welded tube ~20% down	Burst pressure ↑ Temperature ↑	High-strength alloys High-temperature solutions
CAC/EGR (integrated)	Folded tubes with turbulators; plate and fin	Corrosion test std ↑ ↑ ↑ Cleanness after brazing ↑ Brazeability requirement ↑	System solution - MLC for tube and slow corroding turbulator TRILLIUM®



Exhaust gas recirculation and charge-air cooler system helps reduce NO_x

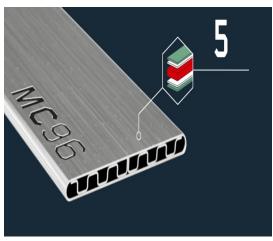
- The combination of turbo, charge-air cooler and exhaust gas recirculation will induce ambient air and the engine's exhaust gas back to the combustion cycle
 - Reducing the amount of oxygen
 - Increasing the specific heat capacity of the mix, and power, reducing fuel consumption
 - Greatly reducing NO_x emissions to meet environmental requirements
- Material major challenges:
 - Severe internal corrosion resistance

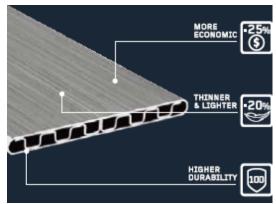
Example turbocharged engine



MULTICLAD® folded tube solution









Gränges has a leading position in China and will continue its competitive strategy to pursue growth





Gränges is well positioned to capture growth opportunities in Asia

Gränges Asia's business development relies on the growth of:

- Vehicle production in Asia and specifically growth in China
- The heat exchanger aftermarket
- Stationary heat exchangers and other industrial applications

Gränges still has a great opportunity to grow in Asia due to:

- Positive growth trends in today's focused markets
- Some particularly fast-growing areas
- Being well-positioned for further growth





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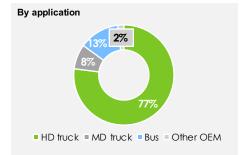


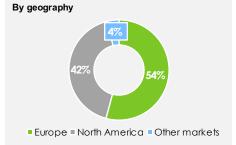
Leading powertrain cooling solutions supplier

TitanX at a glance

- Leading global supplier of engine cooling systems
- Tailored product portfolio serving the CV segment, mainly serving heavy duty (HD) and medium duty (MD) trucks
- Offering also targets buses, genset and construction
- Long standing relationships with leading OEMs such as Volvo, Daimler and Scania
- Significant market share gains and contract wins since 2009
- Production of engine coolers dates back to the early 1950s
- Principally owned by EQT and Fouriertransform, founded as a standalone entity in 2008 through a carve out from Valeo (HD engine cooling division)

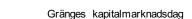
2015E sales breakdown





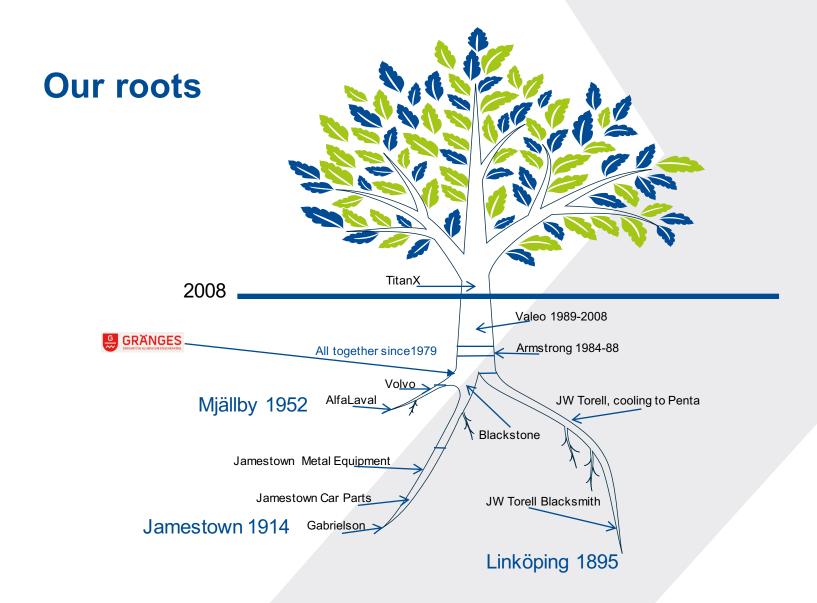


Condensers Overview of main products Charge air coolers Radiators Oil coolers



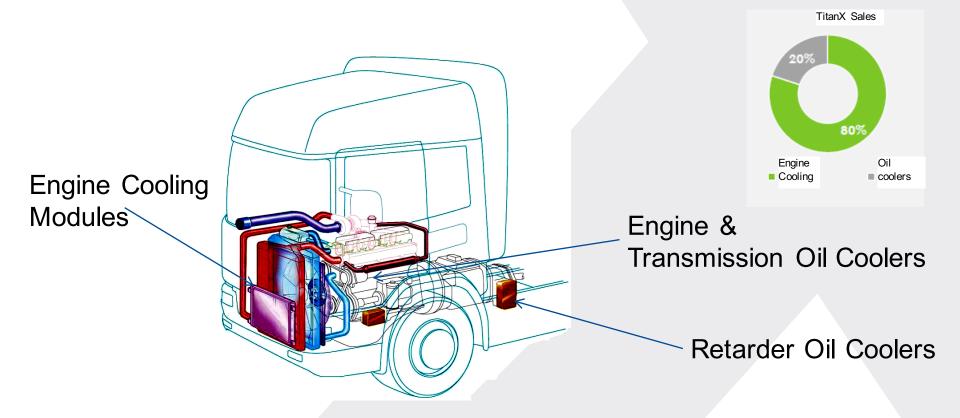
Source: Company data.







Keeping the powertrain cool – TitanX heat exchangers





Some of our biggest customers















Volvo since 1950s Mercedes since 1980s

Scania since 1950s

Freightliner since 1980s

Navistar since 2010s

Renault since 1990s

Iveco since 1980s



Why customers choose TitanX

Customer intimacy

- ► Focused CV product range enables us to work closely with customers
- ► Close customer proximity with global footprint
- Feedback also indicates we are easy and flexible to work with

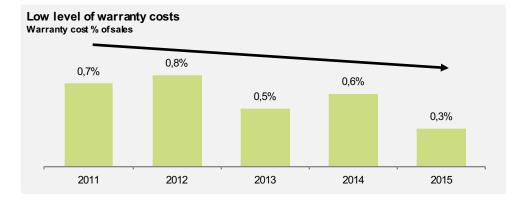
Superior product quality and low execution risk

- Process and manufacturing know-how allowing for production of complex parts at low cost, high quality and in high volumes
 - Enables competitive TCO and risk profile from customers' perspective
- Focused product range results in low share of customers' spend which reduces their risk

Technology focus

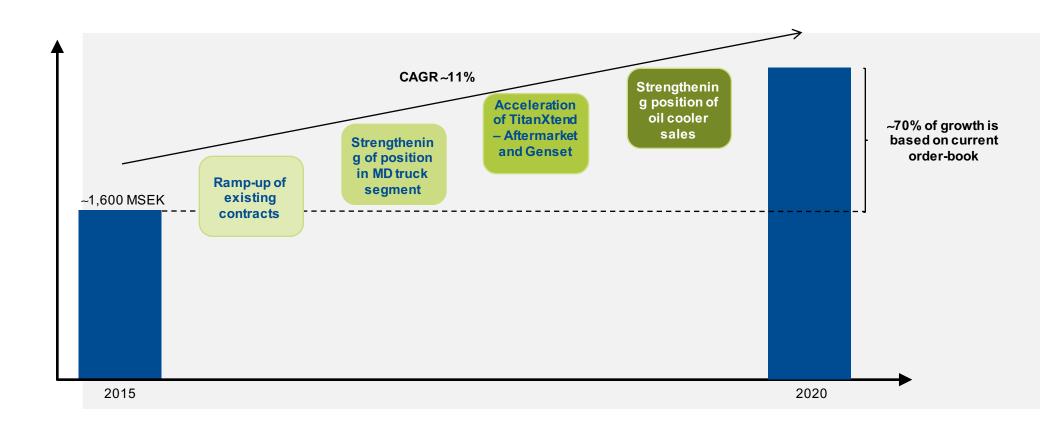
- ▶ High level of application and system expertise
- Comprehensive experience of problem solving allows offering of customised (patented) solutions







Strong growth based on order-book and new initiatives



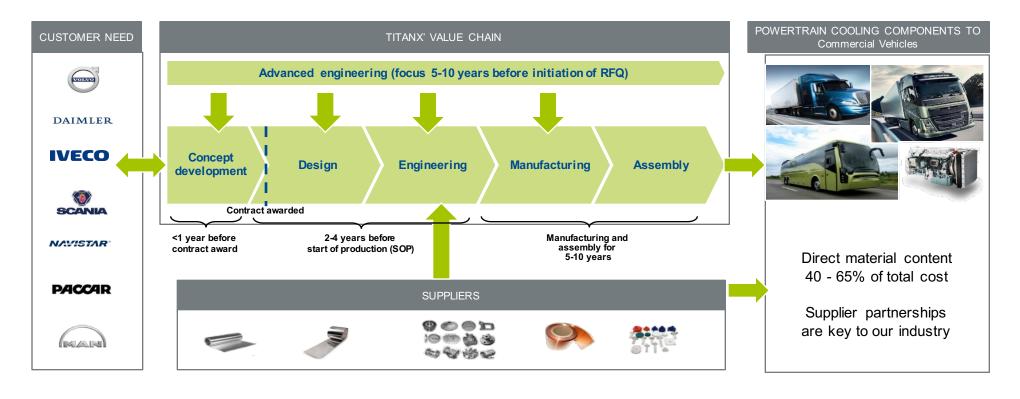


Global presence and facilities





TitanX is a tier one development partner





TitanX demands on key suppliers

Certified to the Automotive Industry Standards

ISO 14001, OHSAS 18001, ISO TS 16949, Zero defects mindset

Truck compatible Terms and Condistions

Consignement stock on all raw material, EDI, MOQ meeting truck volume, LME regulation matching OEM principles

Continous cost performance

Annual price improvement and support for customer improvement projects

Development Partner

Leading expert in their field, active creation of value add in application projects, shared research project and priorities

Global Presence

Production footprint aligned with leading OEM/Tier one footprint



Gränges and TitanX enter global partnership

- Aim to improve profitability and competitiveness for both
- Identify new value creation opportunities
- Improve Total Cost of Ownership
- Addressing multiple areas
 - ✓ material price
 - √ design
 - √ innovation
 - √ global expansion





Interaction with Gränges on many levels

Research

• Fin forming

Standardizati on

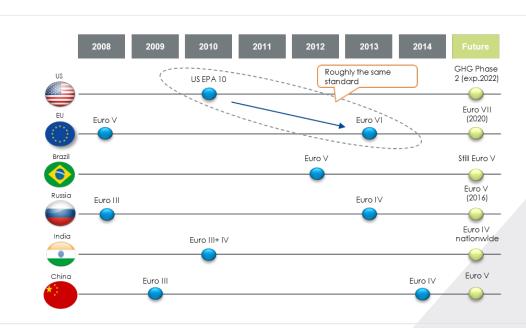
 Single alloy for all structural Aluminum parts in the heat exchanger

Application engineering

Heat exchangers without internal fluxing - world wide



Emission changes drive innovation



- Euro II Mainstream Charge Air Cooling
- Euro III EGR
- Euro IV Cooled EGR
- Euro V High volume Cooled EGR
- Euro VI EGR & SCR systems

The Greenhouse gas emissions laws will drive the technology development



Key research areas at TitanX

- Waste heat recovery with both organic Rankine cycle and thermal electrics
- Short loop EGR GRÄNGES
- Space and weight projects;
 - Advanced material application for support structure

 - Ultra thin tube

- Numerical methods
 - Multi physics simulations
- **GRÄNGES**

- Virtual data collection
- Process innovation
 - Flux free internal brazing
- **GRÄNGES**
- Reduced copper brazing
- Fin forming

GRÄNGES

- Telemetrics
 - Fuel and your cooling system
 - Next generation specification
 - Application specific warranty
 - Total life prediction



Going forward

Developing markets go for advanced technologies

Tougher demands on parts

Legislation driven technology development



1-3 more heat exchangers per vehicle

Cost driven continuous improvements

Fuel efficiency centered new technology 2020-2023



A well positioned partnership must be able to

- innovate products and process in Europe
- supply the right level of technology and be present in all major global markets
- launch timely step by step improvements to protect margins

Together we must be focused on creating value for the end customer





Thank you

WE HAVE YET TO SEE AN ENGINE WE CAN'T COOL



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