Engineered for the Future
CFT – Concept Fire Truck
A3PS ECO-MOBILITY 2019
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Rosenbauer
Key Figures

153 years of experience
900 mio. EUR turnover

22 locations worldwide
3,600 employees
20% world market share

1 Each minute a Rosenbauer fire truck starts an emergency response somewhere in the world!
Product Portfolio

ARFF

Personal Protective Equipment

Municipal Fire Trucks (EN)

Technical Equipment

Aerial Ladders and Platforms

US Fire Trucks
Global Footprint

- Karlsruhe / Germany
- Luckenwalde / Germany
- Mogendorf & Gladbeck / Germany
- Neidling / Austria
- Oberglatt / Switzerland
- Chambery / France
- Holmfirth / UK
- Madrid / Spain
- Linarees / Spain
- Rovereto / Italy
- Leonding / Austria
- Neidling / Austria
- Radgona / Slovenia
- Moscow / Russia
- Wyoming / MN
- Lyons / SD
- Fremont / NB
- Riad / Saudi Arabia
- Dschidda / Saudi Arabia
- KAEC / Saudi Arabia
- Kunming
- Singapore
- Brunei
- Brisbane
- Halfway House / South Africa

- Production
- Sales / Service
Megatrends
The firefighting megatrends are based on the megatrends of the German Zukunftsinstitut (https://www.zukunftsinstitut.de/dossier/megatrends/). Since 2012 they were continuously developed with international fire fighting experts in so called „Future Dialogues“.

Currently there are 13 trends as migration was included during 2017. These trends are relevant for the future picture of fire fighting and were the base for the concept study of the firetruck of the future – the CFT.

Relevant Firefighting Trend Clusters

Silver Society / Gender Shift
Safety / Health
Mobility / Neo Ecology

Urbanization
Connectivity
Individualization
Climate Change predictions vary between +2 and +5°C (+35 to +41°F). This process is not reversible anymore. The Paris agreement tries to freeze the global warming at a level below +2°C with a target of +1.5°C. Latest results show that the increase in temperature has already reached almost +1°C.

https://de.wikipedia.org/wiki/Globale_Erw%C3%A4rmung
Climate Change and the Paris agreement will lead to a strong increase of electrified vehicles. In 2025 the so called tipping point is expected. From this point onwards more vehicles with electrified propulsion systems will be sold than with conventional drive trains.
According to an analysis from ICCT (International Council on Clean Transportation) in Europe, an electric vehicle reaches a reduction of CO2 of about 30% compared to a vehicle with highest efficient combustion engine.

Even in Germany which has a high CO2 energy mix due to coal power plants, an electric vehicle is CO2 neutral after 3 years compared to a vehicle with an average efficient combustion engine.

Source: ICCT (International Council on Clean Transportation)
https://www.theicct.org/publications/EV-battery-manufacturing-emissions
More and more bigger cities are starting to fight against the CO2 driven climate change. Modern Cities are powerful economic and political ecosystems beeing more flexible and faster than countries in realizing climate targets.

C40 Cities – Global Leadership on Climate Change

http://www.c40.org/cities
Demographic development will significantly influence the availability of firefighters. Currently big fire brigades have already difficulties to recruit enough young people.
Trend Urbanization

By 2030 traffic levels will increase by 100%

As traffic density will further increase significantly it will be essential for firetrucks to have compact dimensions, high agility and excellent navigation tools!
**Trends Mobility and Connectivity**

**Autonomous Vehicles**
V2V (vehicle to vehicle) and V2X (vehicle to other things) communication is constantly increasing. For emergency vehicles it will be essential to participate in a smart way in this communication pattern to be able to influence traffic behaviour.

**IOT**
Internet of Things is one of the major trends. Since communication technologies have reached new levels as more than 8 billion things are already connected. This number will more than double during the next two years! Interpretation of information and data security will be decisive for successful applications.
Concept Fire Truck
New Concepts lead in direction 2030 showing modular systems, hydrogen as energy carrier and autonomous vehicles.
Electrified concepts have arrived in reality already and are state of the art for busses. Pre-series vehicles are tested on the roads of big and modern cities like Hamburg.
Latest News (2019)

Mack Garbage Truck based on Volvo Components

Full electric Freightliner eCascadia

Hyundai FC Truck

Toyota and Kenworth with FC Technology
Trucks – Future Trend

- E-Truck sales ≈15% until 2030
- LDTs ≈25-35% of the sales across Europe and China

Global Truck Sales 2030

Additionally, there is a strong belief, that for longer distances and heavier vehicles **Hydrogen** will be the future concept (starting from 2025)

Investment in H2 Infrastructure until 2025
(No. of filling stations)

Source: Hydrogen Council 2017

JKU Study
Projection for Trucks > 7t
Disadvantages for the fire service

- Loss of pay load: - 1,700 kg!
- Loss of lower compartment space!
- No infinite pump operation!

Electrified chassis require modifications and a range extender for the pump operation. Which additional advantages would they provide for the fire brigades of the future?
CFT – Concept Fire Truck

- Outstanding Ergonomics
- Higher loading volume
- Agility & driving performance
- Improved communication
- Highest vehicle safety
- Environmental friendly

Only the implementation of electric drives enabled the development of a **vehicle architecture without any compromises** considering all future requirements of fire brigades by providing functional excellence, outstanding ergonomics and highest safety levels.
Functional Excellence
Narrow dimensions

Length: 7600mm
Width: 3065mm
Height: 2350mm

NARROW SLIDING DOORS
150mm
Agility

- Small turning circle
- All wheel steering
- Crab steering
Outstanding Ergonomics

- Expected development of removal heights
  - All equipment can be reached from the ground
  - First attack equipment in the crew cab
Optimum Ergonomics
Manipulation System

- Lifting platform at the rear end of the CFT
- Containers with heavy tools to be transported to the place of action
- Easy manipulation system for roof equipment (roof ladder and roof box)

LIFTING CAPACITY

up to 2t
Manipulation System
Intuitivity – One Button Operation

Simple Operation

- Intuitive Touch Screens
- Focus on main functions
- One Button Operation
- Driver Control Panel
- Commander Control Panel
- Main Control Panel serves as Crew Info Screen
- Individual configuration
Electric Drive

- 350 kW/475 hp electrical power
- 30 min electrical operation
- Range Extender for infinite operation
- Zero/low Emissions
- Reduced Noise levels
Technology Partnership with Volvo Penta

- Li-Ion Batteries [60 kWh]
- Electric Motors [180 kW Peak]
- Inverters
- High Voltage Distribution
- E-PTO Options 40, 70 & 110 kW
- System Engineered according to ISO26262
- Same components as used in Volvo Trucks and Busses
Technology Partnership with BMW

- Range Extender Application
- BMW B57 6 Cylinder Diesel Engine
- 200 kW, 600 Nm
High Driving Dynamics

- High acceleration
- 4 wheel drive
- Low center of gravity
- Optimum load distribution
Driving Safety

- Safety cell
- Electronic mirror system
- Rear cameras
- ESP in 4x4 drive mode
- Rollover protection
- Driver warning device
- Force feedback system in driver seat

- Blind spot detection
- Object identification/recognition
- Less covered visual field

Sicherheitszelle
Spiegelersatzsystem
Rückfahrkameras
ESP im Allradmodus
Rollover Protection
Driver Warning Device
Force Feedback System im Fahrersitz
Development Process
Innovation & Development Approach

- **Research Project**
  - Concept Fire Truck

- **Development Project**
  - Prototypes to be tested by potential customers

- **Single Unit Production**
  - Set up of business model
  - First contracts closed

- **Serial Production**
  - Improved business model

- 1. Early Involvement of Stake Holders
- 2. Open Innovation with Model Regions
  - 3. Internal Start Up → RED
  - 4. Agile Product Development
1. Early Involvement of Stake Holders

- Future Dialogs with Experts
- Firefighting Trendmap
- Internal Innovation Workshops
- Core team with focus on the initial Concept creation
2. Open Innovation with Model regions

- Selection of Model Regions – CFT Affinity Index
- Exclusive Demonstrations and Feedback Sessions
- Innovation Partnerships
- CFT Platform to exchange learnings in all Aspects
World cities with a high CFT affinity

- Copenhagen
- Toronto
- Auckland
- Tokyo
- Singapore
- Dubai
- Gothenburg
- Oslo
- Munich
- Berlin
- London
- Paris
- Madrid
- Amsterdam
- Oslo
- Tokyo
- San Francisco
- Los Angeles
- Auckland
CFT Demo Tours

Amsterdam

UK

Oslo

Zell am See
The aim is to implement the 1st pre-series truck and start testing in Berlin in autumn 2020. The implementation and testing phase will be accomplished by end of 2021.
Customer Feedback

Top 5 Firefighting Trends

1. Health
2. Security
3. New Ecology
4. Mobility
5. Urbanization

Top 5 Functions of the CFT

1. Driving Safety
2. Agility (small turning circles)
3. One Button Operation
4. Ergonomic and flexible Design
5. Driving Performance
Life Cycle Costs – Value Creation

Direct Value Potentials
based on electric drive and vehicle architecture

- Less service costs
- Less fuel/energy costs
- Higher payload and volume → optimized fleet
- One responsibility → less risks and less administration

Indirect Value Potentials
Based on ergonomics and functional excellence

- Less injuries and sickness
- Highly efficient crews
- Longer service time → less training costs
- Best and latest technology → efficiency and highly motivated crew

Fuel costs comparison of different powertrains for a distance of 100 km in a mid-range vehicle

Source: PWC 2019
3. RED – an internal Startup

Rosenbauer E-Technology Development GmbH

- Independence of slow corporate structures and processes
- Easy options to foster partnerships (e.g. JVs with Start Ups)
- Implementation of agile methodologies
- Reduction of risks for the group
- Direct felt responsibility
- Higher transparency

Never go hunting alone!
4. Agile Product Development

RED Scrum Process

- 3 CSMs – Michael, Edmund, Josef
- Product Owner(s) – Split roles Michael/Edmund
- Scrum Master – Josef
- Dev Team – Josef, Ronald, Stefan, Gregor, Simon, (+ Edmund)
- Agile Backlog planning (= Refinement)
- 4 weeks sprints (70 storypoints/sprint)
- 3-4 hrs Sprint Review
- (0.5 hrs Retrospective)
- 2 hrs Sprint Planning
- 20 min daily Scrum
CFT – a concept study for the near future!

We did not just use an existing chassis and develop the body around it...

... we developed an innovative emergency vehicle, answering the functional demands of tomorrows emergency task forces.

A concept study for the near future!
CFT – a concept study for the near future!

You find further information about the CFT and the model regions on the Rosenbauer Website:

https://innovation.rosenbauer.com/de/concept-fire-truck/

in the Rosenbauer Blog:

https://www.rosenbauer.com/blog/de/cat/innovation/cft-de/

and on YouTube:

https://www.youtube.com/user/RosenbauerGroup

https://www.youtube.com/watch?v=It7rByg6FBc&list=PL2961725DEB848A7C&index=1
Thank You!

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