

# EFDA GOAL ORIENTED TRAINING SCHEME

## TASK AGREEMENT

### WP5 Thermomechanical Engineering of In-Vessel Components

#### Trainee Report

Reporting Period: 1st January, 2010 – 30th October, 2010

Entire Period of Research Training: 06th July, 2009 - 06th July, 2012

NAME OF TRAINEE:	JÓZSEF NÉMETH
EMPLOYING INSTITUTION / TA PARTNER:	KFKI-RMKI, H-1121 BUDAPEST, KONKOLY-THEGE MIKLÓS U. 29.-33.
<b>REPORT ON TRAINING ACTIONS</b>	
<b>Completed training steps</b>	
<u>Introduction to basics of fusion physics and fusion technology</u> In Technical University Budapest the Trainee took part in a course, which was organized by KFKI-RMKI. The 4 <sup>th</sup> Karlsruhe International School on Fusion Technologies handled also with the basics of plasma physics and fusion technology.	
<u>Thermo mechanical analysis tool (ANSYS course)</u> He was a participant of an ANSYS advanced course, which was organised by KFKI-RMKI / BME. During the course, which focused on the thermo mechanical module of ANSYS, he got higher level knowledge about using the software.	
<u>Remote Handling (RH)</u> The trainee got acquainted with the method of remote handling in the frame of TBM integration tasks. He studied the complete TBM system from RH aspect. He became familiar with the time schedule and the concept of the structural solutions. One of the topics of 4 <sup>th</sup> Karlsruhe International School on Fusion Technologies was the RH, who he could deepen his knowledge on the field.	
<b>Main training activities - FEM tasks</b>	
<u>Task I – Thermal analysis of Compass ion beam neutralizer</u> The neutralizer is a part of the ion beam system. The bottom part of the structure is heated, and the temperature of the top part is limited to a narrow range. The aim of the task was to determine the wall thickness and the material of the neutralizer. The result of the task: This task was perfect to learn the using of heat radiation as boundary condition, and to deepen the knowledge about heat convection.	
<u>Task II – Thermal analysis of ITER-CXRS retractable tube shutter actuator</u> The shutter actuator is a pneumatic structure, in which the main parts are two bellows inside each other. This study aims to answer the following questions: - What is the temperature field of shutter actuator during operation of ITER? - Is additional cooling necessary? - What is the optimal wall thickness of bellows? The loads and boundary conditions were internal heat generation and temperature of the coolant water. The result of the task: knowledge of handling a complex model, which includes solid and shell elements as well.	
<u>Task III – Thermo mechanical analysis of ITER EQ PP #1</u> The complete port plug structure includes a welded flange, base, two side plates and front frame. This assembly is completed by the bolted top plate. All parts are heavy steel constructions with internal water	

cooling channels. During the simulation the temperature of the coolant was constant, and the thermal loads were internal heat generations, which were interpolated values. This task included a steady state thermal and a transient thermal analysis, and after these a thermal stress field was calculated. This is an ongoing development, and further results are foreseen. The result of the task: experience on thermal transient analysis and knowledge of using time dependent loads. Calculation of thermal stresses, which is the starting point of a complete thermo mechanical simulation.

### Seminars, meetings

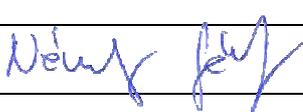
The trainee has been participated in the following seminars and trainings:

- |                      |   |
|----------------------|---|
| 26-28 April 2010     | Hungarian Plasma Physics Workshop on Fusion Technology, Dobogókő, Hungary<br>Topic: Experimental result and engineering developments in plasma diagnostics<br>Organizer: KFKI-RMKI / Association EURATOM-HAS  |
| 4-17 September 2010  | 4 <sup>th</sup> Karlsruhe International School on Fusion Technologies, Karlsruhe, Germany<br>Topic: Introduction to fusion and plasma physics, plasma heating and diagnostics, materials development, divertors and blankets, fuel cycle of a fusion reactor, magnetic confinement, remote handling, operating facilities<br>Organizer: KIT |
| 20-23 September 2010 | Advanced Ansys Course, Budapest, Hungary<br>Topic: Advanced application of Ansys Workbench and Mechanical APDL from thermo mechanical point of view<br>Organizer: KFKI-RMKI / BME /Association EURATOM-HAS  |
| 27 Sep.- 1 Oct. 2010 | 26 <sup>th</sup> Symposium on Fusion Technology (paper), Porto, Portugal<br>Topic: Thermo mechanical analyses of in-vessel components<br>Organizer: IPFN / Association EURATOM-IST  |

**Achieved Milestones and Deliverables:** Career development plan

### Comparison to the career development plan

The deliverables show good correspondence with the career development plant. Some course is going to achieve in the next period.

Date:	29th October, 2010	
name and Signature of Trainee:	József Németh	
name and Signature of Supervisor / Scientist-in-charge (Home Institution):	Gábor Grunda	
Signature of Supervisor / Scientist-in-charge (Host Institution) if applicable:	-	