



# Escola de Camins

Escola Tècnica Superior d'Enginyeria de Camins, Canals i Ports  
UPC BARCELONATECH

Final Report on Industrial Training

Company: IDIADA Automotive Technology S.A.

Department: Body Development

Tutor: Eduardo Martín Santos

Handed to

Academic tutor: Lelia Zielonka

Written by

Student: Alfredo Alameda González

Degree: Master on Numerical Methods in Engineering

Signature

ETS d'Enginyers de Camins, Canals i Ports de Barcelona - Barcelona Tech

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## INDEX

Introduction	3
Part 1. Work Environment	4
Part 2. Acquired Experience	
a) Internship experience	5
b) Training	6
Conclusion	7

## INTRODUCTION

The purpose of this report is to describe my internship stay at the company IDIADA Automotive Technology S.L, as a student coming from the Master's Degree in Numerical Methods in Engineering at the Universitat Politècnica de Catalunya. These internship has been of a curricular nature and had a total duration of 450 hours.

This training vacancy was found by means of the list of suitable companies where to develop a profesional stay that was delivered to the students during the initial presentation of the subject 'Industrial Training' of the Master's Degree. A brief look at the website of the company gave an idea of the magnitude and quality of the work that is carried out in it, so the interest to carry out the professional stay in IDIADA was great from the beginning.

After some initial contacts by e-mail and a subsequent personal interview, I had the chance to be selected to become a CAE engineer trainee under the supervision of Eduardo Martín Santos, who was in charge of performing the tutor duties during my stay.

Before starting these internship I was taking the last subjects of the Master's degree in Numerical Methods in Engineering, after three years combining it with the development of a professional career as site manager in a construction company. It should be pointed out that, given the obvious incompatibility, such activity was abandoned weeks before starting my stay at IDIADA.

After this internship, only my Master Thesis will be left in order to obtain the Master's Degree in February 2019.

## **PART 1. WORK ENVIRONMENT**

My work as a CAE Engineer trainee has been developed as part of the Materials Engineering team within the Body Development Department at the Applus+ IDIADA facilities in the industrial estate of L'Albornar, Santa Oliva, province of Tarragona.

The Materials Engineering team's aim is to research, develop and implement computer simulation of the behavior of new materials used in the manufacture of automotive components, as well as advising other departments on the improvement and optimization of their respective activities in the field related to materials science and engineering. This activity supposes a differentiating element of Applus+ IDIADA with respect to its competitors, and it allows the company to show a differentiating factor when dealing with their customers and to offer solutions based on simulations in the most accurate and approximated way to the real physics of the proposed problems.

The facilities that Applus+ IDIADA owns in Santa Oliva are part of the worldwide cutting edge. Laboratories, test tracks and a large number of engineers and technicians form an ideal environment where to start my professional career in the world of computer-aided engineering. Besides, it is worth to mention that Applus+'s commitment to the environment is evident in its quality and management policy, based on the ISO 9001, ISO 14001 and OHSAS 18001 standards.

Throughout this period I have always had the support and advice of both my tutor and the rest of the team's engineers. At all times I have been provided with guidelines, documentation and advice, and I have been proposed with itineraries to follow and tests to be carried out based on the own experience and intuition of the team members.

For all these reasons, I value my experience at Applus+ IDIADA as very positive, and I hope this will be a place to develop my professional activity over the next years.

## **PART 2. ACQUIRED EXPERIENCE**

### **a) Internship experience**

The great professional contribution that these internship has given to me was undoubtedly the chance of developing a research project starting from scratch as part of one of the leading engineering companies worldwide.

After an initial training process of two weeks long, I was given the basic skills with respect to technical software for the realization of the pre- and post-process of finite element simulations using ANSA and META software. This training was carried out, at first, by following tutorials distributed by the software manufacturer, and later, by supporting the work of other team engineers performing dealing with simple tasks within real problems that were gaining in complexity as I learned how the software worked.

At the same time this period also helped me to understand and to be able to introduce myself into the daily and weekly routines of the department, as well as to know the inner workings of the company in other levels apart from engineering, such as training in quality, human resources, research and development or safety at work.

After completing this first period, my main task was the research and development of a method for the stabilization of the simulation of adhesives used in the manufacture of components for the automotive industry, making use of the finite element softwares Pam-Crash and LS-DYNA .

The progressive introduction of new materials and designs in the automotive industry makes the use of adhesives an increasingly important factor to be taken into account, and its correct simulation will therefore affect the quality of the service offered to the customer.

Like all investigative work, it started with a thorough review of the state of the art regarding the simulation of adhesives, followed by the study of the cohesive materials that both Pam-Crash and LS-DYNA offer in their material libraries, as well as the multiple parameters that has to be used and adjust them in order to perform the simulation as closely as possible to the real behavior of an adhesive.

The use of a simple model with few elements served as a starting point for the understanding of the operation with these materials. Once the desired behavior is reproduced more or less faithfully, the aim is to increase the complexity of the model and, ultimately, its implementation in a crash simulation of a complete car.

Another interesting aspect of this internship stay was the chance to assist to meetings with certain customers together with some members of the department. On the other hand, I have also had the opportunity to attend some laboratory tests. I consider these activities very important since they provide a global perspective of the operation of the company, and allow to visualize the type of problems that their professionals face every day.

### **b) Training**

The tasks carried out in Applus+ IDIADA can not be more related to the training acquired at the Master's Degree.

From the beginning, the use of the finite element method (currently the most used numerical method for computer simulation of most physical processes) and the management and discussion about other related concepts such as the influence of the timestep and the quality and refinement of the mesh in the obtained precision of the results, the study of the numerical stability of the simulations or the always difficult objective of finding the perfect conciliation between computational cost versus accuracy of the results obtained, are a constant in the Body Development department.

Also, in a transversal and continuous way, the physical and mathematical concepts that affect most of the engineering problems worldwide have been dealt with.

Finally, it is very important to note that the use of English as a vehicular language is a constant at Applus+ IDIADA, given its position within the sector, its internationality and its clientele. As during the Master's Course, the complete documentation read, analyzed and generated by me or by other team members was written in English.

## **CONCLUSION**

In my opinion, I could not be more satisfied with the chosen place for the realization of my professional stay for the realization of the internship. The quality of the work performed, the level of professionalism exhibited by its workers as well as the human quality of the department, make Applus+ IDIADA an optimal place for the training of any engineering student.

I consider that the work done by me has been positive, complete, not free of difficulties, useful for the company, interesting to be used in my Master Thesis, and there exists the possibility of extend and improve it during a second stage of extracurricular internship that will begin during next September.

