

Industrial training report



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Summary:

The industrial training consists of the elaboration of a wide range of "test suit" cases in order to validate the correct writing of a data file script by the new comet problem type interface created by Compass.

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1 INDUSTRIAL TRAINING DEVELOPMENT

1.1 INTRODUCTION

The target of the industrial training is the correct functioning of the new problem type interface of the in-house finite element code: COMET (coupled mechanical and thermal) developed by Michele Chiumenti group. This new interface has been developed by the company Compass and writes the data file which is read by the COMET code. This data file is not always correctly written and, therefore, the location of the errors or the missing information is necessary in order to have a robust problem type.

1.2 MAIN TASKS

The main tasks developed during the industrial training have been:

- Elaboration of a huge "test suit" data base of mechanical, thermal and thermomechanical cases.
- Location of the errors generated in the new data file by comparison and finding a solution.
- Communication and help to the Compass worker in order to fix the errors in the tcl file.

In the next section, a wider explanation about the tasks is performed.

1.3 WORK STAGES

1.3.1 TEST SUIT ELABORATION

The first step, in order to locate the errors in the data file writing, consisted of identifying the huge casuistry of data which could be written in the data file. In other words, a "test suit" data base of cases employing the old COMET interface was developed. This big data base provided us with an invaluable number of data files in order to compare them with the ones generated by the new COMET interface. A brief summary of the casuistry is collected in the table below.

ANALYSIS	FE TECH	KINEMATICS	SOLVER	GEOMETRY	MATERIAL
Mechanical	Standard Q1P0 Mixed $u-\sigma$	Small strains Long strains	Linear Non-Linear	2D 3D Plane Stress Axysymmetric	Elastic Plastic Damage
Thermal	NONE	NONE	Linear Non-Linear	2D 3D Axysymmetric	Temperature dependent
Thermo-mech	Standard Q1P0 Mixed $u-\sigma$	Small strains Long strains	Linear Non-Linear	2D 3D Axysymmetric	Elastic Plastic Damage + Ta dependent

CASUISTRY TABLE

To all this casuistry, it is necessary to add the information about mesh, loads and constraints, the different data for processing, time steps, solver information... leading to a enormous number of combinations. As it is understandable, just the most probable and important cases are run, being impossible to check every single combination.

1.3.2 DATA FILE COMPARISON

The second step is the comparison of the old interface data file with the new one. The new data file should provide the COMET program with, at least, the same data correctly written as in the old interface data file. These errors are listed and communicated to the Compass responsible in order to be fixed by them in their code written in tcl. This procedure is repeated with every new version of the new interface of COMET in order to fully clean it.

1.4 COMPASS COLLABORATION

The collaboration with the Compass responsible of the new interface has been done by means of e-mail and phone communications, and a weekly visit to their company. In these visits, the Compass worker corrected the tcl file with our help giving her clear explanations about the errors and the way to correct them according to the COMET user manual.

1.5 ADDITIONAL SKILLS DEVELOPED

The industrial training requires the use of certain additional tools which contribute to certain skill acquirement such as:

- Use of notepad++ code editor (modify and compare data files)
- GiD pre and postprocessor to run the old and the new problem type.
- RamDebugger code editor to read the tcl and locate what it is written.

1.6 COMPLETION OF THE JOB

The new interface of COMET is working for the mechanical cases, and it is also working in the main cases of the thermal and thermo-mechanical problem. Therefore, apart from particular cases in which the user should use the COMET manual to costumize the data file by hand, it is possible to state that the new interface is performing a good job when writing the data file for the COMET problem type.

1.7 STUDENT'S IMPRESSION

This job, locating and fixing the errors in the new COMET problem type for GiD, has improved my knowledge and ability when tackling with general problems types (main files, interaction with GiD...). Furthermore, as I was working with Compass, I have learnt a lot regarding to user interfaces and tcl file coding. On the other hand, due to the fact that I was working running cases of the thermo-mechanical coupled problem, the familiarization with all the parameters, integrations techniques, non-linearities, finite elements strategy and, in general, all the surrounding stuff of the solution of this problem, was mandatory in order to fulfil properly my goal. I can say that I am proud of my job and very glad because this new fixed interface is to be employed in several applications, therefore, I feel that my work is useful in the short term.

Signature



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