

# solute

Multidisciplinary technical  
engineering consultancy



**solute**

About  
**solute**



# About us

**solute**

## Multidisciplinary engineering consultancy

**+120**  
employees in  
4 offices

**+15**  
years of  
experience

**12**  
areas  
of knowledge

- **Multidisciplinary:** work in more than 6 industries and 12 areas of knowledge
- **International:** projects and collaborations on a global scale
  - **Innovation:** R&D as SOLUTE's backbone

ISO 9001 ISO 27001 ISO 14001 ISO 45001



# International presence

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## Europe

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Portugal	Lithuania
Spain	Serbia
France	Turkey
Italy	Germany
UK	Denmark
Poland	Finland
Sweden	Austria
Netherlands	Romania

## North & South America

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USA	Peru
Canada	Brazil
Mexico	Uruguay
Colombia	Argentina
Ecuador	Chile

## Africa & Middle East

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Morocco	Tanzania
South Africa	Oman
Saudi Arabia	Tunisia
UAE	Jordan

## Asia & Ocenia

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India
China
Australia



# About **TSRWIND**

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2008  
founded

10-20  
employees

Acquired by  
**SOLUTE (2022)**

Robotics and engineering applied to O&M within the wind energy industry (wind turbine inspection)



**Eolos**

Blade external  
inspection



**Cerberus**

Blade internal  
inspection



**Kratos**

Tower welding  
inspection



# R+D projects

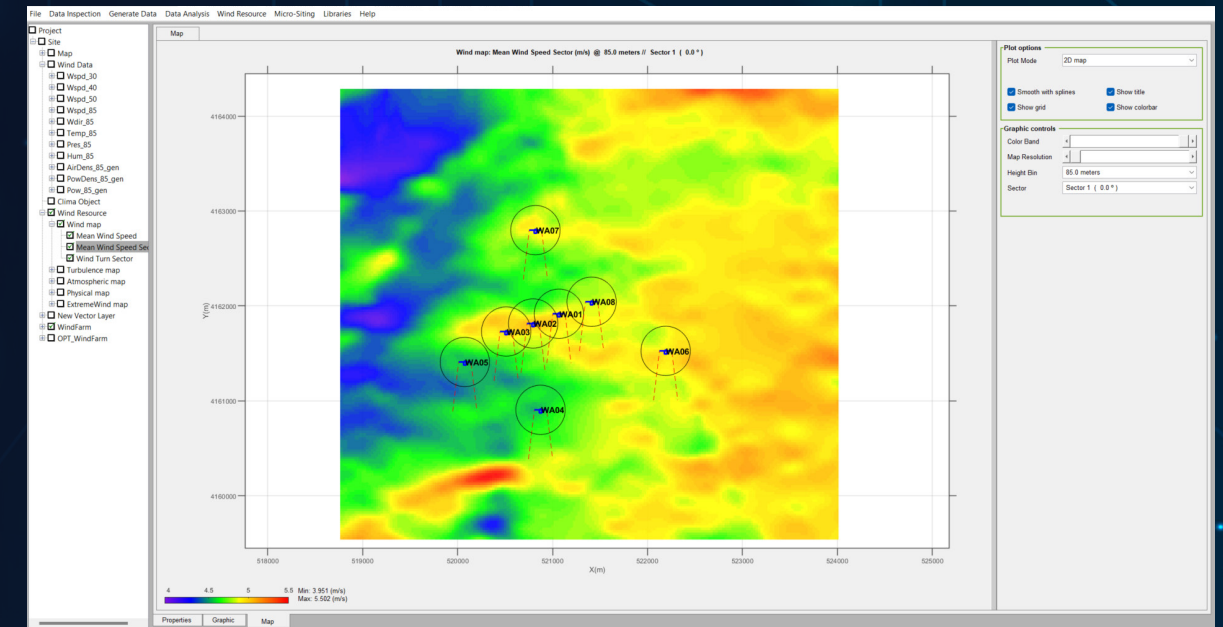
# solute

R+D is SOLUTE's backbone

# furorow



# aphelion



## R+D projects in development



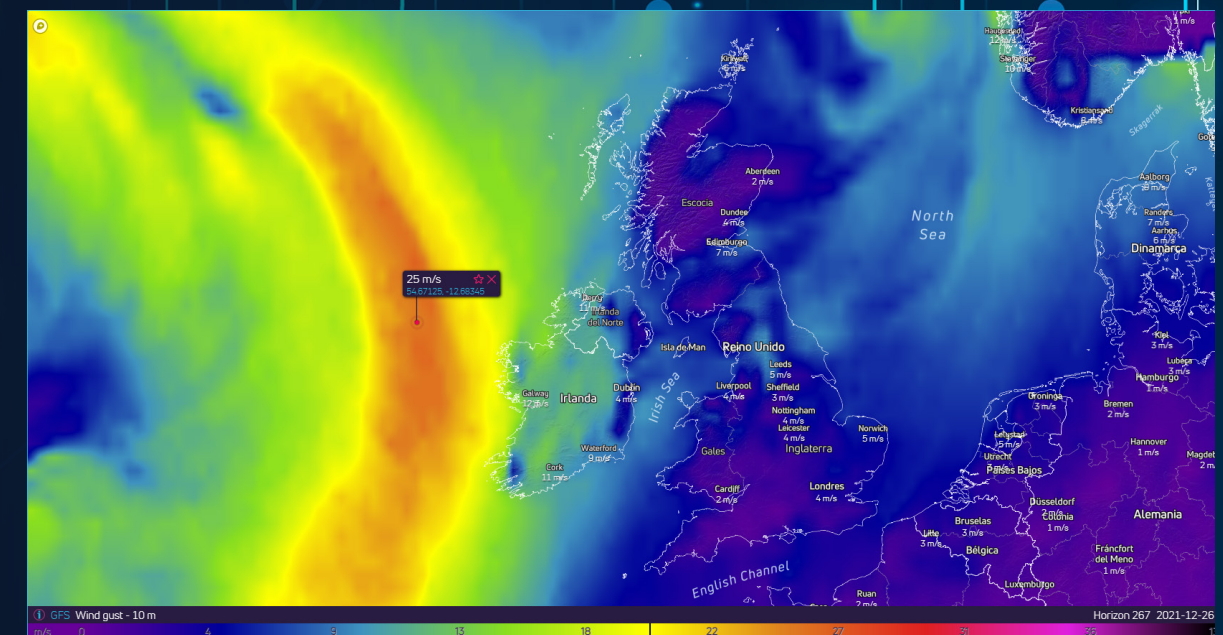
Eolian



Aeronautical  
Technological Program



WTG blades inspection  
drone



# Capabilities and sectors

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## Sectors

Energy

Wind  
Solar  
Nuclear  
Others

Transport

Automotive  
Railway  
Aerospace

Software  
solutions

Machinery  
industries

Meteorology

Heavy  
industries

## Areas

Wind and solar  
energy

Structural  
mechanics eng.

Automotive

Software  
development

Meteorological &  
energy forecasting

Virtual  
reality

Civil  
engineering

Electrical  
engineering

Design/  
BIM

CFD /  
Aeronautics

Artificial  
intelligence

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# Structural-mechanical engineering services





# Structural mechanical engineering

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Study of the structural performance for the design, optimization and certification of new products and assemblies

- Mathematical simulation by means of FEM and CFD of different physics involved.
- Design and study of machinery elements.
- Root Cause Analysis (RCA) of singular events, edition of expertise reports.
- Assistance to manufacturing engineering, O&M activities, testing, monitoring. Correlation tests/simulation
- Use of advanced simulation SW tools

## CAE & CFD Simulation

Structural-  
mechanics

Fluid dynamics -  
CFD

Electromagnetism

## Application to several industries

Wind energy

Railway

Automotive

Nuclear

Machinery



# Structural-mechanics

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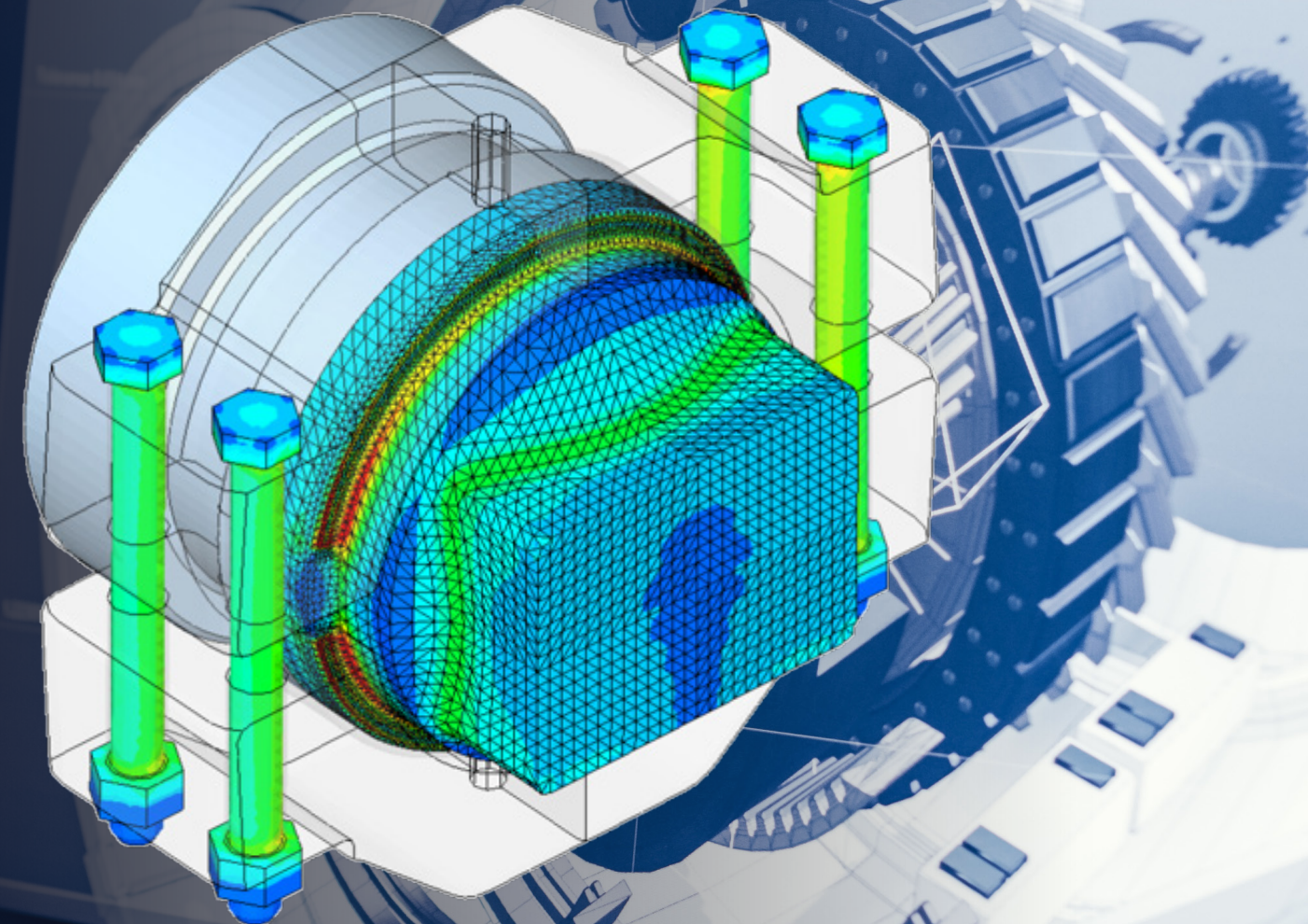
## Software & tools



## Hardware

32 CPUs

128 GB RAM  
DDR4

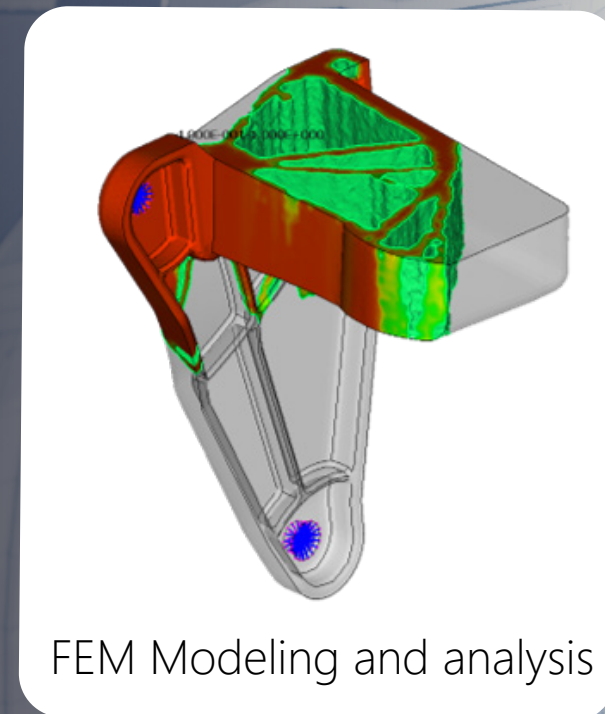


# Structural-mechanics

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## FEM Modeling and analysis

- Non-linear modeling, implicit and explicit
- Experiments design
- Root Cause Analysis (RCA) corrective measures definition
- Collaboration with design in development departments
- Topological and parametric optimization processes
- CAE - testing correlation
- Morphing techniques in mesh modifications without CAD geometry



FEM Modeling and analysis

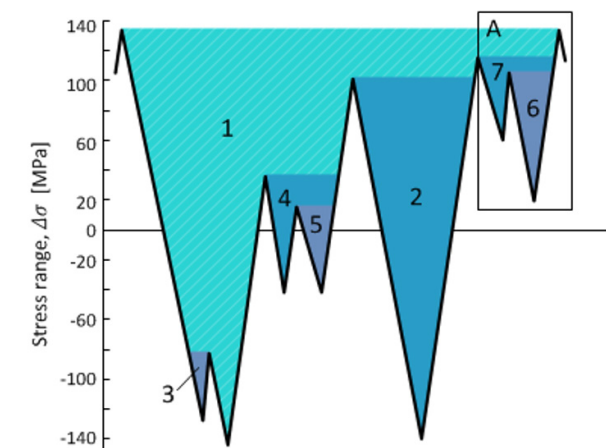
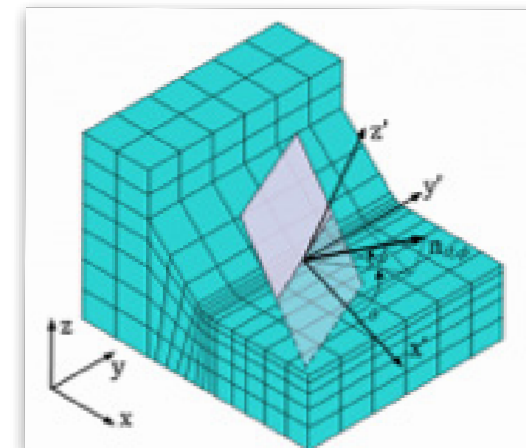
## Fatigue analysis

- Non-linear modeling, implicit and explicit
- Random fatigue, Power Spectral Density (PSD)
- Temporal series, critical plane method, Miner rule

## Joints analysis

- **Weldings** (extreme and fatigue)  
Different methodologies and approaches: following different standards such as EC3, evaluating principal stresses in hot-spot areas

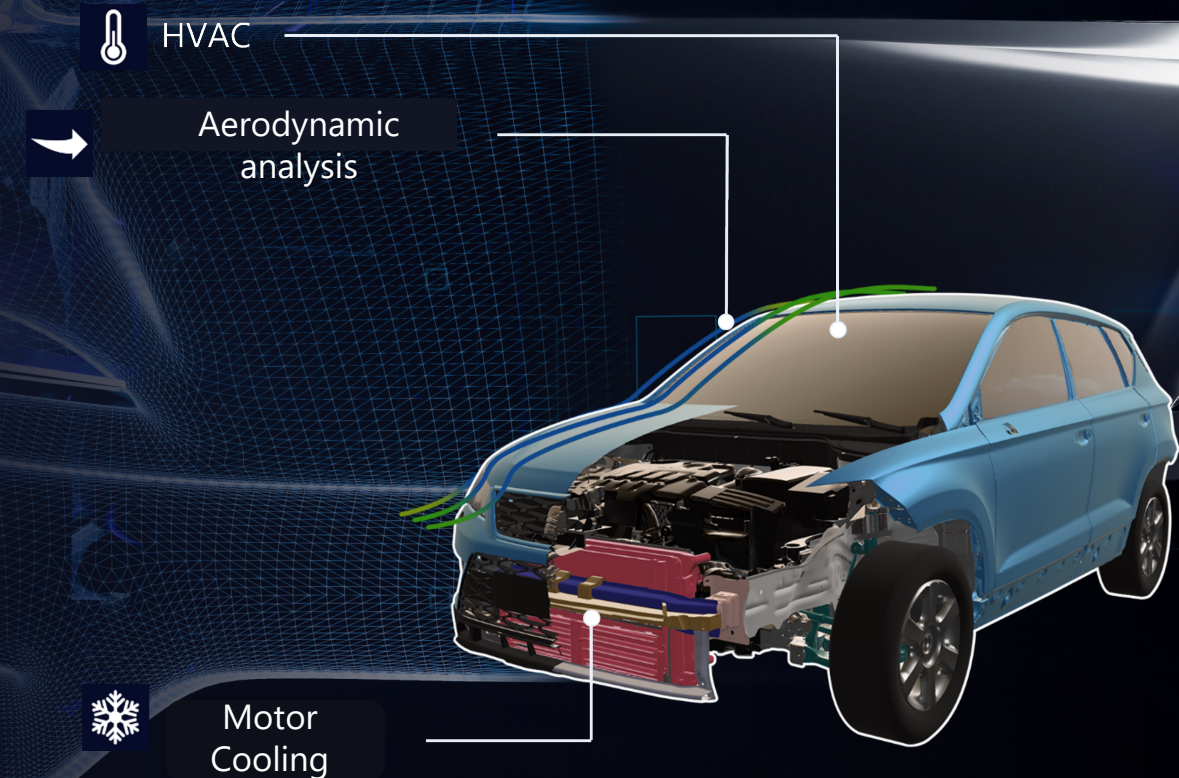
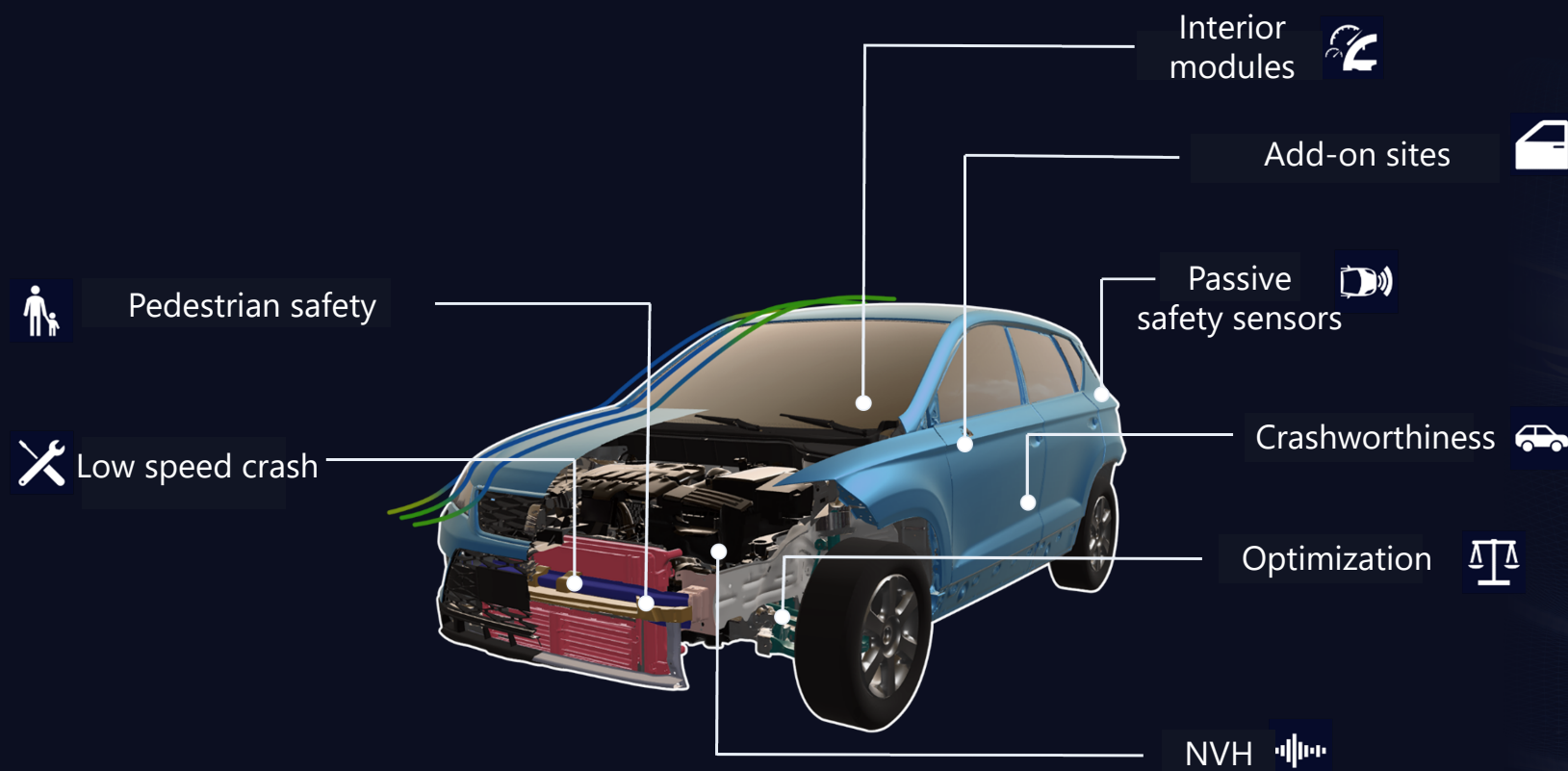
- **BOLTS**  
Different methodologies: both analytical and FEM evaluation following different standards, such as Eurocode 3, VDI2230



Fatigue analysis

Structure analysis by CAE

Fluid dynamics analysis by CFD

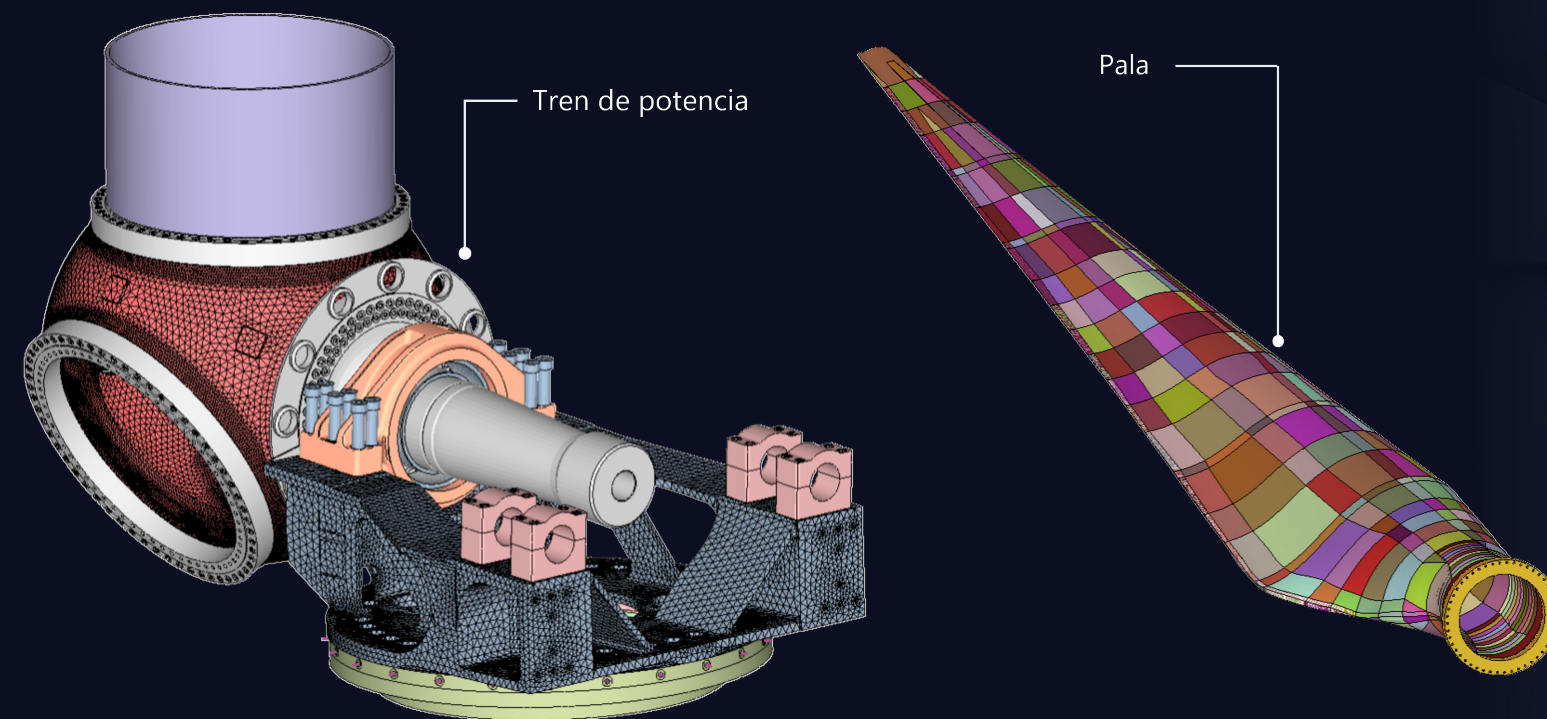


AUTOMOTIVE BODY DEVELOPMENT

# Wind Energy

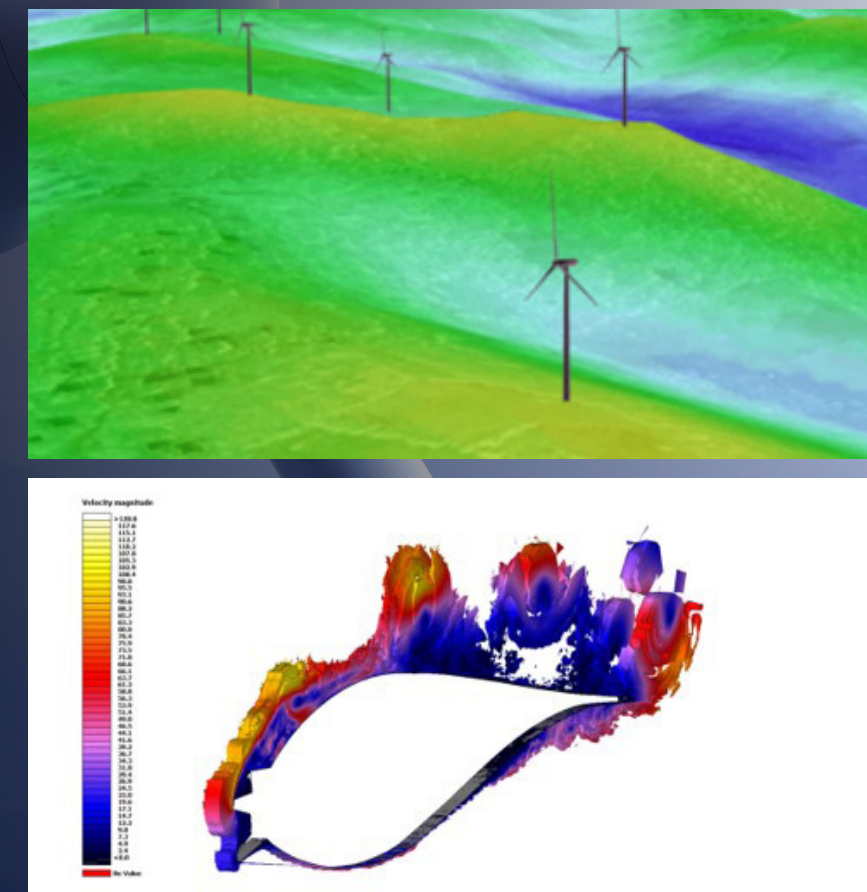
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Structural Mechanics



Wind turbine design, analysis and certification

CFD



CFD studies in wind cases

# Railway

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## Calculation projects

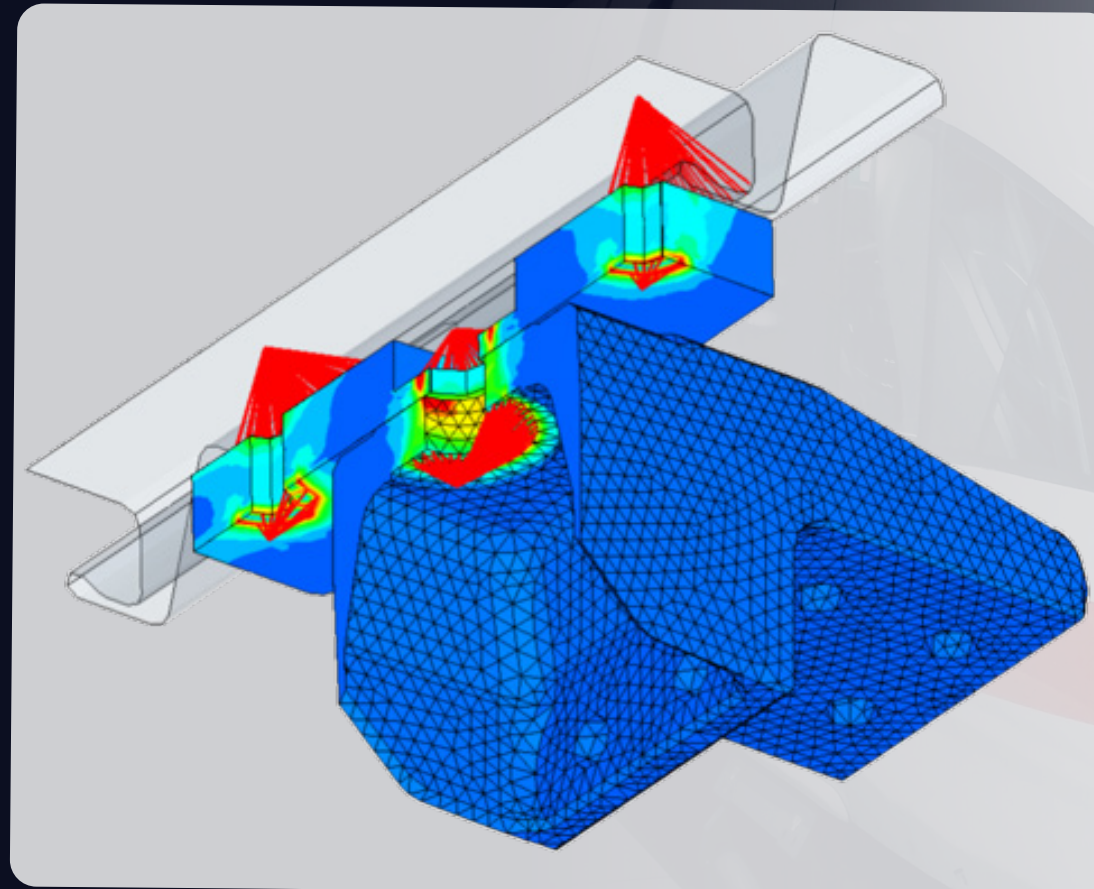
### Types:

- Implicit
- Explicit: crash / quasi-static
- Lineal / non-lineal
- Frictional contacts
- Static fatigue, random (PSD)

### Components:

- Box structure
- Rolling components
- Auxiliar equipment
- Hook mecanisms
- Fiberglass
- Cowcatcher
- Etc.

## Structural Mechanics



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Position:	Order:	Direction:
X	10.56	10.56
Y	52.12	52.12
Z	27.89	-27.89



General inquiries: [info@solute.es](mailto:info@solute.es)



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