NVH activities
Asia-Pacific operations
Business partner

NVH Laboratories
Styling, CAD, CAE,
Testing
Prototyping
CAE partner
China local partner

Styling design
Models
Engineering
Virtual analysis
Prototyping
Testing
Italian Automotive Solutions

CAD CAE Design center

NVH Design
NVH Testing
NVH Engineering
NVH Systems
Test Facilities

NVH Test Facilities

AUTOSTUDI
Styling
Design
Engineering
Virtual Analysis

NVH Design
NVH Engineering
NVH Systems
NVH Test Facilities

Ticeri Tianjin Proving Ground

Test & Engineering center

NVH Design
NVH Engineering
NVH Virtual Analysis

Design
Prototyping

Prototyping center
What we do while others don’t

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

What Customers get

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 assessment
Services & Facilities

- Styling design
- Models
- Engineering
- Virtual analysis
- Prototyping
- Testing
Instruments available for NVH:

- 1 x 48 channels 24bits-51.2 kHz NetdB system
- 1 x 12 channels / 1 x 24 channels Head Acoustic SQ Lab
- 1 x 16 channels VXI Front-End
- 1 x 10 channels 24bits-192 kHz DAQ Front-End
- 5 x Vibration controller (Spectral Dynamics, Data Physics, Ucon) Sine, Random, Shock, S on R, R on R, Road simulation
- 3 x 4 channels 24bits-51.2 kHz DT
- 1 x HMS-II / 1 x HMS III artificial head
- 1 x 3d baffled sphere Nittobo – 31 microphones and 12 video camera
- 1 x 64 channels planar antenna
- 3 x Electrodynamic shaker 70/100 N
- 1 x Electrodynamic shaker 1000 N
- 1 x Electrodynamic shaker 2000 N
- 1 x Electrodynamic shaker 10 kN
- 1 x Electrodynamic shaker 27 kN
- 1 x Electrodynamic shaker 54 kN
- 1 x Climatic chamber 2.5x1.2x1.5 m, -40°÷ 140°C, 10÷ 95% UR
- 1 x Climatic chamber 0.8x0.80x0.95 m, -50°÷ 160°C.
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

Bench marking

“Target setting” for reference car pointed to new design

- Customers 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

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
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"
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
What we do

while others ...don’t

NVH Laboratory

Sources
Sound Field or Forces

Paths
Airborne & Structureborne

 Receivers
Noise an Vibration Targets

Targets

N&V Sources

Sound Perception

Sources
Sound Field or Forces

Paths
Airborne & Structureborne

Receivers
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N&V Sources

Sound Perception
NVH Testing
NVH Testing

Studi di impatto

NoiseVision: Sistema di BeamForming imbarcabile

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

Test in a semi-anechoic chamber on rollers bench
NVH Testing

MODAL ANALYSIS

ACOUSTIC IMAGING
Material Testing

**poro-acoustic properties**

**Standing wave tube ISO 1053-ASTM E-1050 standards**
- Tubes sizes: 28mm, 100mm and 45mm
- 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: sismic table in painted steel
Vibro-Acoustic Simulation

FEM-BEM-SEA Model

- **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

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**Legend:**
- FEA
- BEM
- SEA

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Body parts ➔ SEA subsystems

SEA Model
What we do
while others ... don’t

TESTING
Full scale vehicle static tests

Equipment to check load and travel of actuators

Gauging by means of a comparator the doors slackening

Doors slamming measurement
The electrodynamics shaker is used for fatigue test in different range of frequency and temperature.

**Testing Facilities**

- **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
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 3rd parties facilities
What we do
while others ...don’t

New Ideas

Automotive News Europe Congress
Torino May 2008

Testing Expo Congress
Shanghai 2008
Styling

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

Passion and Personality
...also for Restyling solution

Research and Development
Win to win sharing organisation with clear strategies

Innovation and Creativity
Allows to work out advanced styling proposals

S t y l i n g  d e s i g n
Models
Engineering
Virtual analysis
Prototyping
Testing

VIBRO-ACOUSTIC
ACUSTICA ARIA ACQUA AMBIENTE
Styling

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

Diversification and flexibility for a global support
Styling

Innovative proposals

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

IAS Centrostile boast excellence in various market segments including motorbikes and similar.
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: polystirene model for moulds, control calibers, assembling masks, temporary moulds, certified prototypes of single and assembled elements, up to complete cars.
Models

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.

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.

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

IAS can support on:
Design
Prototyping
Pre-series
Experimental manufacturing
3d Plotter
Stereolytography
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
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.
Going from CAS model to Engineering processing requires high skill and sophisticated tools that IAS own and use since more than 20 years.
Engineering

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

Chassis study
Virtual Analysis

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

Software
- ANSYS
- ADAMS-CAR
- NASTRAN
- ABAQUS
- FALANCS
- FATIUC
- PAM-CRASH
- PAM-SAFE
- MADYMO
- RADIUS
- STAR-CAD
- 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 areas
Virtual Analysis
The software to analyse the suspension elastocinematics is the package named: Adams Car.

Virtual simulation of suspension elastocinematics