



Winterthur Gas & Diesel



HERCULES-2

Work Package 3: Intermetallics and advanced materials for marine engines

Work package leader:

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HERCULES-2

PTB Meeting, May 12th 2016, Athens

WP Leader: Monika Damani

WP Deputy: Sebastiaan Bleuanus

Objectives

Subproject 3.1: *Novel materials for engine applications*

Examine possibilities of using novel materials in engines to facilitate the development of components that enable higher engine loads, hereby increasing efficiency and lower emissions. Ensure proper lifetime performance and durability.

Subproject 3.2: *Novel materials for turbine casing*

Material of turbine casing is reviewed in respect of material and design in order to meet requirements needed for higher exhaust gas temperatures.

Expected outcome

Subproject 3.1: Suitable new materials can be identified for at least two components for higher load operations and longer life time.

Subproject 3.2: Performance is improved through material / design optimization.

Partners:



Structure: Partners, roles

Max Planck Institut für Eisenforschung Düsseldorf:

Materials selection & optimization; materials investigation and testing activities



Deloro Koblenz:

Materials selection and optimization of processing and joining technologies. Manufacturing of sample materials



ABB Baden:

Evaluation, prototyping and test of new material and test of new materials for advanced turbine case.



Wärtsilä Finland & Wärtsilä Netherlands:

WFI: Boundary conditions, material and processing selection; material testing activities incl. rig or engine validation; WNL: Work package deputy and coordination of research activities at partners

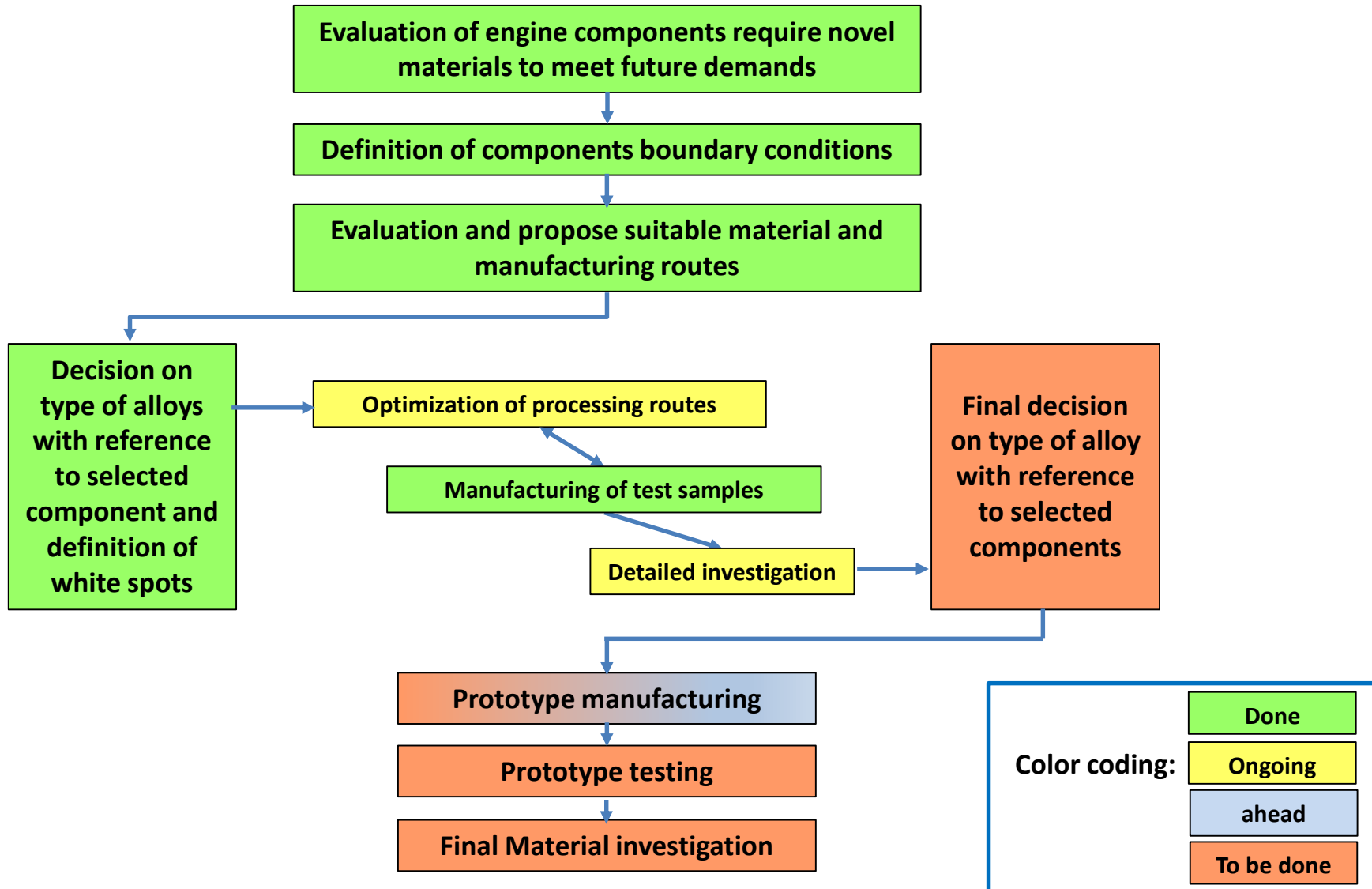


Winterthur Gas & Diesel Ltd.:

Boundary conditions, material and processing selection; material testing activities incl. rig or engine validation; Project lead and co-ordination of research activities at partners



Status of Sub-project 3.1: Novel materials for engine application

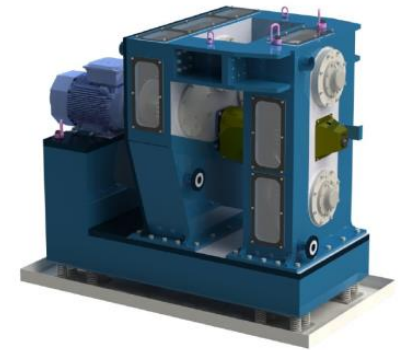


Status of Sub-project 3.1: Novel materials for engine application

Achievements:

Samples of three chosen alloys have been manufactured (casting)
Microstructure and hardness was checked and found to be in order
Test sample machining is under way

Test rig for high load bearings assembled, instrumented and calibrated.

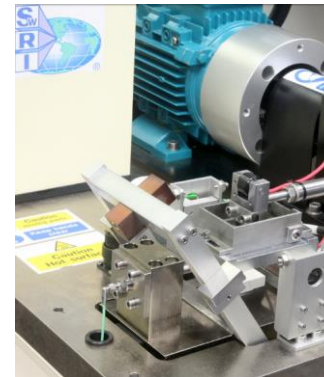


Bearing materials test rig

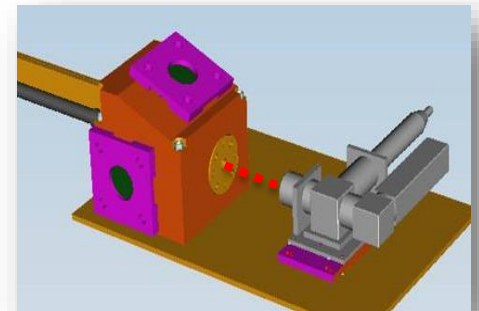
Planned next activities:

Extensive materials testing to be done, such as:

Various corrosion tests, thermal cycling and tribo testing on sample material

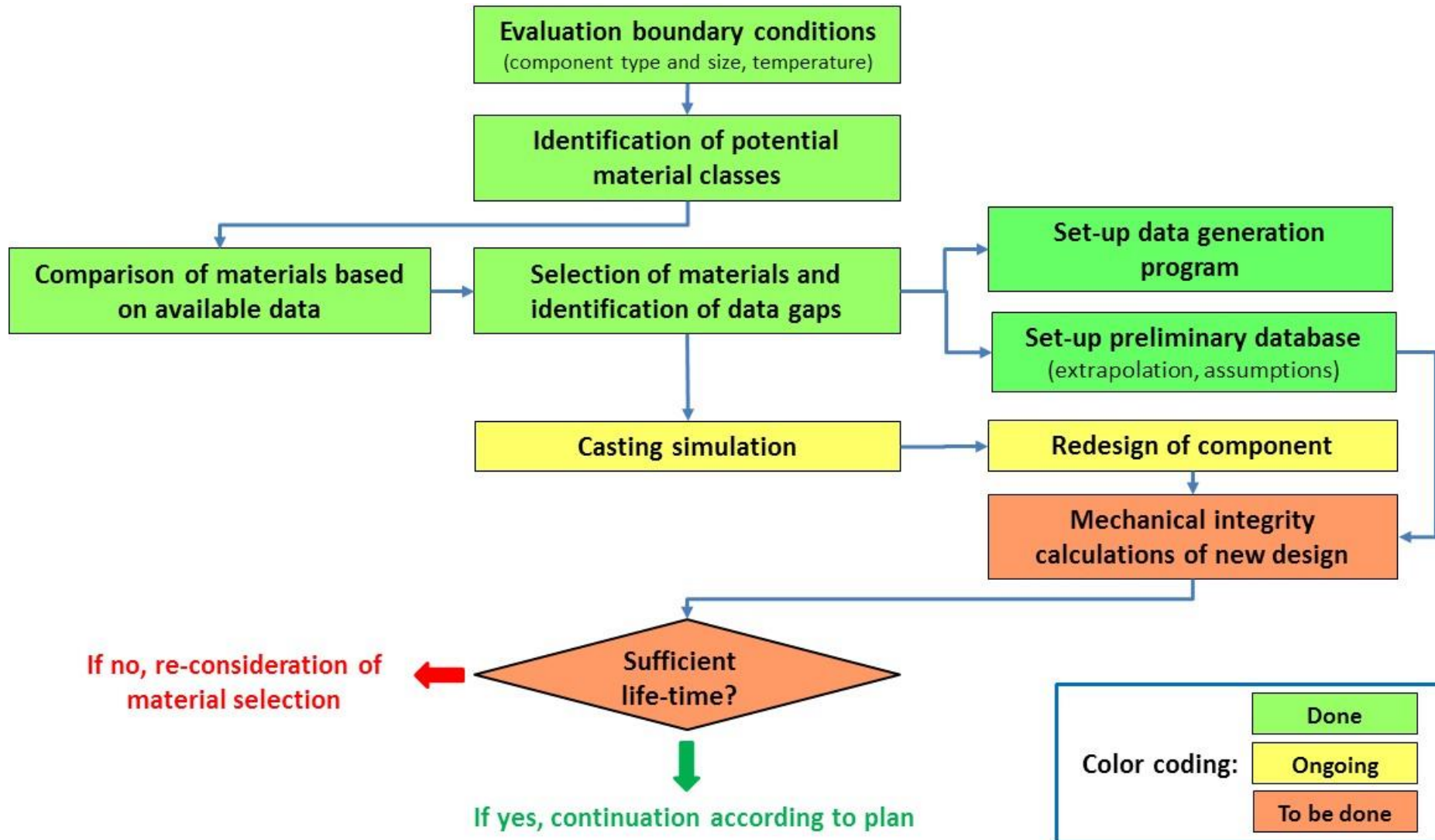


Tribo tester: CPT



Thermal cycling test rig

Status of Sub-project 3.2: Novel materials for turbine casing



Status of Sub-project 3.2: Novel materials for turbine casing

Work already done:

- Decision on casting type, requirements are defined
- Decision on manufacturing method
- Material classes identified
- Review of availability of required material data
- Preliminary material database setup

Next planned activities:

- Casting simulation
- More detailed material characterisation
- Parameterisation of CAD-model
- Definition of TMF load profile
- TMF calculations

