



## Railway technology Engineering services

Design  
Calculation  
Documentation  
Production management

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## Engineering Services Overview

SAMES engineering services cover all steps of design process and connected manufacturing support.

### Concept design

- Basic vehicle concept
- Interior arrangement
- Pre-design studies

### Development

- Bogie design
- Articulation design
- Carbody design
- Static and dynamic analysis
- Vehicle dynamics
- Driving stability
- Comfort analysis

### Manufacturing support

- Production drawings
- Purchasing definition
- Production process support
- Testing support

## Services

### Concept design

#### Basic vehicle concept

- Vehicle concept definition (MGT or GT concept)
- Section length definition (with respect to modular design concept)

#### Interior arrangement

- Seat arrangement
- Capacity check
- Door arrangement

#### Pre-design studies

- Weight analysis
- Clearance analysis
- Basic Driving stability

### Development

#### Bogie design

#### Articulation design

#### Carbody structural design

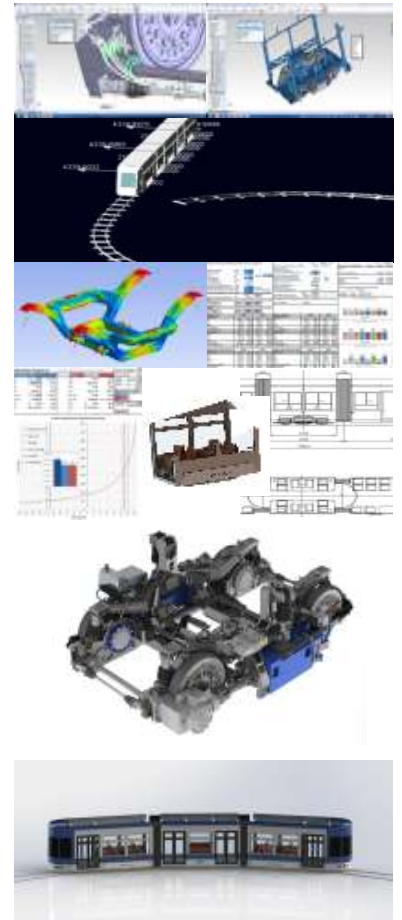
- Steel, Stainless steel or Aluminium

#### Static and dynamic analysis

- Load and load cycle/case definition
- FEM – Simulation (Structural Static, Fatigue, Structural dynamics, Eigen value)

#### Vehicle dynamic

- MBS – Simulation (Stability, Derailment safety (Y/Q) acc. UIC 518, Comfort (Wz) acc. UIC 513)



**Turn-key solution  
in engineering services!**

## Your advantage Know-how

- Well trained and high experienced engineers
- Most modern development methods
- Long term experience with production of bogies
- Along with production of bogies, the know-how and contacts to many manufactures and sub-suppliers

Depending on customers wish – instead of solely development, customer can have either prototype- or series production of bogies (SAMES – prototype- or preseries production can prevent failures in series production and as a consequence high costs)

## Services

### Manufacturing Support

#### Production drawings

- Overview drawings
- Manufacturing drawings
- Assembly manual
- Quality control documents

#### Purchasing definition

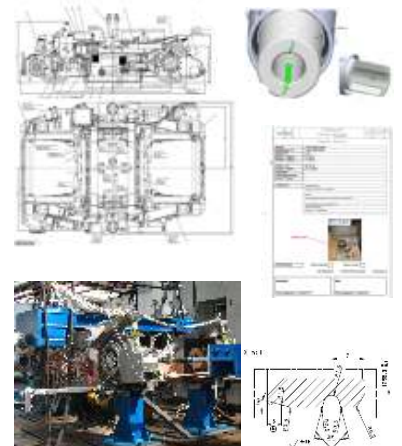
- Subsupplier order data definition

#### Production process support

- Manufacturing process support
- Assembly training

#### Testing support

- Load case definition
- Definition of load cell application
- Documentation of results





## Production

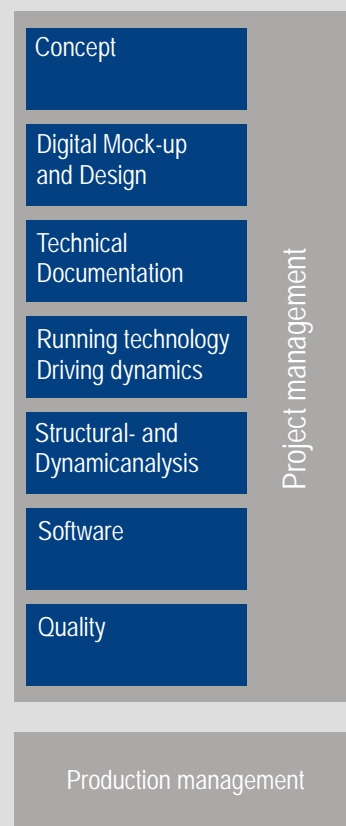
### Prototype- and Pre-series production

- Production capacity e.g. for more than 16 bogies/month
- Articulation production and Testing
- Suspension production and Testing
- Vibration technology production and testing
- Local mechanical production combined with european high quality production of e.g. frame structure (e.g. German made casted nodes, welded in eastern Europe)
- well-known sub-suppliers of e.g. wheels, brake system, traction motor, gearbox, etc.

Your advantage with SAMES prototype- and pre-series production:

- Failure detection can be done quite early in production process
- Minimized financial risk for customer complete production documentation after pre-series production

## Organisation



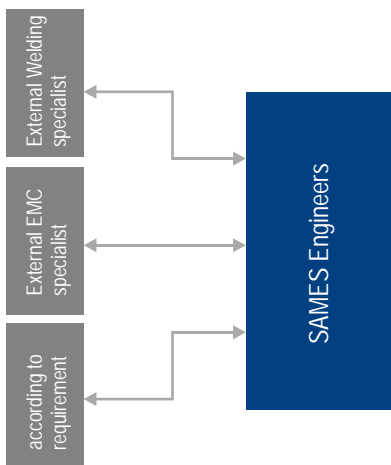
**detailed - creative - .innovative**

## Know-How and Specialists Internal and External

SAMES combines internal and external know-how.

So e.g. external welding-specialists are working in close cooperation with our development engineers and EMC is granted by external service contractors.

While SAMES uses these services, the most important know-how like structural- and dynamic analysis and design process remain completely in SAMES responsibility.



## Standards

More than standards

SAMES is working according up to date standards.

- Examples:
- DIN EN 13749
  - UIC (e.g. 513, 518, 615, 510-5, etc.)
  - VDV 152, 150, etc.
  - EN 13103, EN 13452-1, EN 12663-1
  - BoStrab, SpR
  - DIN 5510
  - DIN EN 15085
  - etc.

## References

Our satisfied customers are:

- MAN
- BMT
- WATTEEUW
- BOMBARDIER
- KONCAR
- RENK
- ZF
- ...

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