

Total Vehicle Validation Services Holistic Quality Monitoring in Reality



MODUS HISPANICA S.L.
AUTOMOTIVE • TEST • ENGINEERING

... all tested

**Objective and Subjective Evaluations
Systems, Modules, Chassis, Body,
Brake Systems, Electronics, Steering,
Powertrain, Driving Dynamics, Tyre Wear, Motorbikes**

About MODUS

MODUS Hispanica S.L. is the leading company for complete Validation Services testing automotive products in the real world for OEMs and suppliers. The main objective is to give clients a benefit by anticipatory analysis of product quality, especially focusing on reliability.

The modus of validation is:
objective, reliable, true, neutral, integrative and customer oriented.

Dipl.-Ing. Juergen Bauer, founder and managing owner of **MODUS Hispanica S.L.**, has been involved in the management of vehicle design and development over a period of three decades and has gathered compounded experience in total vehicle endurance tests with his company MODUS since 1993 in Andalusia.

More than 38 million kilometres have since been driven for validation tests like long range durability, special aggregate analysis, module and system tests.



“Validation in the real world under all circumstances gives chances for coincidences, accessing weak points of automotive products.”

**Managing Owner of Modus
Dipl. Ing. Jürgen Bauer**



MODUS testing focus

Long range durability and special system and module functions in the real world on open roads and proving grounds in total Europe and specifically in Andalusia

Holistic product validation on entire vehicle for function and quality by subjective driver evaluation

In addition measurement of consumption, wear, fatigue and deviation, power-train performance and emission, noise and vibration, handling and comfort, dust protection and corrosion

Dealer assessment due to anticipatory satisfaction of final customer

Engineering consulting projects:

- Project Management
- Process – Timing and Controlling
- Development Tuning of Ride and Handling, Brakes and Tires
- Complete Brake Evaluation by Mojacar Brake Test

Benefits

Costly quality repairs totalling 10% of OEMs' annual revenues resulting in a loss of quality image for reliability, customer satisfaction and confidence is the consequence.

The integration of results stemming from an early warning system validation reflects a high benefit and more value - polishes a company image and increases customer satisfaction.

Benchmark testing shows the difference of quality to competitive models.

Supplier integration during the validation process leads to higher quality at a pre-series stage.



Test Sites in Europe

Germany

- Wiesbaden-Igstadt, Hestia
- Munich, Bavaria

Spain

- Conil - Cadiz, Andalusia
- Jerez - Cadiz, Andalusia
- Mojacar - Almeria, Andalusia

Slovakia

- Banska-Bystrica

France

- Salon-de-Provence

Sweden

- Älvsbyn, Lapland



Validation method "PISTE"



MODUS created a validation method named **PISTE**
(**P**ermanent **I**ntegrative **S**imultaneous **T**esting **E**urope)

The Method:

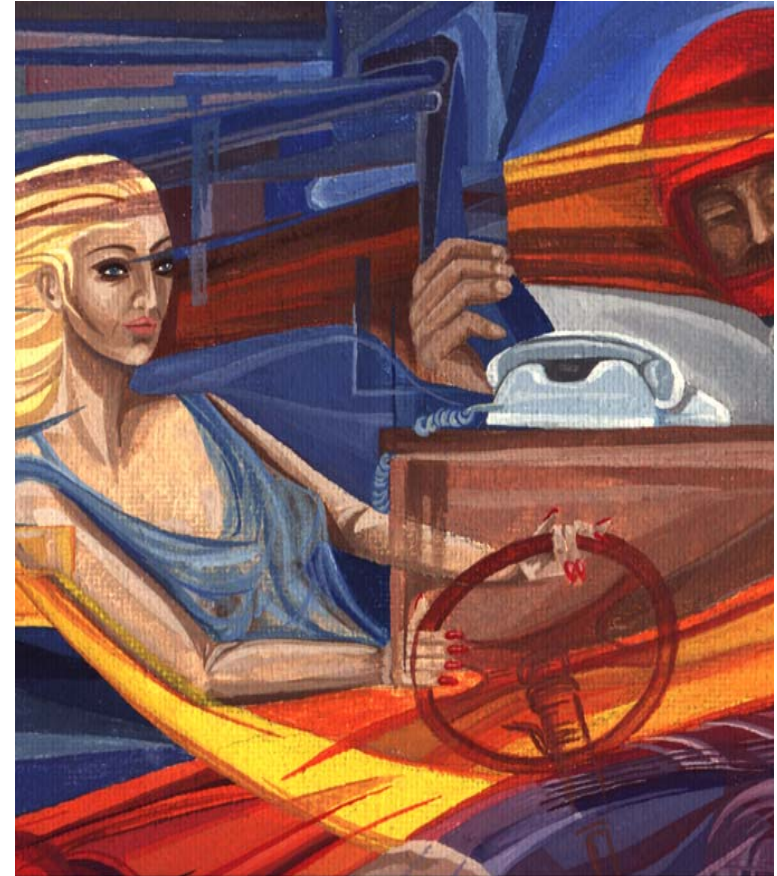
the life cycle of an average European automobile with 160.000 kilometres is compressed to 100.000 km during six months. The challenge is to create the strain, simulate the various topographic and climatic basic conditions as well as the different individual driving habits.

AVERAGE EUROPEAN CUSTOMER		MODUS PISTE			
km total per vehicle	160.000	100.000			
km / year / car	16.000	200.000			
time (years)	10	0,5 ; 20 times faster			
sequences daily driving	16 km/seq 2,8 seq./day	122 km/seq; 7,6 seq/day added hand actions for example: open FL door x 20.000			
cold starts	each 65 km ; 2.460	each 690 km; 145			
female quota	28,4%	5%			
trailer towing	3%	10%			
uphilling: m / 100 km ; %	550 ; 1%	1.090 ; 2,2 %	620 ; 1,2 %	450 ; 1,8 %	240 ; 0,4 %
area in Europe		South	Central	East	North
country		SPAIN	GERMANY	SLOVAKIA	SWEDEN
km / test in PISTE		40.000	25.000	25.000	10.000

“Chances” for Automotive System Validation

The method of total vehicle validation in reality safer controls the vehicle aggregate functions and their interactions. Visual checks, wear and geometric measurements as well as the mode of driving, due to the assignment of driving and analysing staff, evaluates the vehicle focusing on vehicle safety functions and is based on valid acknowledgement representing road and country type scale factors. Test vehicles are driven 100.000 km in total, 40% in Spain, 25% in Germany, 25% in Slovakia and 10% in Sweden. Rolling through Europe within six months this validation method leads to the best “simulation” of the average European customer using an automotive product for 160.000 km during ten years.

The behaviour of the test vehicles are monitored and documented electronically as well as documented in detail by trained drivers. Modus´ GPS control system, knowing every second the dynamic conditions, avoids the subsequent analysis of troubles emerging from coincidences. Permanent and continuous reporting of the driving status and events by the staff ensures simultaneous feed back to the responsible development and quality control staff of MODUS clients.



Less warranty costs and recall actions produce lasting benefits.

“Chances” for Automotive System Validation



The neutrality of external service personnel with customer orientated drivers and evaluators reduce the risk of tunnel vision - in the case of validation a disadvantage secondary to positive expectations and a high level of company identification. To discover a surprising upcoming event the “detective by accident” must be neutral. Specialized service providers like MODUS Hispanica S. L. play a dual role: on the one hand the one of the average driver and on the other hand the one of the professional tester – an important virtue of the herein proposed method by testing under all circumstances receiving more than a neutral service charge.

PISTE is an integral process, interdisciplinary, time optimized method, integrating vital forces and fields of the holistic system existing in interactions of the automobile and the real world under aspects of quality image, function and reliability, focusing on Customer Satisfaction.



“System tests need the reflection of the adequate stress in the reality”, says Jürgen Bauer

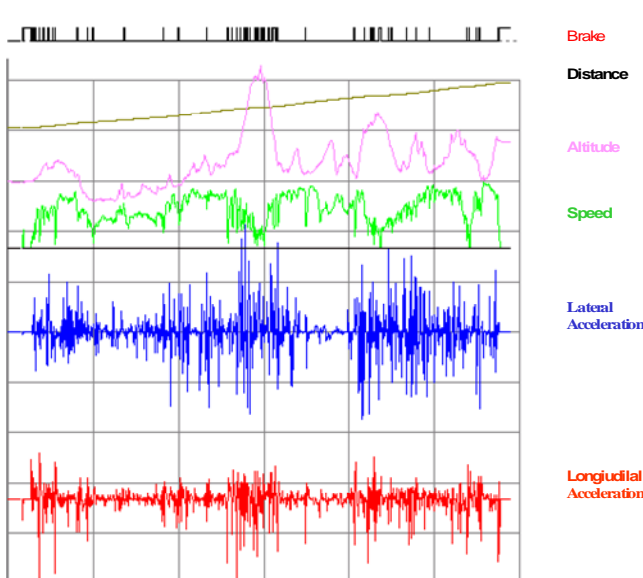
Every second knowing what happens

MODUS has compounded experience in total Vehicle Validation of nearly 40 million km on selected, specific routes all over Europe.



Photo: Sierra de Cadiz

Test run control by GPS, 100 % of driven test mileage logged for all vehicles



MODUS PISTE reflects the total vehicle life time of approx. 160.000 km by driving 100.000 km over a period of six months...

... 40% in Spain, 25% in Germany, 25% in Slovakia and 10% in Sweden under...

... totally controlling the **driving mode** by the **MODUS** driving and analysing system.

Management Summary

Computer simulation and test bench analysis does not cover all the possible stress of the automobile´s “real world”.

The PISTE method with individual driving habits, climatic and topographic conditions like “CITY, MOUNTAINS, FREEWAY, WINTER and SUMMER” needs to be implemented.

The car´s average life cycle of usually 160.000 km is compressed to a six months PISTE test phase.

Validation in the real world is a mature method which reduces warranty cost and recall actions. The results are true, neutral, integrative and strong customer oriented.

Major Asian, American and European OEMs and Suppliers, e.g. Toyota, Mitsubishi, GM, Hyundai have proven the success of the MODUS PISTE method.

The MODUS test ground features the same dynamic parameters of kinematics and abrasion as routes like the “Stilfser Joch” and areas in Austria or Switzerland. MODUS guarantees a broad test of the entire vehicle as well as modules like “the Mojacar Brake Test”, tires, steering gear and embedded systems.

The OEM defines with the major tiers and MODUS a combined validation concept and the outline is based on a coherent business and benefits case.

In order to meet anticipatory customer satisfaction, the optimal time period for the reality tests is the pre series phase approximately 6 months before start of series production (SOP).



Contact

Our clients appreciate the compounded experience of the MODUS Team:

80 employees, engineers, technicians, drivers and evaluators in validating their development target during the total development process through quality assessment and benchmarking.

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