INTRODUCING INNOVATIVE PRODUCTS TO THE MARKET IN LESS TIME AND WITH LOWER RISK
Are you interested in learning a new methodology to develop your vehicles in less time, with less risk and with less cost?

VI-grade introduces a new approach aimed to accelerate your automotive development process. Many automotive companies have already adopted this new method, which enables them to efficiently evolve from physical testing to simulation. This methodology allows them to test more vehicles variants in less time, solving problems much earlier in the development process and ultimately reducing the number of physical prototypes.

Let’s see how VI-grade can help you accelerate your development process!
At VI-grade we help automotive OEMs, suppliers, research institutes and racing teams to develop their products faster by means of simulation software and driving simulators.

By using an end-to-end simulation process that goes from off-line simulation on a desktop computer to the usage of simulation models on Driving Simulators, our customers are able to identify problems earlier in the design cycle, thus finding innovative solutions and minimizing late cycle changes. All this results into more innovative products that hit the market faster.

Driving Simulators thus became a competitive advantage for those companies who upgraded their development process in order to heavily rely on them.
“It’s about making the car better, not just save time. I believe we have created the best car so far in Volvo’s history”.

Mattias Davidsson
Lead vehicle dynamics engineer
Volvo

Volvo halved the development time of the new XC60 and developed the new S90 chassis with the driving simulator.
Until now, vehicles and automotive components have been developed following a so-called sequential design process (target setting, simulation activities, physical prototypes, testing on test track), leading to the definition of all modifications required to reach product sign-off.

This process has become obsolete thanks to the power of simulation and Driving Simulator solutions, that allows to obtain precious information on developed products much earlier in the design cycle. This is possible since test drivers don’t need to wait until the first physical prototype is available, but they can literally “drive” simulation models, providing subjective feedback to CAE engineers.

This is the meaning of “Bridging the gap between Testing and Simulation”!
ACCELERATED PRODUCT DEVELOPMENT
DECREASE PROTOTYPES AND DEVELOPMENT TIME

EASIER SYSTEM-LEVEL VALIDATION
OVERCOME COMPLEXITY OF SYSTEM INTEGRATION

AFFORDABLE DEVELOPMENT PROCESS
DISCOVER POTENTIAL ISSUES AND INVOLVE TESTING DEPARTMENT EARLIER
No matter what kind of car you have to develop, no matter what kind of discipline you have to investigate, no matter what kind of frequency range you have to work on, no matter how much space you have available in your engineering facilities...

VI-grade has the Driving Simulator that fits your development needs!

VI-grade Driving Simulators are COMPLETE, UNIQUE and OPEN. COMPLETE because they are turn-key solutions and cover the complete design cycle from concept to sign-off, UNIQUE since they are based on a patented architecture, and OPEN because they can be interfaced with 3rd party software that you might require to use during your development activities.
“We’re expecting to significantly reduce the number of physical prototypes during the development phase thanks to the Driving Simulator”.

Jack Cheng
Co-founder and Executive VP
NIO

NIO developed a brand new electric car with no reference vehicle to start from, completely relying on Driving Simulators.
OUR SIMULATORS INSTALLED IN THE WORLD

100 AUTOMOTIVE CUSTOMERS IN 20+ COUNTRIES

100+ SIMULATORS INSTALLED SINCE 2013
START
SHAPING
THE FUTURE
OF THE
AUTOMOTIVE
INDUSTRY

VI-grade DRIVING SIMULATORS
DISCOVERING

VI-grade DRIVING SIMULATORS

DESKTOP  COMPACT  STATIC  DYNAMIC
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THE ENTRY-LEVEL SOLUTION FROM VI-grade FOR DRIVING SIMULATION

DESKTOP

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APPLICATIONS

- Vehicle dynamics
- Control systems development
- Real-time vehicle model preparation for other simulators

BENEFITS

- Minimum size
- Minimum investment
- Same software used on VI-grade
- COMPACT, STATIC and DIM simulators
- Fully upgradeable
Our DESKTOP NVH Simulator creates an interactive driving experience of vehicle NVH, bringing your sound data into the real world, so it can be physically experienced.

Leveraging NVH Simulator and Software technology from Brüel & Kjær, the DESKTOP NVH Simulator is equipped with a steering wheel and pedals so that drivers can interact with the vehicle and experience the sound of the vehicle in real-time. Highly accurate vehicle sound is played through headphones or speakers, allowing the driver to experience the sound of a vehicle throughout all of the dynamic aspects of driving, like changing gears and accelerating, or changing from smooth to coarse to rough road surfaces. This immersive context for sound evaluations helps people select appropriate sounds and compare alternative designs – whether they are engineers or non-experts. Software-in-the-loop and hardware-in-the-loop capabilities enable integration with other vehicle systems, such as vehicle performance models and active sound design solutions.
EXPERIENCE THE SOUND OF A VEHICLE

APPLICATIONS

- Virtual prototyping of NVH at any stage of the vehicle design process
- Setting NVH targets before physical prototyping, cascading targets down to individual components
- Competitor vehicle benchmarking
- Powertrain sound quality assessment throughout development
- Non-expert NVH assessment by customers, management and marketing
- Helping computer-aided engineering (CAE) analysts understand the impact of design changes on the NVH characteristics of the vehicle
- Tuning active sound design systems (electronic sound enhancement) on the desktop

APPLICATIONS

- Build and experience the sound and vibration of NVH virtual prototypes, including traditional IC-engine vehicles, EVs, hybrids or vehicles with any type of propulsion system
- Drive and assess new vehicles well in advance of first physical prototypes
- Rapidly assess multiple driving conditions and part load conditions for powertrain sound quality
- Listen to your CAE data, incorporate CAE data in the NVH Simulator virtual prototype
- Combine and experience data from multiple sources, including in-vehicle and test bench recordings, and multiple CAE analysis result types
- Drive any vehicle in the database at any time, no need to coordinate vehicle availability, track time and weather for drive assessments
- Understand and design the NVH of the vehicle through full control of the sound – turn individual components on and off or apply filters to components in real-time

BENEFITS

- Increase confidence in the NVH decision-making process
- Drive and assess new vehicles well in advance of first physical prototypes
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The COMPACT Simulator features a driver’s seat, a fully-adjustable steering wheel, dashboard, pedals, gear stick and screen and it can be placed directly in your office. It is the perfect solution for those companies that want to start using a Driving Simulator to boost simulation activities and to test models in real-time whilst getting a subjective feeling.

The COMPACT Simulator from VI-grade is the ideal tool for automotive OEMs that wish to prepare models to be used for a more advanced simulator (both STATIC and DiM) and that need to quickly test specific components. The COMPACT Simulator is also an ideal solution for Tier I suppliers that need to make sure that their components will work well when inserted into a more complex vehicle model. This kind of simulator can also be used by universities and research centers to develop and test dedicated control algorithms, as well to expose their students to driving simulator technologies.
POCKET SIMULATOR IN YOUR HANDS

APPLICATIONS

• Vehicle dynamics
• Control systems development
• ADAS development
• Automotive components development
• Real-time vehicle model preparation for dynamic simulator
• HMI studies

BENEFITS

• Reduced size
• Reduced investment
• Same software used on VI-grade static and dynamic simulators
• Fully upgradeable

TECHNICAL FEATURES

• Cylindrical Screen - (R=2m, FOV=75°, H=1.5m)
• BARCO 120Hz Projector
• Concurrent iHawk Hard Real-Time Computer
• Steering Wheel Torque Feedback Unit
• Active Belts
• Active Seat
• Active Brake
• Shakers for High Frequency
• VI-DriveSim STATIC 3 Channels
• Concurrent SIMulation Workbench (SimWB)
• SimSound
• Traffic simulation software
STATIC SIMULATOR
The STATIC Simulator by VI-grade is a professional solution that allows OEMs, Tier1 suppliers and Research Institutes to use driving simulator to start bridging the gap between physical testing and simulation. Our STATIC simulator is based on the same VI-DriveSim software package that is used on COMPACT Simulator and on DiM, but is also fully compatible with 3rd party software solutions. This makes it possible to upgrade the static simulator to a dynamic simulator later on, leveraging previous investments.

Ride & Handling, NVH, ADAS & AV, HMI and Motorsport are some of the disciplines that could be developed using a STATIC Simulator by VI-grade. Cylindrical screen and professional projectors make it possible to reach very high level of realism and to give driver an immersive driver experience.

Thanks to the real-time hardware infrastructure, our static simulator is also suitable for software-in-the-loop and hardware-in-the-loop applications.
EQUIPPED WITH ADAS CONTROLLERS AND HMI DEVICES

APPLICATIONS

- HMI
- Vehicle dynamics
- NVH
- ADAS
- Control systems development
- Components development

BENEFITS

- Immersive driving experience
- Full cockpit
- Fully upgradeable to dynamic simulator
- Limited investment

TECHNICAL FEATURES

- Cylindrical Screen - (R=3m, FOV=230°, H=3m)
- BARCO 120Hz projectors
- Concurrent iHawk: Hard Real-Time Computer
- Steering Wheel Torque Feedback Unit
- Active Belts
- Active Seat
- Active Brake
- Shakers for High Frequency
- SmartEye Eyetracker
- Vi-DriveSim STATIC 3 Channels
- Concurrent SimUltation Workbench (SimWB)
- Graphic Merge & Blending, Calibration
- SimSound
- Traffic simulation software
- ADAS Controllers (ACC, LKA, LDW, AEB, TJA, AutoPilot)
- Vi-BioTelemetry
Our STATIC NVH Simulator creates an interactive driving experience of a vehicle’s interior noise, vibration and harshness (NVH), bringing your sound and vibration data into the real world, so it can be experienced by real people.

Leveraging NVH Simulator and Software technology from Brüel & Kjær, our STATIC NVH Simulator provides even more authenticity, displaying the track in front of a real, stationary vehicle that is equipped with headphones, speakers and shakers – adding vibration simulation to all of the capabilities of the Desktop NVH Simulator.

Simulation models can contain any available NVH data, from simple recordings of the whole vehicle to an engineering model including path and source contribution data, and modified components. Our NVH simulators can easily incorporate CAE data predictions, allowing subjective evaluations of virtual component designs when inserted in the real vehicle’s NVH data.

STATIC NVH SIMULATOR

FULLY IMMERSIVE VEHICLE NVH EVALUATION

Courtesy of Hyundai Motor Group
EQUIPPED WITH HEADPHONES, SPEAKERS AND SHAKERS

APPLICATIONS

• Virtual prototyping of NVH at any stage of the vehicle design process
• Setting NVH targets before physical prototyping, and cascading targets down to individual components
• Competitor vehicle benchmarking
• Powertrain sound quality assessment throughout development
• Non-expert NVH assessment by customers, management and marketing
• Helping computer-aided engineering (CAE) analysts understand the impact of design changes on the NVH characteristics of the vehicle

BENEFITS

• Build and experience the sound and vibration of NVH virtual prototypes, including traditional IC-engine vehicle, EVs, hybrids or vehicles with any type of propulsion system
• Increase confidence in the NVH decision-making process
• Drive and assess new vehicles well in advance of any physical prototypes
• Rapidly assess multiple driving conditions and part load conditions for powertrain sound quality
• Listen to your CAE data, incorporate CAE data in the NVH Simulator virtual prototype
• Combine and experience data from multiple sources, including in-vehicle and test bench recordings, and multiple CAE analysis result types
• Drive any vehicle in the database at any time; no need to coordinate vehicle availability, track time and weather for drive assessments
• Understand and design the NVH of the vehicle through full control of the sound – turn individual components on and off or apply filters to components in real-time
• Complete immersion with a full-vehicle body and large visual screen – looks and feels like a real car
• Calibrated, accurate, multi-axial, independent vibration at all driver touchpoints – seat, steering wheel, floorpan
DiM, the family of turn-key, yet open driving simulator solutions from VI-grade, provides automotive engineers with a complete set of innovative, integrated driving simulators for a new generation approach to system-level simulation, allowing companies to bridge the gap between testing and simulation.

The dynamic configuration provides motion feedback to the driver thanks to an innovative nine-degrees-of-freedom moving platform with reduced dimensions and larger displacements, called Driver in Motion (DiM).

Our engineers went beyond the basic six actuators design to provide a larger workspace whilst maintaining high stiffness, in order for the system to be more relevant for low as well as for high frequencies which characterize automotive chassis design. By dividing and conquering the problem, it is now possible to study both vehicle dynamics and ride on the same motion platform with DiM® driving simulators.

The DiM product family is now larger than ever, thanks to the addition of cable-driven simulators that enable to go beyond the mechanical barriers of other simulator architectures, guaranteeing high adaptability and top-class performances.
A UNIQUE ARCHITECTURE:
LOW & HIGH FREQUENCY
FOR COMBINED DYNAMICS

DI M PRODUCT LINE

DiM® 150 - DiM® 250 - DiM® 400 and higher

APPLICATIONS

Motorsport
Race Set up
Hybrid and race strategy
Driver’s Training
Car development

Vehicle Dynamics
Chassis Tuning (Vehicle Dynamic Targets)
Tire development
Driver’s Training
Control System Design (SIL & HIL)

Ride & Comfort
Chassis Tuning (Ride & Comfort Targets)
A to B comparison
Off-line results (from experimental test and/or multibody simulations) playback

ADAS & AV
ADAS development & verification (AEB, LKA, ACC, …)
Dangerous maneuvers simulation
AV algorithms development & verification
HMI studies
Driver’s Distraction and monitoring
Human – systems interactions
DiM® 150 is already successfully installed at leading automotive OEMs, motorsport teams and engineering service providers. It is an award winning driving simulator for integrated active / passive vehicle dynamics and ride development, as well as for ADAS and NVH applications. Thanks to the architecture, the DiM captures low and high frequency performance for combined dynamics.

- Standard workspace
- Typical steady-state accelerations (tested on several situations by many expert users)
- Good immersion (standard 7m cylindrical screen)
- Class leading velocity and acceleration performances

DiM® 250 features the same architecture and performance as DiM® 150, however, with extended linear actuators for increased travel of the tripod. This motion platform is suitable for applications which require longer time exposure to steady state accelerations. The longer time exposure corresponds to larger platform movement to cover the driver reaction time. DiM® 250 still comes with fixed screen as the DiM® 150 ensuring the best possible visual immersion quality.

- More workspace (longer tripod actuators)
- Longer steady-state accelerations (better acceptance of driving simulator by unexperienced users)
- Better immersion (bigger 8/9m conical screen)
- Same class leading velocity and acceleration performances on bigger workspace
DiM® 400 (and higher) is the newest addition to the DiM family and brings a host of new technologies to advance driving simulators.

Leveraging the concept of the original DiM150 and DiM250, DiM400 adds a cable drive system for the lower stage to enable a larger motion envelope for even longer time exposure.

For the upper stage, a new hexalift component enables to improve the motion envelope by increasing available vertical travel, which in turn leads to a better vertical feel under combined loading events.

Cable-driven simulators can easily adapt to client-specific budgetary and space requirements. They can be built in any size, ranging from 4 meters of surge and sway up to 15 meters and beyond.

Up to 5 meters, cable-driven simulators come with a fixed screen. Above that value, the screen is replaced by a dome or other visualization equipment, such as VR headsets.

VI-grade Cable-driven simulators are the first simulators that adapt to your needs… and not vice versa!

- Even more workspace (freely adjustable to customer needs thanks to cable-based design)
- Longer exposure to steady state acceleration (capable of lane change at 1:1 motion cueing)
- Better immersion through improved motion envelope shape under combined loading
- Much larger yaw range while maintaining velocity and acceleration performances on an even larger workspace
- Bigger heave for a better vertical feel
- Active vibration control through a patented Inertia Compensation System
“We expect our STATIC Driving Simulator to be a very important tool for race strategy preparation and driver training”.

Sylvain Filippi
Managing Director
Envision Virgin Racing

Envision Virgin Racing installed the cutting-edge race STATIC Simulator in its expanded Silverstone headquarters.
ACCELERATE THE AUTOMOTIVE DEVELOPMENT PROCESS

VI-grade APPLICATIONS
RIDE & HANDLING

It’s all about fine tuning your chassis, developing the right balance, selecting the right tires, tuning the transmission, setting up seamless control systems to achieve the best driver experience.

VI-grade driving simulators, vehicle dynamics software, and services can help you wade through the sea of options. Our driving simulator leads the market in capability for OEM development in vehicle dynamics and our software is uniquely designed to take advantage of our simulator’s capabilities. For steering feel, limit handling, or chassis controls, VI-grade’s solution ecosystem is here to help you evolve to the next generation of vehicle product development.

Accelerated, Easier and Affordable: VI-grade driving simulators will bridge the gap between CAE models and sign-off.
NVH

Design and engineer the sound of your vehicle to meet brand and customer expectations before building the first prototype.

Our NVH Simulators create an interactive driving experience of a vehicle’s interior noise, vibration and harshness (NVH), bringing your sound and vibration data into the real world, so it can be experienced by real people.

Highly accurate vehicle sound is played through headphones or speakers, and calibrated, accurate, independent multi-degree-of-freedom vibration is applied at all driver touchpoints. This immersive context for sound evaluations helps people select appropriate sounds and compare alternative designs – whether they are engineers or non-experts.
VI-grade offers a collaborative environment for ADAS and AV applications in which vehicle simulation technology, state-of-the-art software solutions for control system design, traffic simulation, sensor fusion and driving simulator are seamlessly connected together. Thanks to this joint offering, multiple ADAS simulation environments are available:

- **Software-in-the-loop**, environment in which new control strategies are developed and tested with virtual real-time vehicle models.
- **Hardware-in-the-loop**, environment in which active control strategies are verified against all possible working conditions.
- **Driver-in-the-loop**, environment aimed to frontload activities in the development cycle when prototypes are not yet available.

ADAS & AV

Test your algorithms and automatic systems in a safe and collaborative environment to validate ADAS functions integrating software and hardware sensors.
VI-grade driving simulators can provide state of the art driving simulators with complete cockpits to enable HMI studies to be done in fully immersive events. Highway, urban, or parking lot scenarios can be quickly tested, completely and repeatably. And by using a driving simulator, 24/7 testing is possible with engineers, or public test subjects. Barriers like weather and vehicle maintenance are removed enabling the most rapid and accurate test environment. Further, with a controlled environment, customer feedback and design changes can more clearly quantified and help drive development faster and cost effectively. Finally, virtual dashboards enable rapid design changes to be built and tested with as little as a few keystrokes.

HMI

Evaluate your HMI criteria with a real car cockpit and dashboard and develop new interfaces in a controlled and easy-to-modify environment.
In a VI-grade driving simulator, the driver can learn the track with high quality immersion helping to achieve accurate lap times. Side by side with the race engineer, driver feedback and simulator-based telemetry can help the engineer navigate vehicle setup options.

Gain time off track to gain time on track with faster optimization of the chassis setup by experimenting with a wider range of setups. At the same time, you can accomplish driver training of the track and of the vehicle.
“We use the COMPACT driving simulator to perform all vehicle dynamics activities which fall under the Simulator Aided Engineering (SAE) definition”.

Noritaka Hayashi
Manager of CAE Department
Subaru Corporation

Subaru Corporation adopts COMPACT Driving Simulator from VI-grade
EVOLVE FROM TESTING TO SIMULATION
“The driving simulator is a key facility in our chassis and vehicle dynamics development projects as it links up our virtual and real activities”.

Roger Mateu
Head of Vehicle Dynamics and NVH
Applus+ IDIADA

Applus+ IDIADA integrates virtual and physical testing with 2 new VI-grade driving simulators.
VI-grade is the leading provider of best-in-class software products and services for advanced applications in the field of system level simulation. Together with a network of selected partners, VI-grade also provides revolutionary turn-key solutions for static and dynamic driving simulation.

Established in 2005, VI-grade delivers innovative solutions to streamline the development process from concept to sign-off in the transportation industry, mainly automotive, aerospace, motorcycle, motorsports and railways. With office locations in Germany, Switzerland, Italy, UK, Japan, China, and the USA, and a worldwide channel network of more than 20 trusted partners, VI-grade is a dynamic and growing company with a highly skilled technical team.

VI-grade is part of Spectris plc, the expert in providing insight through precision measurement. Spectris’ global group of businesses are focused on delivering value beyond measure for all our stakeholders, targeting global, attractive and sustainable markets, where growth and high returns are supported by long-term drivers. Spectris is headquartered in Egham, Surrey, United Kingdom, the Company employs approximately 9,000 people located in more than 30 countries.
BRIDGING THE GAP BETWEEN TESTING AND SIMULATION

DESKTOP. COMPACT. STATIC. DYNAMIC.