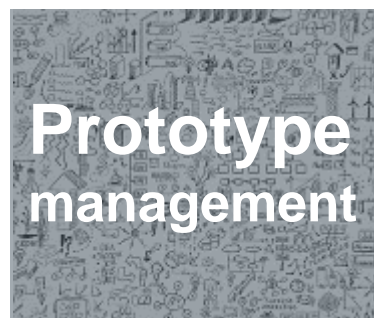
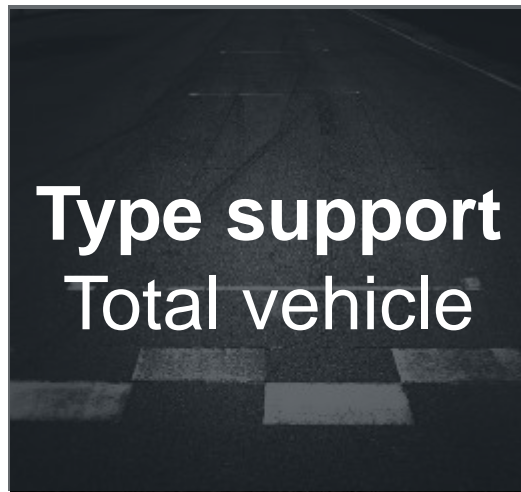


TOTAL VEHICLE AND COMPONENT VALIDATION PORTFOLIO



INDEPENDENT WORLDWIDE, TAILORED TO EACH PROJECT



**EDAG
Driving
authorisation
levels**



**Protection
according to EDAG
test specifications**




**Approval
authorisations for
prototypes**




Local test tracks



**Workshop +
Equipment**
-H2-/HV-suitable
-prototype-conform



**Use of EDAG test
catalogue and test
procedures**



**Own error
management
system**
*(Confluence/JIRA)



**Measurement
technology and data
evaluation**

TYPE ESCORT TOTAL VEHICLE



Concept & Design

- Definition of the overall vehicle targets compared to the customer requirements
- Definition of the laws to be fulfilled for the certification and derivation of the hedging strategy
- Load case definition for safeguarding the total vehicle functions and attributes
- Evaluation of concepts and design specifications with regard to the achievement of total vehicle objectives, including the ability to obtain certification
- Definition of the first prototype usage plan

Simulation & Testing

- Creation of validation plans at total vehicle level
- Simulative evaluation of attributes (handling, aerodynamics, NVH, durability...)
- Test vehicle management, fleet management
- Integration level management, setup and reconstruction support
- Coordination, realization and analysis of the tests (System and overall vehicle testing, ride session in hot and cold climatic condition)
- Testing and acceptance tests to ensure development quality

Validation

- Complete vehicle test near to the customer requirements
- Validation of the overall vehicle function
- Support and escort the certification process
- Tracking and release the overall vehicle function
- First contact for the management regarding to the overall vehicle attributes
- Support of the quality team during the industrialization process
- Tracking maturity level of the vehicle until SOP

NVH – ATTRIBUTE DEVELOPMENT

- Competition analysis for target value definition of acoustic attributes (Powertrain-NVH, vibration comfort, AVAS, rolling noise, etc.)
 - Targetsetting of complete vehicle and subsystem for NVH attributes
 - Conception of acoustic package and acoustic materials
 - CAD/CAE-supported design and validation process
-
- Soundproofing and isolation (insulation box, window test bench, tires)
 - Road test (airborne sound, structure-borne sound, GPS, CAN, speed measurement)
 - Structural Dynamics
 - Component test (Sound power, near field mapping)
 - Road/wind excitation simulation
 - tire rolling noise as well as engine, transmission and exhaust gas acoustics
 - Acoustic transmission path analysis
-
- Exterior/Interior noise evaluation
 - Variant tests for potential analysis
 - Pass-by noise ECE/GB/FMVSS, AVAS law requirement
 - Sound pressure and acceleration measurements in road tests

**Concept
&
Design**

**Simulation
&
Testing**

Validation



HOMOLOGATION

- Classification of the product in legal regulations (vehicle class, countries/regions, series/small series/individual approval)
 - Identification of all legal requirements and approval-relevant inspection scopes
 - Assignment of the respectively valid framework directive for the entire vehicle
 - Concept evaluation for admissibility
 - Harmonisation of technical requirements to minimise country-specific vehicle variants
-
- Definition of the safeguarding scenario to achieve type approval
 - Constant comparison of the development status with legal requirements
 - Control of necessary changes in the development process
 - Coordination and preparation of approval-relevant documents
 - Officially accepted test documentation by means of continuous quality management
-
- Application for type-approval with the required documentation
 - Organization of the necessary hardware for type testing
 - Coordination and execution of acceptance tests, including technical services if necessary

**Concept
&
Design**

**Simulation
&
Testing**

Validation



PROCUREMENT OF LEGAL TEXTS

- Access to the GSO „Legal texts online“
- Further sources like EUR-Lex, UN, WP.29

INTERNATIONALITY & ACUTALITY

- Cooperation with out subsidiaries in Europe, USA, Brazil, Mexico, China, Japan, Malaysia and India
- Regular further training on the topics of legal requirements and framework guidelines
Example: IWVTA

RECOGNISED TEST REPORTS

- Accreditation of the in-house test centres according to DIN EN ISO/IEC 17025:2005 by DAKKS
- Certified quality management system according to DIN EN ISO 9001:2015
- Cooperation with established partners f.e.: Pinfarina (own measurements in wind tunnel (ATP Automotive Testing Papenburg GmbH (access to test site), Cisema (CCC)

PREPARATION OF DOCUMENTS FOR SUBMISSION TO AUTHORITIES

- Approval portfolio: application, test reports, drawings and type-approval certificates
- Country certificates with specific drawings

FURHTER SUPPORT

- Involvement of certification service providers, e.g. for approvals in China
- Communication with official bodies



MEASUREMENT & TEST EQUIPMENT

CONSULTING

- Definition of diagnosis/measurement and analysis interfaces
- Cross-functional coordination of measuring points
- Arrangement and coordination of data transfer

HARDWARE

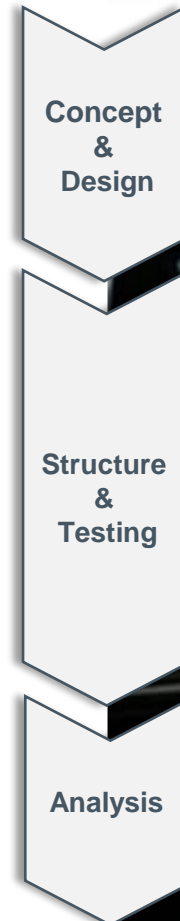
- Hardware installation and commissioning
- Hardware provision: measuring computer, data logger,...
- Own metrological solutions for fleet tracking

TESTING

- Test execution and- monitoring
- Support by mobile, experienced team (Europe-wide testing)
- Field test support (mobile workshop/ diagnosis/ remote diagnosis)

DATA ANALYSIS AND MANAGEMENT

- Data handling, data analysis- and plausibility checks
- Automated report generation and reporting
- Fleet data management



PROTOTYPE MANAGEMENT



- Query/Coordination of the required test carrier requirements with the departments
- Planning, scheduling and organization of vehicle bodies and updates for testing purposes
 - Creation of a test carrier usage plan
 - Assumption of the function test carrier control circuit
 - Creation of vehicle profiles / partial vehicle profiles
- Determination of the spare parts requirements for test carriers
- Coordination and body support in the body shop/test construction
- Pooling of test vehicles after takeover of the setup and action planning and implementation
- Integration level management -> scheduling of the maturity model of the software versions
- Issuing of a driving approval for prototypes according to EDAG process
- Authorization for prototypes
- Fleet management (spare parts management for test vehicles; approvals, service, vehicle camouflage, etc.)
- Procurement of competition vehicles
- Worldwide prototype-safe vehicle transports/logistics
- Prototype-safe scrapping according to EDAG process



COMPONENT VALIDATION

- Competitive analysis to define the target value corridor for modules, subsystems and components in relation to the overall vehicle targets and customer requirements.
- Definition of the safeguarding strategy for modules, subsystems & components with regard to legal requirements, overall vehicle goals and customer requirements.
- Load case definition for safeguarding the modules, subsystem & component level with the aim of obtaining a release recommendation for series use
- Evaluation of concepts and design specifications with regard to components in terms of overall vehicle target achievement incl. certifiability
- Definition of an initial validation & assurance plan

- Creation of validation & assurance plans for subsystems & components (test & scheduling according to assurance strategy, alignment with CAE)
- Determination of test vehicle requirements (test parts, test set-ups, partial bodies, etc.)
- Coordination, execution and analysis of component tests (material, single component, subsystem & integration tests in the overall system)
- Supply tracking (DVP, parts availability & quality, test results per trial phase)

- Component tests according to LAH specifications and under customer-related operating conditions
- Validation of the components within the scope of acceptance tests
- Support and monitoring of the certification process
- Documentation and release of the components in the vehicle function (integration)
- Tracking of the maturity level of the components & subsystems Objective: Support with regard to obtaining a release recommendation for series use
- Support of the quality management in the series run as well as in series production

**Concept
&
Design**

**Simulation
&
Testing**

Validation



CORROSION PROTECTION

- Definition of targets for corrosion protection of entire vehicle and components
 - Definition of technical standards and design guidelines
 - Material pre-selection
 - Support of BIW design with regard to corrosion protection
 - Definition of underbody coating, cavity wax
 - Definition of stone chip protection measures
 - Technical documentation
-
- Simulation of e-coating thickness
 - Simulation of stone chipping
 - Creation of validation plans
 - Management of the test hardware, support during set-up
 - Coordination, execution and evaluation of the tests (corrosion endurance run and stone chipping)
 - Release recommendation within the project
 - Organization, monitoring and evaluation of corrosion resistance tests on complete vehicles and components
-
- Corrosion resistance testing on complete vehicle (corrosion durability run), including body disassembly and documentation
 - Body validation with regard to e-coat, sealing/coating, cavity wax, stone chipping
 - Support of paint shop processes during body implementation (application of corrosion protection measures by coating)

**Concept
&
Design**

**Simulation
&
Testing**

Validation



TIGHTNESS

- Definition of objectives/concepts for watertightness and water management, e.g. wading depth
 - Definition of technical standards and design guidelines
 - Support of BIW design with regard to water tightness and water management
 - Definition of sealing lines along wet/dry separation
 - Technical documentation
 - Geometric/virtual evaluation of sealing components
-
- Simulation of drainage geometry capacity
 - Flow simulation of water drainage
 - Preparation of validation plans
 - Management of test hardware, support during set-up
 - Coordination, execution and evaluation of the tests (leak test for water, dust, exhaust gas,...)
 - Release recommendation within the project
 - Organization, monitoring and evaluation of leak tests on complete vehicles
-
- Investigation of water tightness in the sprinkler chamber under different conditions/vehicle positions (long-term sprinkling, monsoon sprinkling, tipping/tilting)
 - Validation of dynamic tightness
 - Investigation of dripping behavior on doors, windows and tailgate
 - Measurement of air tightness



OPERATIONAL STABILITY AND DURABILITY

- Attribute responsibility in development projects
- Target definition of the complete vehicle
- Adaptation of specification requirements
- Definition of the assurance programme

- Continuous design review in cooperation with simulation in early development phases
- Load collective recordings for the evaluation of real excitation profiles
- Test execution and coordination (test bench & real endurance test)
- Field test support through mobile workshop/ diagnostics/ remote diagnostics (Europe-wide testing)

- Automated report generation and reporting
- Fleet data management
- Data handling, data analysis - and plausibility check
- Dismantling and dismantling documentation

**Concept
&
Design**

**Simulation
&
Testing**

**Validation
&
Analysis**



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THANK YOU.
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