Minutes of MGT Materials Meeting

04 December 2015, Teleconference

Attendees:

Federico Cernuschi	RSE
Nigel Simms	Cranfield University
Ron van Gestel	Chromalloy
Mario Ferrari	UNIGE
Ignacio Lescano	ETN
Ugo Simeoni	ETN
Michel Delanaye	Mitis

1. Welcome and Introduction

I. Lescano opened the meeting and welcomed the participants. He introduced the MGT Materials document created by F. Cernuschi and N. Simms.

2. Materials Vision Document

F. Cernuschi presented the Materials Vision Document. He stated that RSE is an expert in bigger turbines, and that the document is the result of a literature review for the last 10-15 years. N. Simms agreed to include additional contribution in the following days.

F. Cernuschi highlighted that most of the papers found relate to problems within the recuperators, in terms of metallic materials able to withstand high temperature oxidation and creep and the operating conditions of micro gas turbines. In addition, some papers were found related to rotors and stators, generally referring to trials done with ceramic materials.

U. Simeoni pointed out that the MGT Recuperator WG has included a work package on materials. To avoid duplicities, he asked if this comments should be moved to Materials WG or if the Materials WG should be dismantled and address materials issues individually in the other WGs. F. Cernuschi pointed out that the material issues would be transversal to all the groups and therefore the Materials WG should remain and include all of the tasks related to it. I. Lescano agreed to discuss this with the Recuperator WG.

U. Simeoni clarified the objectives of the MGT WG, which are to draft a summary of the micro gas turbine technology and a matrix where the main challenges for the MGT would be identified. These challenges are to be aligned with what the European Commission wants to achieve in order to optimise our resources.

F. Cernuschi mentioned that we need a significant contribution from manufacturers in terms of specifications. It would be possible to test material properties, but without specific targets to achieve, it is difficult to make a step forward. R. van Gestel mentioned that developing new materials would imply decades before they are accepted by the industry, and that is beyond the scope of the MGT WG. M. Delanaye clarified that research in materials is complicated as the MGT community produces little number of small machines and therefore the cost is very high.

F. Cernuschi proposed to select materials to be tested for corrosion, high temperature oxidation, mechanical properties at high temperatures, etc… R. van Gestel mentioned that some materials for seals are available as foils

that could be tested in heat exchangers. M. Delanaye expressed interest in this and in testing the brazing pasted used for manufacturing that would affect the material locally.

F. Cernuschi suggested to consider the TRL that research should start from. Currently, there are no calls from the European Commission for developing MGT technology. However, if new calls were to come in the future, the materials considered would depend on the starting TRL point. If the TRL is low enough, ceramic materials could be considered and plan mid and long term developments. However, if the TRL is higher there would be no possibility of researching new materials and only testing activities of current materials for their application to micro gas turbines could be performed. U. Simeoni pointed out that the RHC (Renewable Heating and Cooling platform) advised the European Commission to have demonstration programmes for 2017 to 2020, and therefore it could be expected to have higher TRL for the next working programme.

U. Simeoni presented the RHC technology road map and used it as an example for what the MGT WG should aim for. Specifically, the WG should focus on providing targets with clear and measurable goals. U. Simeoni asked on how material improvements would help in achieving the targets. He insisted that good ideas and development projects have to include a justifiable benefit or impact to be considered. In that sense, the MGT WG should identify the impact of the tasks described. F. Cernuschi pointed out that manufacturers should be more capable of providing specific targets. I. Lescano asked if Mitis could provide such information. M. Delanaye replied that he has not that information or enough experience to provide it. I. Lescano proposed to follow up with other manufacturers so as to discuss the possibility of having their inputs.

F. Cernuschi highlighted that in the US, companies have promised high efficiency MGT in the near future market with ceramic parts able to reach comparable internal efficiencies with internal combustion engines. He expressed his concerned on the RHC targets that only aim for slight improvements in efficiency. U. Simeoni clarified that the RHC document only focus on district heating and that there is no representation of the MGT value chain on the RHC committees. ETN is interested in being part of this platform in order to represent the MGT community and this initiative is currently in process.

3. Conclusions and next steps

It was agreed that the documents (Materials Vision Document and MGT Global Matrix) will be reviewed by the Material Working Group before 16 December 2015 to:

- Provide comments on the task descriptions and identify main materials that should be tested
- Provide comments on the main challenges of the MGT Global Matrix and identify specific targets
- Identify potentially missing challenges or tasks

This would allow having a second iteration before the end of the year that would be reviewed by the partners in January 2016. A follow-up teleconference could be set early next year to finalize the document.

Annex I: Action list

Action Owner	Description	Deadline date
ETN	To follow up with MGT manufacturers to define measurable targets	16th December 2015
ETN	To follow up with MGT Recuperator WG regarding their material WP	16th December 2015
All	To suggest main materials that potential testing should focus on	16th December 2015
All	To provide specific targets and identify impacts of improving materials	16th December 2015
Leader & Co-Leader	To update the vision document with the latest inputs	21st December 2015