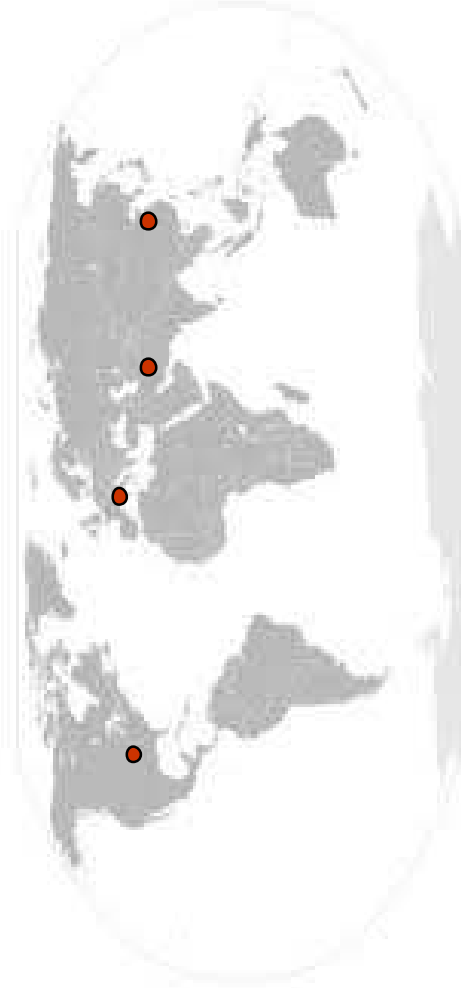


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A U T O M O T I V E  
S O L U T I O N S  
Design: the Italian Solution



- Styling design
- Models
- Engineering
- Virtual analysis
- Prototyping
- Testing

p-front



**NVH activities**



**Asia-Pacific operations**



**Business partner**

Job execution



**NVH Laboratories**



**Styling, CAD, CAE,**



**Testing**



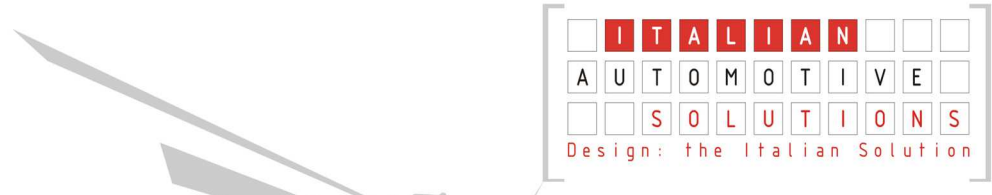
**Prototyping**



**CAE partner**



**China local partner**



Torino, Italia

- Styling design ●
- Models ●
- Engineering ●
- Virtual analysis ●
- Prototyping ●
- Testing ●





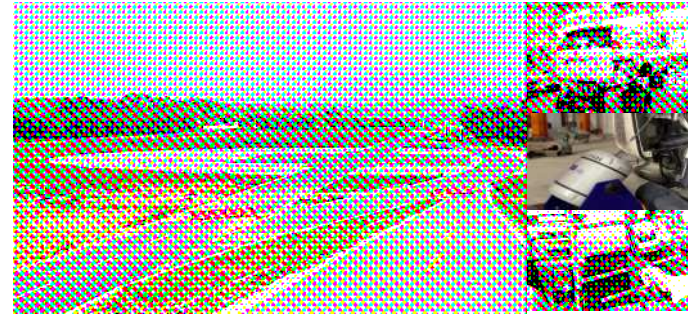
# Italian Automotive Solutions



**AUTOSTUDI**

Styling  
Design  
Engineering  
Virtual Analysis

CAD CAE Design center



**TStech**

NVH Testing  
NVH Engineering  
NVH Systems  
NVH Test Facilities

Ticeri Tianjin Proving Ground



**SCS**  
eura/acoustic

NVH Design  
NVH Testing  
NVH Engineering  
NVH Simulation  
NVH Systems  
Test Facilities

NVH center



**TEXA**

NVH Design  
NVH Engineering  
NVH Virtual Analysis

Test & Engineering center



**LANDRA**

Design  
Prototyping

Prototyping center



# Our jobs

*What we do* while others ...don't *What Customers get*

- Styling
- Design
- Models
- Engineering
- Virtual Analysis
- Vibro-Acoustic Simulation
- Prototyping
- Testing
- Fatigue
- Filtration
- Measuring Systems
- Software Development

- 1st class services
- Turn-key projects
- Project Management
- Individual task support
- Trouble-shooting
- Project platform in-house
- Suppliers handling
- EU-US standards fulfilled
- Advanced Measurement Devices and Analysis tools
- Environment assesment



Fiat Punto



Fiat Tipo



Lancia Prisma



Fiat Croma



Geely LG1



Audi A5



BMW Mini



Fiat Multipla



Peugeot 205



Lancia Musa



VW New Beetle



Iveco Stralis



Iveco Daily



SNH



Fiat Doblò



Liebao



Cadillac



Noble



Ferrari F360



Bentley



Maserati



Saiga Tibia

# VIBRO-ACOUSTIC

ACUSTICA ARIA ACQUA AMBIENTE

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Torino, Italia

## Services & Facilities

**SCS**  
& Partners

MSC Software  
FFT  
MSC Software Company

AUTOSTUDI

TEXA

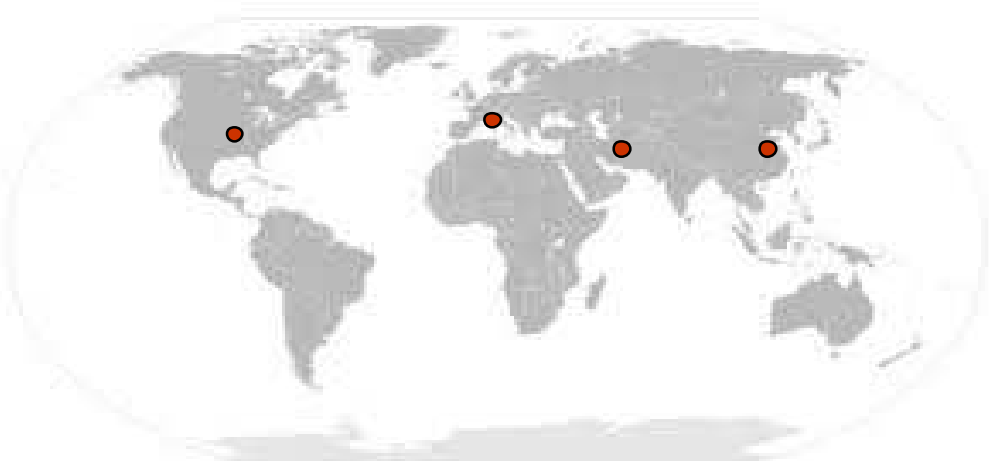
LUCA Consulting

SCS euroAcoustic

LANDRA

VIBRO-ACOUSTIC ACUSTICA ARIA ACQUA AMBIENTE

TStech



- Styling design ●
- Models ●
- Engineering ●
- Virtual analysis ●
- Prototyping ●
- Testing ●







# Softwares available

## Softwares available for NVH:

- MeScope VES
- Head Acoustic Artemis
- ESI Group AutoSEA
- Genesis LEA Sound Design
- SCS Transfer Path Analysis
- SCS Material Testing
- Matelys Acoustic Packages
- Nittobo Noise Vision
- Distran (ETH) Acoustic Images
- Noise Inspector

## Softwares available for CAE:

- Msc/Nastran
- Hks/Abaqus/Std e Hks/Abaqus/Exp
- MDI/Adams Car
- HyperWorks
- Algor/Sap
- Mecalog/Radioss
- Tno/Madymo
- Fluent/StarCD
- OptiStruct
- HyperOpt
- LS Dyna
- Hypermesh
- Msc/Patran

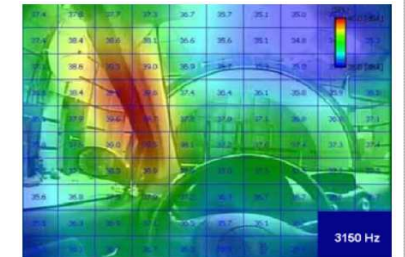
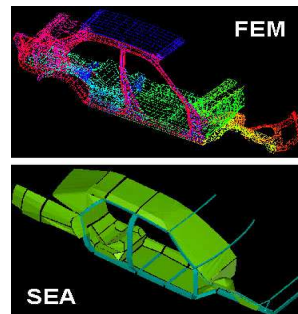
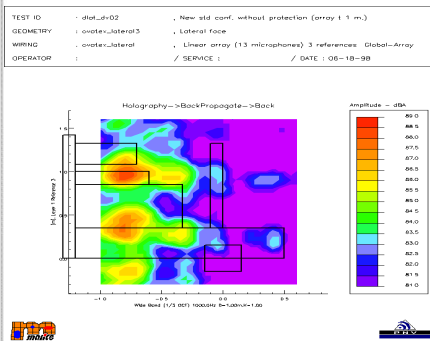


- ✓ Engine and car suspensions attenuation
- ✓ Dynamic stiffness (a/F) of powertrain, car suspension and exhaust system attaching points
- ✓ Experimental and analytical modal analysis
- ✓ Running modes
- ✓ Ride comfort

### Materials

- ✓ Flow resistance of porous material
- ✓ Absorption coefficient measurement (plane wave incidence and random wave incidence)
- ✓ Determination of damping characteristics
- ✓ Transmission Loss measurement
- ✓ Materials Data base

- ✓ Bench marking
- ✓ “Target setting” for reference car pointed to new design
- ✓ Customes methodologies development
- ✓ Interior trims acoustic development
- ✓ Noise path analysis
- ✓ Diagnostic Activities
- ✓ Experimental design validation
- ✓ External noise (Pass-by test)
- ✓ Airborne noise study (N.R. e/o T.L.)
- ✓ Acoustic transparency (p/p)
- ✓ Acoustic transfer function (p/F)
- ✓ Components Acoustic power
- ✓ Noise quality study
- ✓ Subjective evaluation
- ✓ Psychoacoustic analysis
- ✓ Study of annoying phenomena





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# Quality



**ISO 9001-2008**

**ISO 27002 on route**

**ISO 9001:2008**

**ISO/IEC 17025:2005**

ISO/TS 11155-1:2001 "Road vehicles - Air filters for passenger compartments - Part 1: Test for particulate filtration"

ISO 14269-4: "Tractors and self-propelled machines for agriculture and forestry - Operator enclosure environment - Part 4: Air filter element test method"

ISO 10263-2:2009 "Earth-moving machinery - Operator enclosure environment - Part 2: Air filter element test method"

EN 15695-2:2009 "Agricultural tractors and self-propelled sprayers - Protection of the operator (driver) against hazardous substances - Part 2: Filters, requirements and test procedures"

CEI EN 60068-2-6 Test Fc: Sinusoidal vibration :2009-11 ed. 02

CEI EN 60068-2-27 Test Ea and guiding: Urti :01-01-2012

CEI EN 60068-2-64 Test Fh: random vibration and guiding :2012-01

CEI EN 61373 Railways, Tramways, Electrical vehicles, coaches, Shock and vibration :01-02-2012

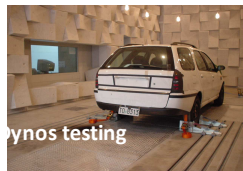
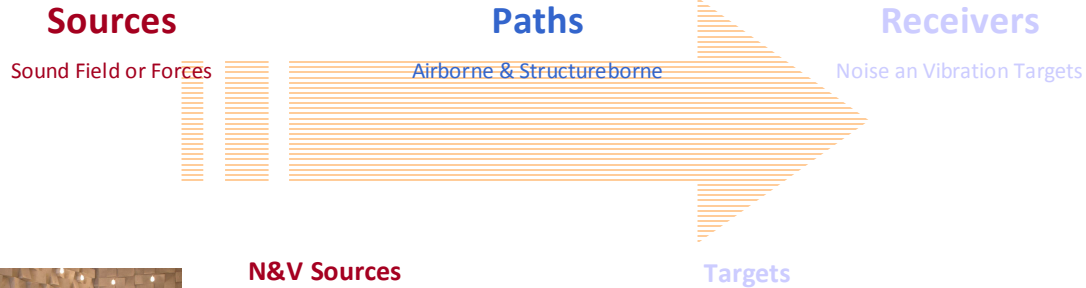
**I T A L I A N**  
**A U T O M O T I V E**  
**S O L U T I O N S**  
 Design: the Italian Solution

# What we do

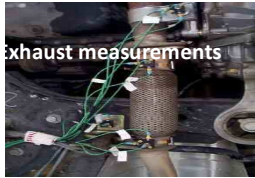
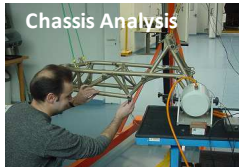
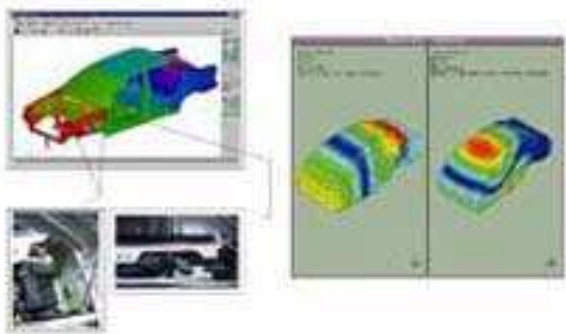
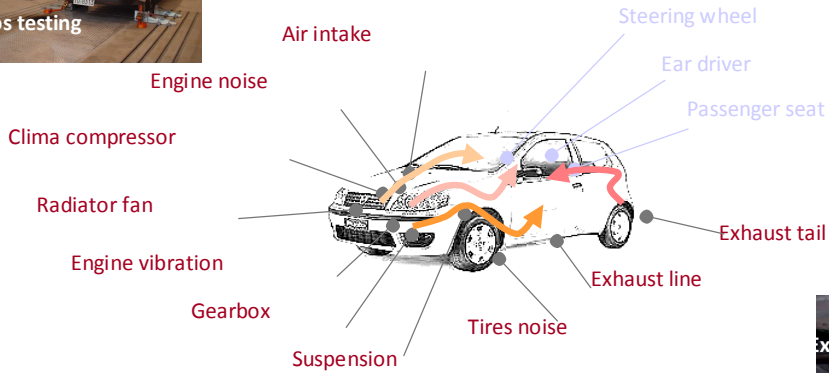
*while others ...don't*



# NVH Laboratory

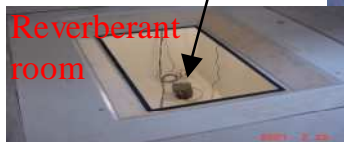


**N&V Sources**





Semi anechoic chamber



Reverberant room



Semi anechoic chamber with chassis dynamometers



Material testing



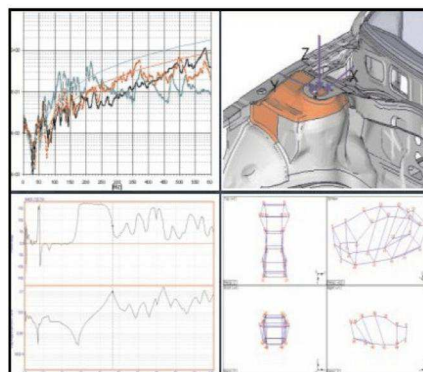
Laboratory next to chambers

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Prove su veicoli  
e componenti di macchinari

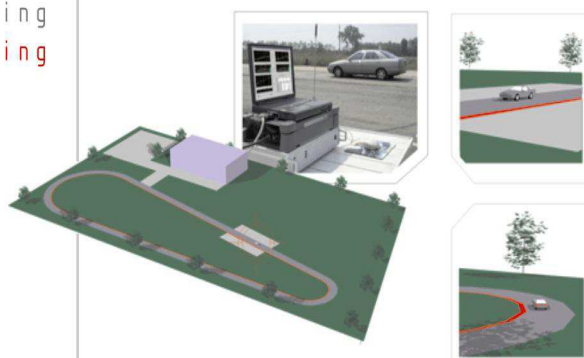
Camere e banchi di prova



Prove e Certificazioni  
di vibrazioni su veicoli  
e mezzi commerciali

# NVH Testing

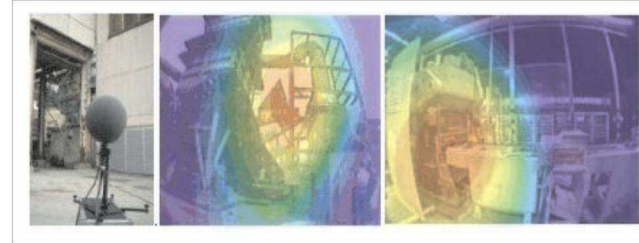
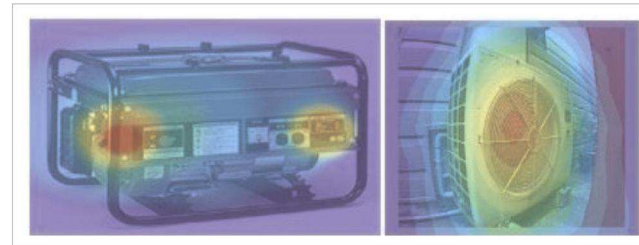
Styling design  
Models  
Engineering  
Virtual analysis  
Prototyping  
Testing



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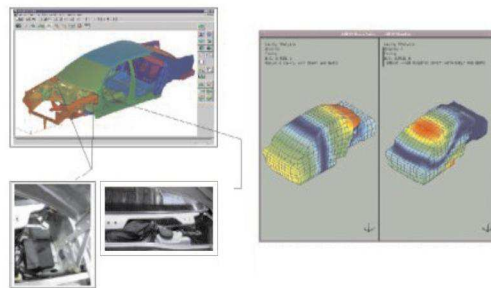
Studi di  
impatto



NoiseVision: Sistema  
di BeamForming  
imbarcabile

# NVH Testing

Styling design  
Models  
Engineering  
Virtual analysis  
Prototyping  
Testing



Prove e  
Certificazioni



Il Sistema NoiseVision  
consta di un trasduttore  
sferico equipaggiato con  
31 microfoni e 12  
telecamere, e consente  
di ottenere - a seguito

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# NVH Testing



Test in a semi-anechoic chamber on rollers bench

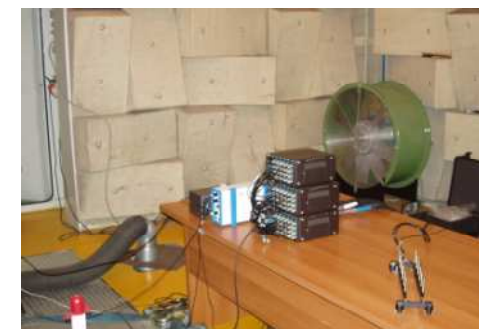
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# NVH Testing

## MODAL ANALYSIS



## ACOUSTIC IMAGING



# Material Testing

## *poro-acoustic properties*

### Standing wave tube ISO 1053-ASTM E-1050 standards

- Tubes sizes:  $\varnothing 28\text{mm}$ ,  $\varnothing 100\text{mm}$  and  $\varnothing 45\text{mm}$
- Samples length up to more than 40 cm
- Kundt tubes pair upgradeable for TL measurement
- Optional measurement of: Transmission Loss, Surface Impedance, Transfer Complex Impedance, Propagation constant



### Flow Resistance ISO 9053

- Diam.100mm chamber with piston and geared motor
- Electronic Speed Controller
- Calibration Cup
- Adjustable Sample Holder
- Four Interchangeable Cams



### Tortuosity

- Method using electrical impedance in water
- Includes n.2 cylindrical tanks for measurement
- Electronic Speed Controller
- Holding elements, electrodes, pipes and connectors.



### Reverberant room for $\alpha_{ST}$ coefficient

- Transportable mini reverberant room with NOT/parallel walls
- Includes internal Diffusers and reference material samples, rotating microphone holder (manual)
- Steel cage around the ABS-CAB for transportation purposes



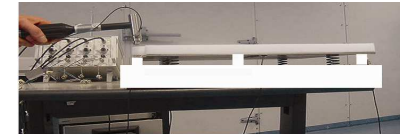


# Material Testing

## *poro-elastic properties*

### Damping Loss Factor SAE method

- Method is based on a reference stainless steel plate suspended on a bearing slab by means of four elastic suspensions
- Method suitable for ASTM and BS requirements
- Plate excitation using instrumented impact hammer
- Response measured with a light accelerometer
- The damping material sample is adhered to the plate surface



### Damping Loss Factor and Elastic Modulus

- Oberst Device Frame including:
  - High temperature, non contact inductive displacement transducer (
  - S-5026 Displacement transducer conditioner
  - M-PS124 Power Supply / Mains Adapter
  - Two Adjustable Arms
  - Electromagnetic Exciter

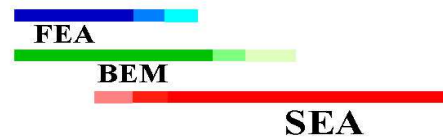
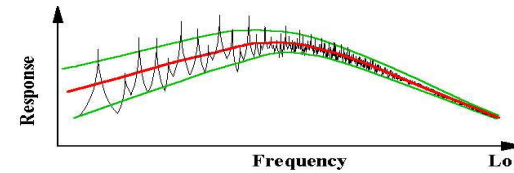


### Bulk Modulus

- Measurement device for dynamic elastic modulus on porous materials
- Steel & Aluminum structure with mechanical parts and 200N shaker
- Sinusoidal generator (stepped sine) and close-loop controller
- Option: static measurement of E (young modulus) and Poisson ratio
- Material compression is measured using a load cell, lateral deformation is measured using double laser multi-beams, resolution down to 10 micron.
- Option: Vacuum chamber and vacuum pump (100 mBA)
- Option: seismic table in painted steel

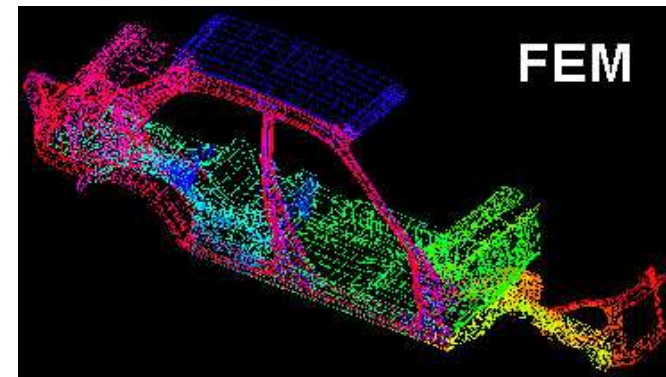


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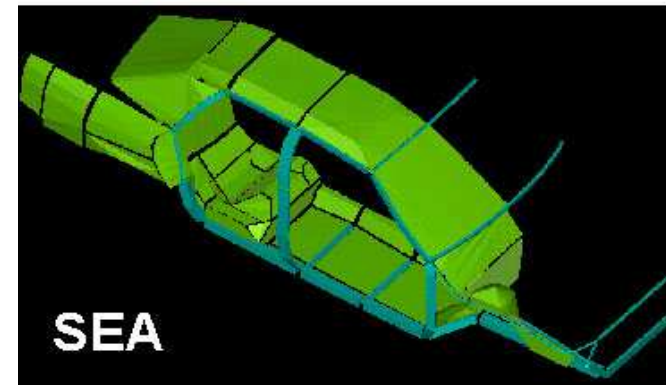


Frequency Range: 0 - 200 Hz  
*Deterministic*  
Displacement at every discrete point  
Execution Time: Months

Frequency Range: 200 - 5,000 Hz  
*Statistical*  
Space-average level (Energy) in freq. bands  
Execution Time: Weeks



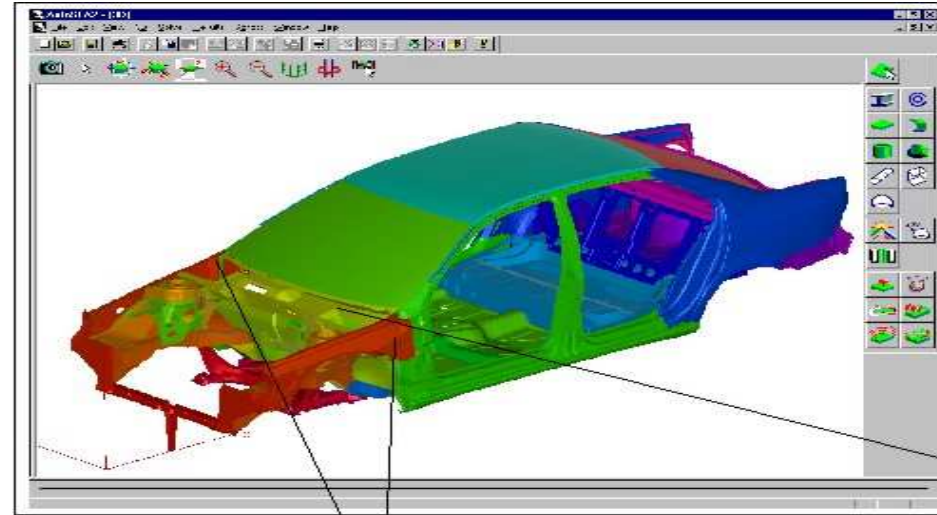
FEM



SEA

FEM-BEM-SEA Model

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Body parts → SEA subsystems

SEA Model



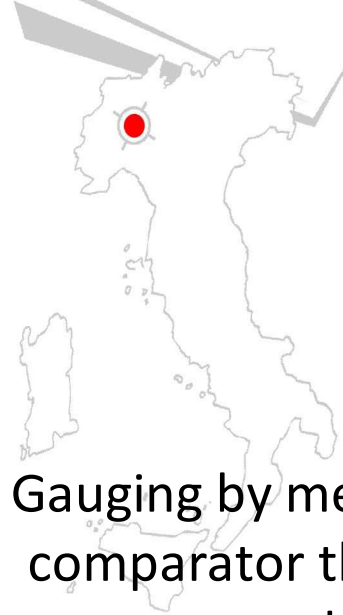
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What we do  
*while others ...don't*

# TESTING



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Equipment to check load and travel of actuators



Gauging by means of a comparator the doors slackening



Full scale vehicle static tests



Doors slamming measurement

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The electrodynamic shaker is used for fatigue test in different range of frequency and temperature



Force range [kN]: 28.9-35.6  
 Head excursion: 51 mm  
 Acceleration range: 0-200 g  
 Frequency range: 0-5000 Hz

**Durability test**



## Full scale vehicle static tests

- Doors slackening measurement
- Measurement of door opening effort
- Attitude measurement and definition
- Measurement of passenger habitability and luggage compartment volume
- Ergonomics assessment
- Interior protrusion assessment
- Light reflection on instrumentation assessment
- Verifying if controls are reachable

## Full scale vehicle dynamic tests

- Performances and fuel consumption
- Handling tuning
- Suspension optimisation for comfort
- Brake tests
- ATB Test
- Standard test of clutch wear
- Acceleration test on slopes
- Rapid fatigue test on country road or track
- Temperature measurement on main mechanical groups
- Electric energy balance

## In Vehicle measurements

- Measurement of temperatures in motor compartment
- HVAC performance assessment
- Defrosting/demisting of windshield/windows time
- Measurement of temperature in passenger compartment

Full Scale Vehicle



## Special Test

Every kind of simulated crash tests (\*)

Measurements in wind tunnel and climatic chamber (\*\*)

Engine power measurement on normal bench

Engine power measurement on rolls-bench

Emissions measurement (including filtration)

Various tests on special tracks (steering pad, comfort track, special fatigue tests, performance measurement on high speed track) (\*)

Handling and comfort bench test

EMC test (\*\*)

(\*) *Performed in AutoStudi*

(\*\*) *Tests performed in 3<sup>rd</sup> parties facilities*



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**What we do**  
*while others ...don't*

# New Ideas



**Automotive News Europe Congress**  
**Torino May 2008**



AUTOSTUDI

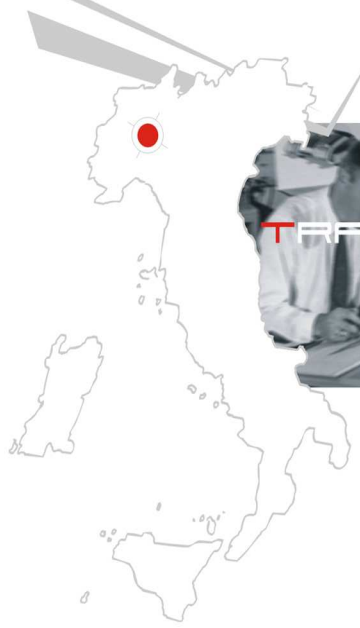


**Testing Expo Congress**  
**Shanghai 2008**

# Styling

	I	T	A	L	I	A	N			
A	U	T	O	M	O	T	I	V	E	
		S	O	L	O	T	I	O	N	S

Design: the Italian Solution



## IAS Centrostile

Designers and Stylist search and develop fine design solution by merging Italian automotive tradition with most recent and advanced technologies

Styling design

- Models
- Engineering
- Virtual analysis
- Prototyping
- Testing



## Research and Development

Win to win sharing organisation with clear strategies



## Innovation and Creativity

Allows to work out advanced styling proposals



## Passion and Personality

....also for Restyling solution



# Styling

I	T	A	L	I	A	N				
A	U	T	O	M	O	T	I	V	E	
		S	O	L	U	T	I	O	N	S

Design: the Italian Solution



IAS Centrostile offer a full support for Research and Development in styling of any kind of vehicle in different segments

Styling design

- Models
- Engineering
- Virtual analysis
- Prototyping
- Testing



Diversification and flexibility for a global support



Diversification and flexibility for a global support



# Styling

	I	T	A	L	I	A	N			
A	U	T	O	M	O	T	I	V	E	
		S	O	L	U	T	I	O	N	S

Design: the Italian Solution



RESEARCH DEVELOPEMENT

IAS Centrostile boast excellence in various market segments including motorbikes and similar

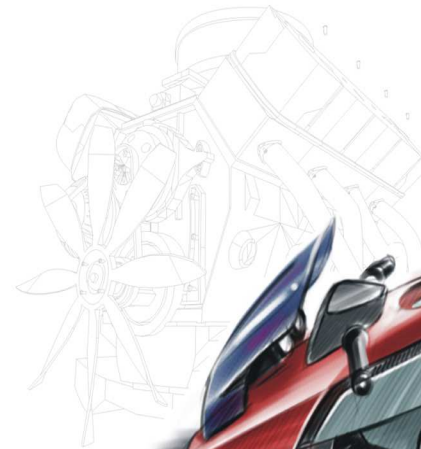
### Styling design

- Models
- Engineering
- Virtual analysis
- Prototyping
- Testing

Upon traditional Italian style on motorbikes, IAS Centrostile propose new understanding reach in modern concepts and strong character



Innovative proposals



# Models

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IAS Modellier follows customers needs for any kind of services and toolings in automotive. From styling models, several high end CAD/CAM services can be offered: polystyrene model for moulds, control calibers, assembling masks, temporary moulds, certified prototypes of single and assembled elements, up to complete cars.



Styling design  
 Models  
 Engineering  
 Virtual analysis  
 Prototyping  
 Testing



# Models

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 A U T O M O T I V E  
 S O L U T I O N S  
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Styling design  
 Models  
 Engineering  
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 Prototyping  
 Testing



In our modern CAD-CAM centre is granted a perfect interfacing among all systems.

In addition to the **mathematization** of surfaces and the definition of machine-tools routing, all modeller activities are deployed within a general contest of the project

From deep-drawing fusion models, our expertise represent a key junction between design and final moulds. Any of our products, tooling, mould, caliber or prototype is certified. We can print full detailed report for comparison between mathematical model and real prototype or model, listing and evaluating gaps and mistakes.



We offer the possibility of 5-axes milling in a wide range of 6000 x 2000 x 1800, allowing to work on full master without repositioning.

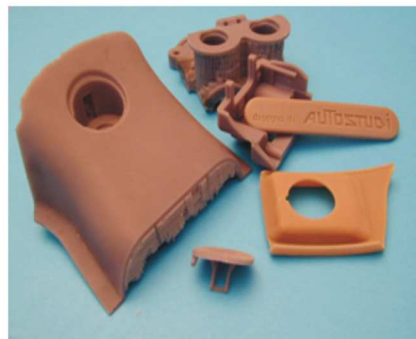
# Prototyping

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 S O L U T I O N S  
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Styling design  
 Models  
 Engineering  
 Virtual analysis  
**Prototyping**  
 Testing

IAS can support on:  
 Design  
 Prototyping  
 Pre-series  
 Experimental manufacturing  
 3d Plotter  
 Stereolithography



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 S O L U T I O N S  
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# Prototyping



Example of installation of a 8V-engine, quite different from the original one. A new ECU has been built to tune the engine control unit to the body computer and a new SW has been written.

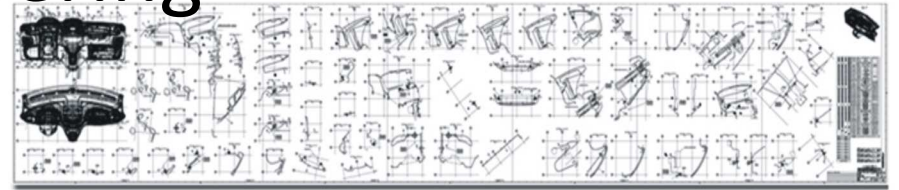


Prototype workshop

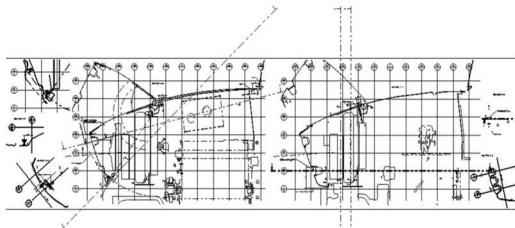


# Engineering

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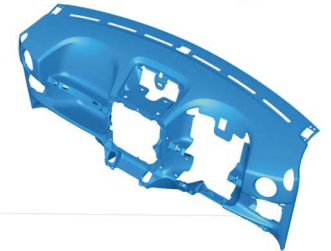


Styling design  
Models  
**Engineering**  
Virtual analysis  
Prototyping  
Testing



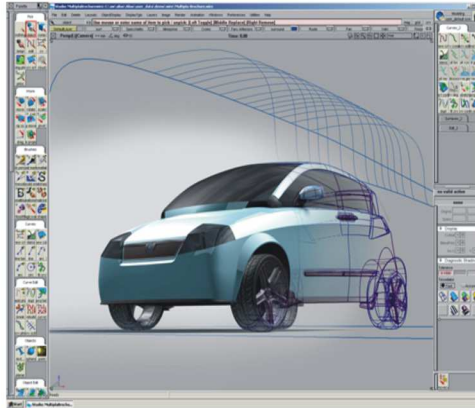
Thanks to a non-common specialty in numerical analysis and calculus for project development, IAS represents a primary entity of excellence among services organisation for industries.

A long-term and full-field offer of different activities in automotive, train, aero-space, ships, household appliances, etc. increased tremendously the group know-how and makes the customer more comfortable for the quality of results and for the timing optimisation.



# Engineering

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Going from CAS model to Engineering processing requires high skill and sophisticated tools that IAS own and use since more than 20 years.

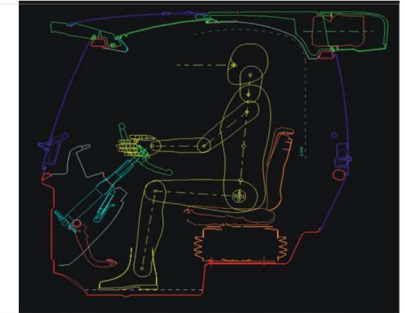
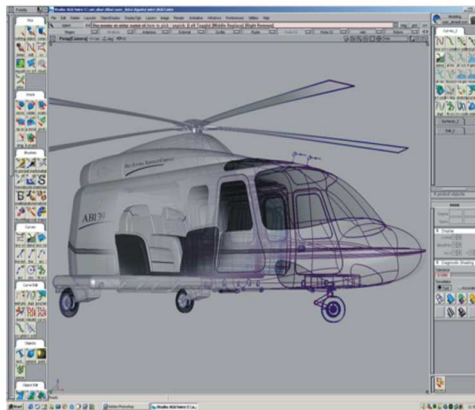
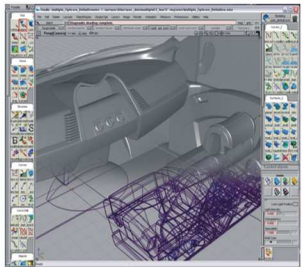
Styling design  
Models

Engineering

Virtual analysis

Prototyping

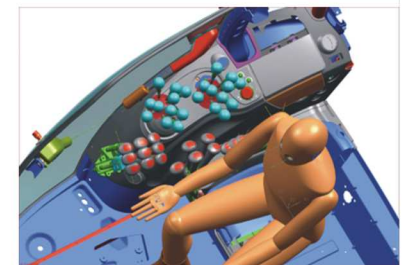
Testing



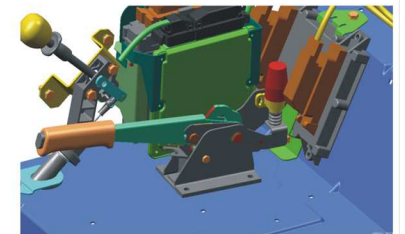
DMU test\_ergonomia

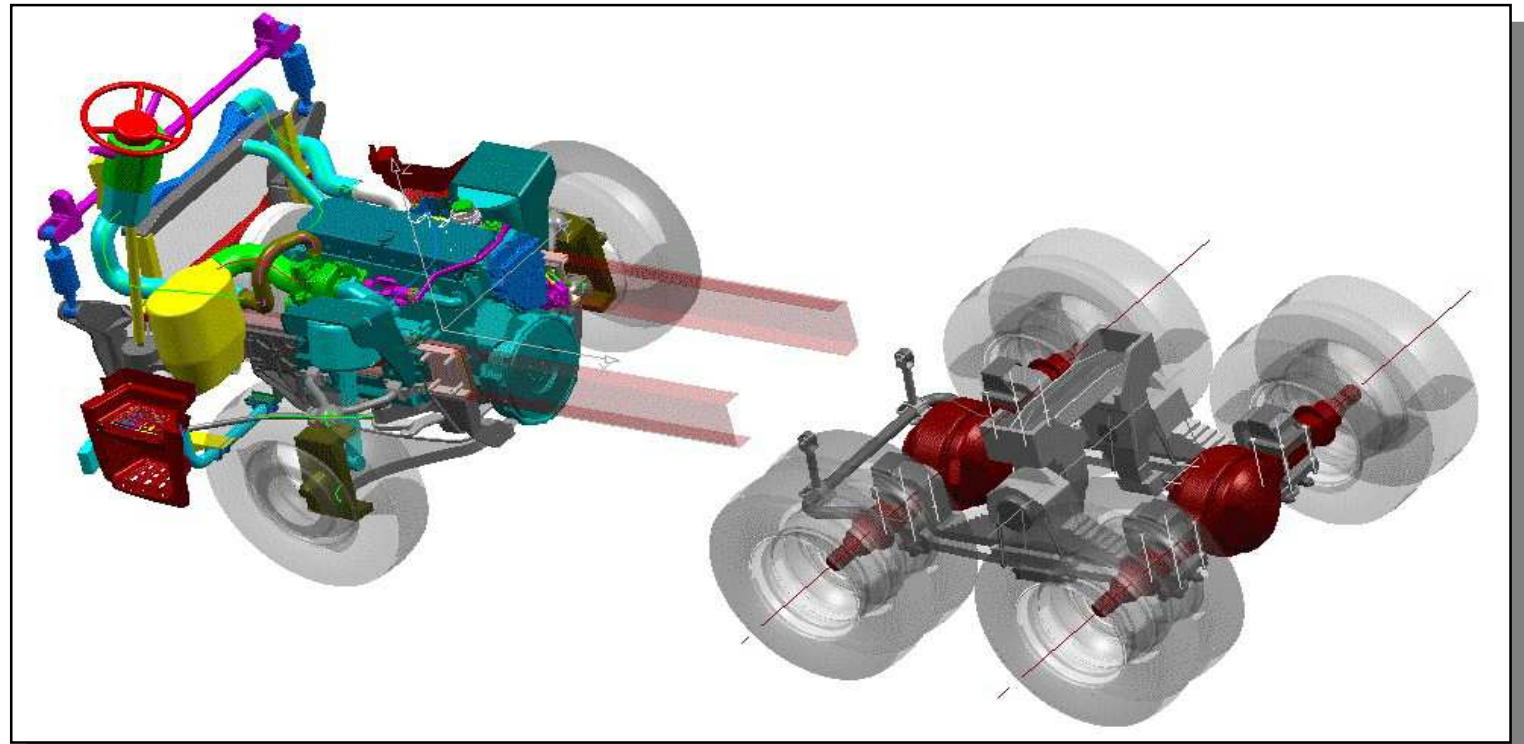


DMU test\_ergonomia



DMU test\_ergonomia





Study of innovative front and rear suspensions for a new heavy truck

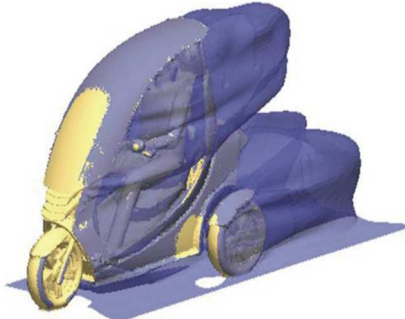
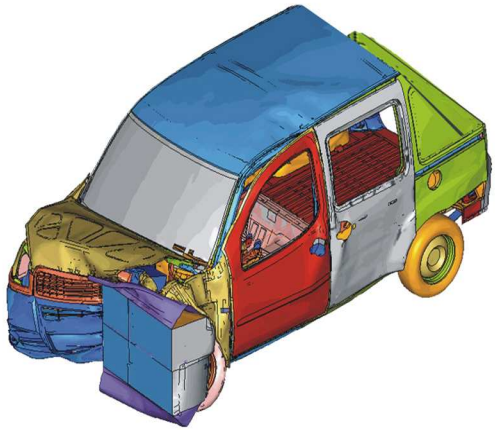
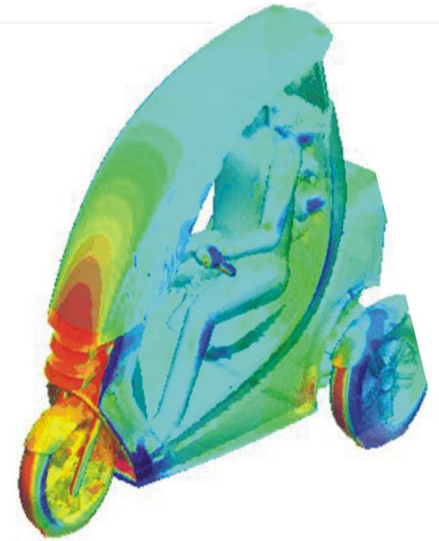
Chassis study

# Virtual Analysis

I T A L I A N  
 A U T O M O T I V E  
 S O L U T I O N S  
 Design: the Italian Solution

## software

- ANSYS
- ADAMS-CAR
- NASTRAN
- ABAQUS
- FALANCS
- FATIQUE
- PAM-CRASH
- PAM-SAFE
- MADYMO
- RADIOSS
- STAR-CD
- FLUENT
- PAM-STAMP
- MOLD-FLOW
- PRO-CAST

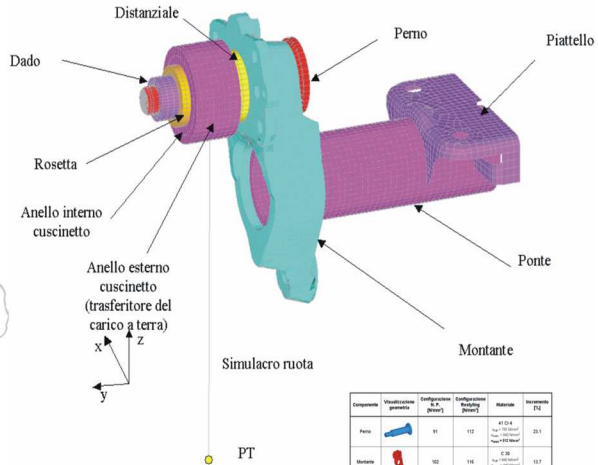


Dimensional management  
 Definition of reference systems for design and production  
 Form of adjustment and tolerances in positioning, with reference to DIN, ISO, ASME standards  
 Simulation and Visualization of 2d and 3d tolerances on full vehicles; identification of critical tolerances area

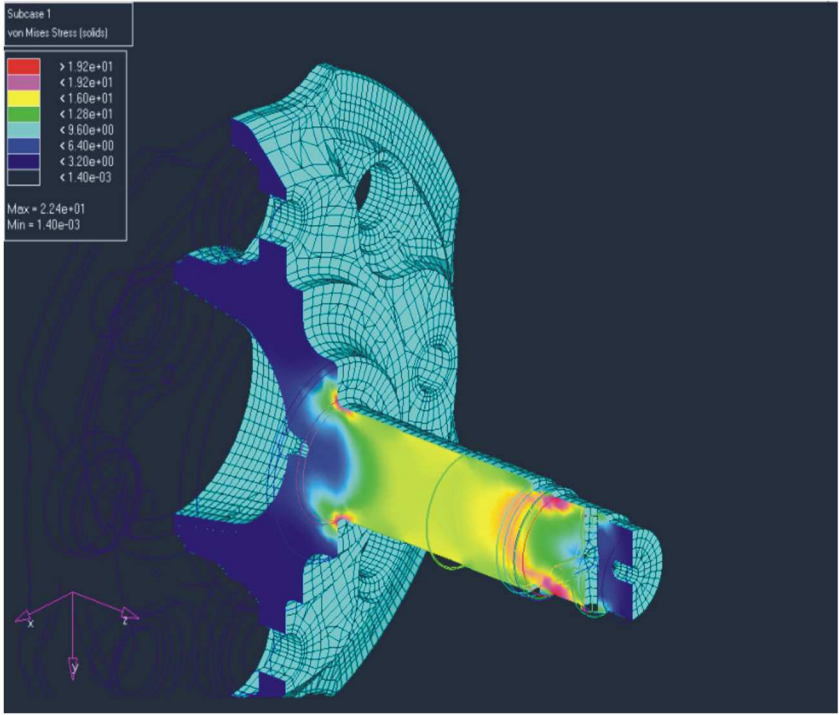
- Styling design
- Models
- Engineering
- Virtual analysis**
- Prototyping
- Testing

- CAE
- Static
- Multibody Dynamic Analysis
- Aerodynamic simulation
- DMU Geometrical simulation (Digital Mockup static and dynamic)
- DMU/EDM process
- Ergonomy
- Assembling and production simulation

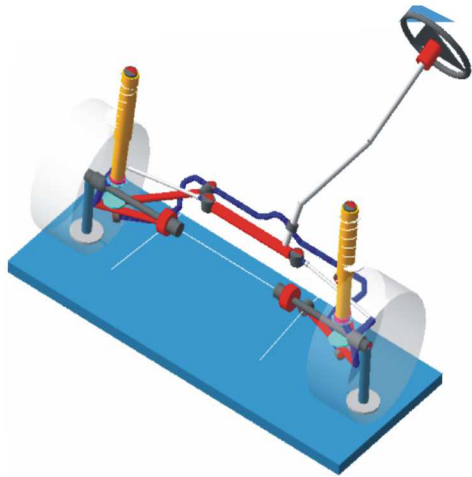
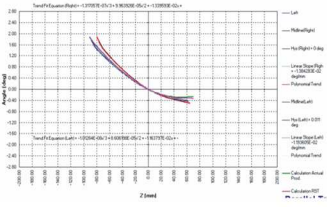
ITALIAN  
AUTOMOTIVE  
SOLUTIONS  
Design: the Italian Solution



Componente	Visualizzazione generata	Definizione (n°)	Empiamento (mm)	Materiale	Massa (kg)
Perno		81	112	A1024 Max. Tensione: 1000 MPa Max. Allungamento: 10%	28.1
Montante		102	176	C15 Max. Tensione: 1000 MPa Max. Allungamento: 10%	13.7
Cuscinetti		85	46	-	-29.2
Distanziale		27	36	C15 Max. Tensione: 1000 MPa Max. Allungamento: 10%	29.9

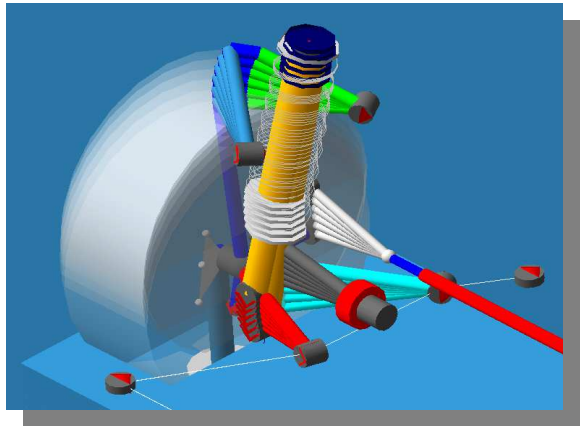
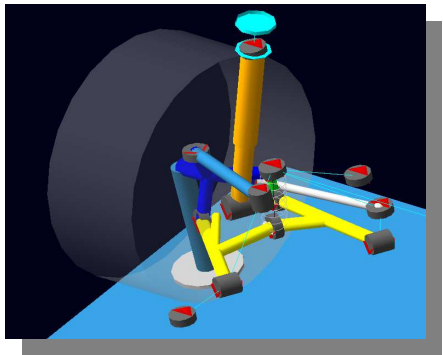


Styling design  
Models  
Engineering  
Virtual analysis  
Prototyping  
Testing

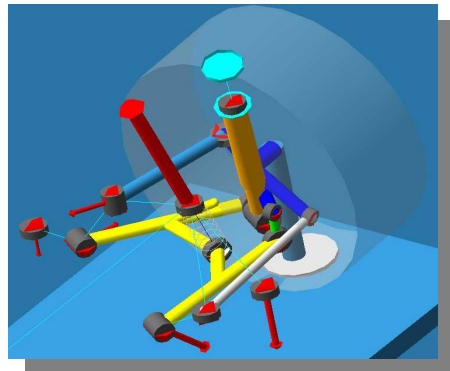


# Virtual Analysis

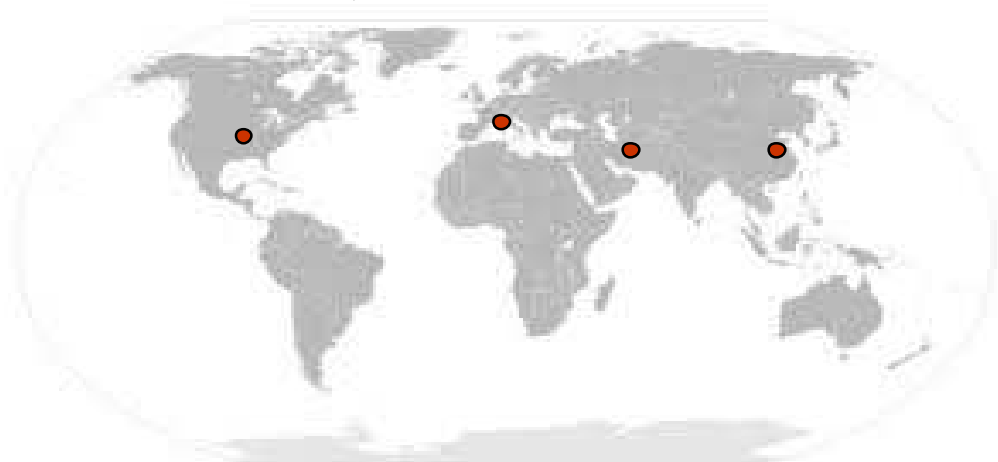
# Virtual Analysis



Virtual simulation  
of suspension  
elastocinematics



The software to analyse the suspension elastocinematics is the package named : Adams Car.



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e-mail: [info@vibro-acoustic.eu](mailto:info@vibro-acoustic.eu)

- Styling design ●
- Models ●
- Engineering ●
- Virtual analysis ●
- Prototyping ●
- Testing ●

