# Marking Criteria

Alignment

Alignment with course content and reading materials (demonstrated by referencing in footnotes). Assessed individually

**Integration**

Level of integration of the project plans. The presentation is marked as part of this criteria. Assessed as group.

## Project management plan contents

The content of the Project Management Plan (max 20 pages) shall include the following. The coloured letters show the marking criteria that each part will contribute to.

* Cover sheet, with table of individual contributions.
* **I** Finalised Project charter ​​​​​​​​​(we assume that you can go back and edit the project charter after obtaining authorisation to begin the project!)
* **I** Definition of success, and description of your strategy for managing the project to realise this definition.
* Project plan
  + **A   J** Scope statement ok
  + **A   J** WBS OK
  + **A   J** Estimates of cost and time
  + **A   J** Network diagram and schedule
  + **A   J** Stakeholder management and communications plan
  + **A   J** Human resource plan​​​​​​​​​​​​​​
  + **A   J** Risk management plan
  + **A   J** Time phased budget (Quarterly) and project contingency reserve budget

1. Introduction

2.Risk management plan

3.

# WBS:

intangible deliverables: robots……

tangible deliverables: reports…..

# Q&A:

**(22) I read in a paper (Crucibles for induction melting of Ti alloys, Fashu et. al, 2020) that vacuum induction furnaces are good for melting Ti alloys for recasting. In this project, it seems like we don't have to do this (from the FAQ), but we do need to heat up the Ti to a high temperature (maybe ballpark 1000 degrees C) to be able to permanently deform it. Will a cheaper alternative for the furnace (i.e. one which operates at a lower max temperature) be acceptable (a), or is it desired that vacuum furnaces are used as they have some desirable properties regarding Ti alloys? (b) Also, is this type of furnace compatible with low-alloy steels? (c)**

(a) Yes. (b) Vacuum is unnecessary, but it would still be preferable to heat titanium with some inert gas protection (e.g. Ar gas). Steel can ​​​​​​​be heated in air. (c) Yes.

Also, you mention induction heating, which may be a good solution, and preferable to an electrical resistance-heated or gas heated oven. e.g. <http://www.gh-ia.com/processes/forging-metal.html>

**(23) What kind of materials are usually used in the MM process? How should these materials be selected?**

See [Requirements](https://teams.microsoft.com/l/channel/19:d3f78ec418d8446cafc723ca2c53c221%40thread.tacv2/tab::782dabf3-328d-4ff3-abbd-e5ec7ca643a2?groupId=5e65c552-b54d-460a-bd19-13aad6fd2c2e&tenantId=3ff6cfa4-e715-48db-b8e1-0867b9f9fba3) - I would suggest not spending a lot of effort on materials selection. If you feel like going into detail then just select one representative alloy for each of steel and titanium.

**(24) After the small MM unit is put into use, should we consider the cost performance of the materials used in manufacturing the parts? If we need to consider this, should it be reflected when the unit is designed?**  
No, the project is just to build and commission the MM cell. It will be valuable to be very clear about what the final deliverables of your project are, and what possible future work is out of scope.

**(11) How are robotic arms programmed (what language, etc)**

There is a lot of flexibility as to the software for robotic arm control. Some robotic arms are packaged with control software out of the box, and provide a control software/hardware interface (take the Universal Robotics UR5e arm for example). Others allow interfacing into existing programming environments. Others can use both.

ROS (Robot Operating System) is one of the most common industry standard programming tools used to interface with robots, such as robotic arms for the MM cell.

**(10) What software exists to model objects in 3d from sensor data?**

Any software that take in a depth reading and generate a point cloud would be sufficient. An example would be the Intel Realsense SDK, connecting programming environments to the depth sensing of the Intel Realsense D435 depth camera.

software ： 1. <https://www.transvalor.com/en/forge>

2. Intel Realsense SDK

2. ROS (Robot Operating System)

position permission:

Willis Annexe building is a possible location. If any part of the equipment is going to weigh more than 2 tons then we may need to consider new foundations for it.