

Development of a V12 engine for the 24h du Mans race



Modelling, simulation, development and testing of the prototype



Context & Objectives

Background : To develop a V12 diesel engine for the 24h du Mans race. To design the engine components (cylinder block, cylinder head cover, cylinder liner, rocker, water box...) and the optimization of these parts (criteria: breaking strength, saving weight of the parts, rigidity)

Issue : To make a success for the ranking of the prototype

Challenge : To make run on test bench then on track the engine within the time limits.

Approach & Solution

Theoretical study of mechanical problems.

Search for relevant information for modeling these problems and create a mechanical models intended to be simulated with ANSYS.

Cooperation with engineers and projectors. Respect of the lead time (planning of long duration simulations on a server used by the design department).

Development of specific programs for the post processing the results

New : development and use of post processing programs in fatigue stress (in FORTRAN) directly applicable on the ANSYS results.

Results & Added Value

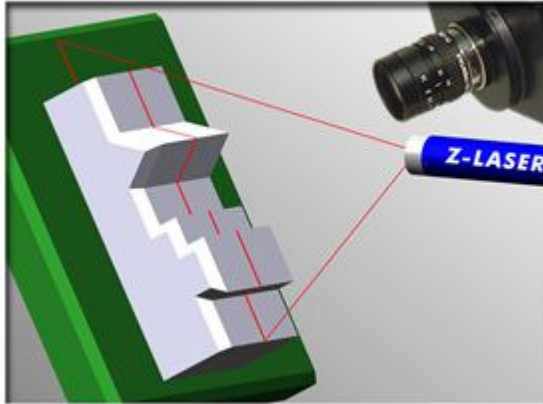
The numerical simulation gave values of constraints, deformations and pressures, rather close with the values obtained by the ideal models and these results were taken into account for the optimization of the design of the parts.

The weight of each cylinder head cover was decreased by 1kg. The whole lightening makes it possible to approach a "maximum engine weight" objective

Developing new automotive applications of the laser



New applications including the laser will equip the « intelligent » car with tomorrow, able to adapt in real time to the driver's request



Context & Objectives

The context : Precise and noninvasive, the laser quickly became essential like the tool king of diagnosis. New applications including the laser sensor will equip the « intelligent » car with tomorrow, able to adapt in real time to the request of the driver.

The stake : Decrease the pollution, the consumption and improve the safety of passengers.

Our challenge : The client asked us to improve and to propose as well methods of laser diagnosis innovating in their laboratories as embarked in a vehicle of « the future »

Approach & Solution

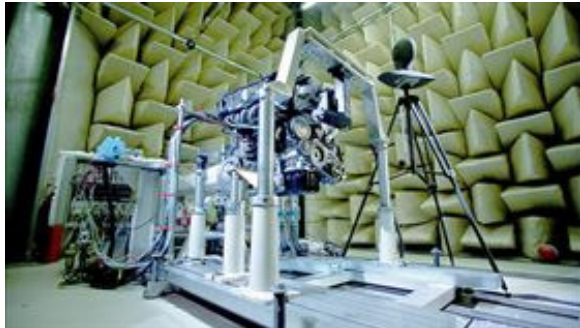
Find applications in the automotive industry by basing us on our knowledge of optics in all sectors of industry (in particular Agro-alimentary and Telecoms)

To develop new ways of research and to develop new methods of use of the laser

Results & Added Value

We proposed innovating optical diagnoses and accompanied the client in the choice by the suppliers in driving optical diagnoses

Engine Knowledge on Vibratory Reliability



Context & Objectives

Background : To bring our expertise on vibratory reliability to the customer's engines under development and in production.

Issue : Responsibility for the performance on the customer's projects.

Challenge : To guarantee the quality of the performance during the design of the innovating projects (Study of the dynamic behavior of a six-cylinder engine in deactivation of cylinders)

Approach & Solution

To specify, dimension and validate the resistance of the components vibrations under engine excitations.

To follow the tests of characterization and vibratory validation at the customer and the suppliers .

To study the dynamic behavior of the engines for dimensioning the suspensions.

To reduce the vibroacoustic radiation of the engine under excitations of the rotating assembly.

Results & Added Value

Validate the relevance of the solution "deactivation of cylinders" to allow a significant profit in fuel consumption .

Optimized design of the parts

Installation of a data base for dimensioning the engine components.

Installation and application of the topological methodology of optimization to the customer : step from now integrated in the deployment of CATIAV5 allowing an important reduction of time for the design.

Selection of the suppliers by validation of their solutions.

The context : Pre-dimensioning of solutions innovating with the noise of injectors



Context & Objectives

The context : Pre-dimensioning of solutions innovating with the noise of injectors
The stake : Capacity to model and calculate the effect of small modifications of structure in low and intermediate frequency on the vibratory and acoustic answer of a standard structure GMP.
Our challenge : Develop an suitable and fast method. Difficulties : ad hoc theoretical formulation, physical field (high frequencies ~1-6 kHz) considered difficult (pbs various).

Approach & Solution

State of the art and bibliography : approaches by identification and modification of dynamic flexibilities,
Orientation towards the technique of the circles of Vincent (know-how customer),
Extensions theoretical (constrained damping, multi-parameters, Constrained parameters),
Development, programming of prototype tool (under matlab), validation and application to injector's problem (num. and experimental)
internal communication (trades) and external (congress, ...)

Results & Added Value

Validated and tested method. 1 publication.
Develop an original, fast and easy method to implement, which answered to the problem
Transferred method to industrial and method office
Customer's repercussions : new capacity to dimension and expertise reports concerning the case of studied applications (noise of injectors).
The consultant brought his experience of research in vibration and acoustics.
Capitalization : the theoretical principles used and developed can be re-used in other technological contexts.

Situation : how reduce the number of tests on vehicles ?



Context & Objectives

The engine technologies develop very quickly. They increase the possibilities of settings, making the engines cleaner, more silent and more efficient.

What is at stake : On top of that managing of new functions, control engine has to assure that they don't disrupt the former one.

Our challenge : a physical modelling of the engine represents an efficient alternative to vehicles tests..

Approach & Solution

The implementation of knowledge and methods capitalized by our consultants during their projects in heat engines and the modelling. Our control of modelling tools and of simulations most used in the industry.

The attention and the availability of our consultants towards needs and wish of model users.

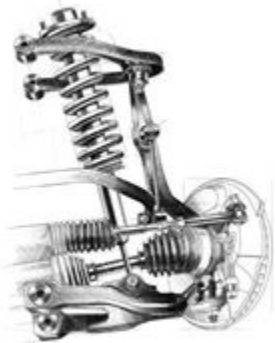
Results & Added Value

Design of a multi-injection diesel engine model , physical, modular with an intuitive interface allowing to display quickly a lot of engine parameters in different configurations.

Optimizing automotive suspensions



Background : How to measure the ride comfort and estimate forces on tyres ?



Context & Objectives

Issue : Improvement of human feeling in driving comfort.

Challenge : Setting a computational tool of a longitudinal model 2D

Approach & Solution

Integration of multiple innovations in the field of the modelling the ground link.

To come closer to the real suspensions handling, by integrating new nonlinear laws forces in the developed models.

Answering the problems suggested within reasonable times

Results & Added Value

Providing advanced analysis for test bench and a computer-aid design for the prototypes by targeting the parameters to improve.

To gain from an external expertise and knowledge with a minimal completion period.

Error Management for Infotainment Systems



Support of the Error Management Process for different Radio Projects of an automotive OEM



Context & Objectives

- Managing the Error Process at Electric/Electronic Development Department for Radio Projects
- Strengthening the collaboration between functional owners, testers, project managers and project assistants
- Connector between supplier and client (OEM) regarding error management and testing of Radio Generation 3 Projects
- Manage workshops about error management for the customer to extend the error processing knowledge

Approach & Solution

- Working with a customer specific error management and reporting tool
- Preparation of weekly reports and presentation to project managers including information about error processing, trends, error reduction rates and prognoses.

Results & Added Value

- Strong communication between supplier and customer, conflict management
- Establishing an efficient and successful error management process
- Support the acceleration of error reduction

Design of Assembly Equipment



Design of fixtures, mounting tools and lift assists for a plant of an automotive company.



Context & Objectives

The assembly of an car is a process where thousands of different parts need to be fixed together in the shortest possible time. Therefore every step must be optimized to ensure the best possible mounting of components or subassemblies in the vehicle after ergonomic, economic and technical aspects.

Approach & Solution

The first step was to collect all requirements from the different departments of the customer. With respect to all requirements the first concept was provided in a presentation. After the confirmation a the prototype was designed in Catia V5 and built by a party company. Finally the bill of material and the CAD were stored in the product data management system of the customer.

Results & Added Value

After the project several fixtures, mounting tools and lift assists for the engine line and power train were in place in the plant of the automotive company. For all tools the documentation that ensures the maintenance and possibility to rebuild was generated and the parametric Catia V5 3D and 2D data was uploaded to the product data management system of the customer.

Development and Integration of Parking Cameras

The mechanical part of the development of Top View, Side View and the Rear View Cameras from prototype to production.

BMW - Automotive



Context & Objectives

Parking cameras are getting more and more popular. Therefore all major car manufactures are getting in the market. The target of this project was to develop a system with five cameras and three functions that were linked to one ECU.

The first camera is the Side View Camera which gives a better view of the traffic coming from the sides. The purpose of the two other camera systems is to make parking easier. Those are the Rear View Camera and the Top View Camera. With the used ECU up to 3 cameras can be displayed at the same time. In addition several guiding lines to help the driver can be overlayed on the camera picture.

Approach & Solution

The first step was to create the specification. Therefore all environmental conditions, all function relevant data and all similar specifications were collected. The second approach was to find a proper position for the cameras to suit all functions. After the position was found the fixing concept was chosen with respect to easy mounting, good stability and the possibility of dismounting for the service.

For all cameras and the ECU a supplier was chosen. The next approach of this project was to monitor the supplier to guarantee the requested quality. Therefore several tests and milestones were defined.

Results & Added Value

The application of cameras as park assistance system was a new technology for the supplier as well as for the car manufacturer. It was the first Cmos camera and the first Side View Camera on the market. After the project the camera was in serial production and several norms were created beside the normal specifications. A special result was that the Top View Camera and the Side View Camera are build in the same housing but with a different optical system.

Development of an embedded exhaust gas analyser



Development of an embedded exhaust gas analyser



Context & Objectives

Situation : What innovations to reduce automotive pollution?

The European Union, aware of the consequences of automotive traffic on environment, imposes more rigorous depollution norms.

What is at stake : respect them and improve performances, consumption and driving pleasure of their vehicles without increase cost, is a real technological challenge for manufacturers.

Our challenge : the client chose us to lead the development of a new on-board function of exhaust gas analyser.

Approach & Solution

Our experience in engine control and sensors put in hostile environment, as well as mass production project.

Our large abilities to lead the function, in mechanical installation, in integration, in development

and electronic system validation and real time in-board softwares.

Our capacity to catalyse the complementary know-how of the client and of its .

suppliers

Results & Added Value

Integration to the engine control system of a complex electrochemical sensor, which the signal treatment allows to optimize engines functionings and post-treatments systems such catalytic converter or particulate filter.