

# Vision and activities of CRM Group in additive manufacturing of metals

Flam3D May 9 , 2017



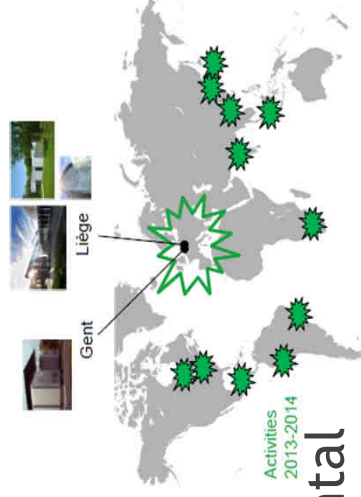
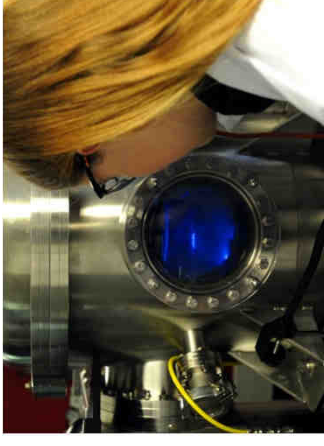
# CRM

- ⌘ Centre for Research in Metallurgy
- ⌘ R&D, Technology & Innovation in :
  - Metal & Steel Production
  - Transformation & Application
  - Associated Materials
- **Holistic approach**
  - Process development
  - Product development
  - Product application

⌘ Located in **Gent & Liège**, active world-wide

⌘ Budget 35Mio euro, 245 people

⌘ From analysis & characterisation over incremental R&D until breakthrough developments



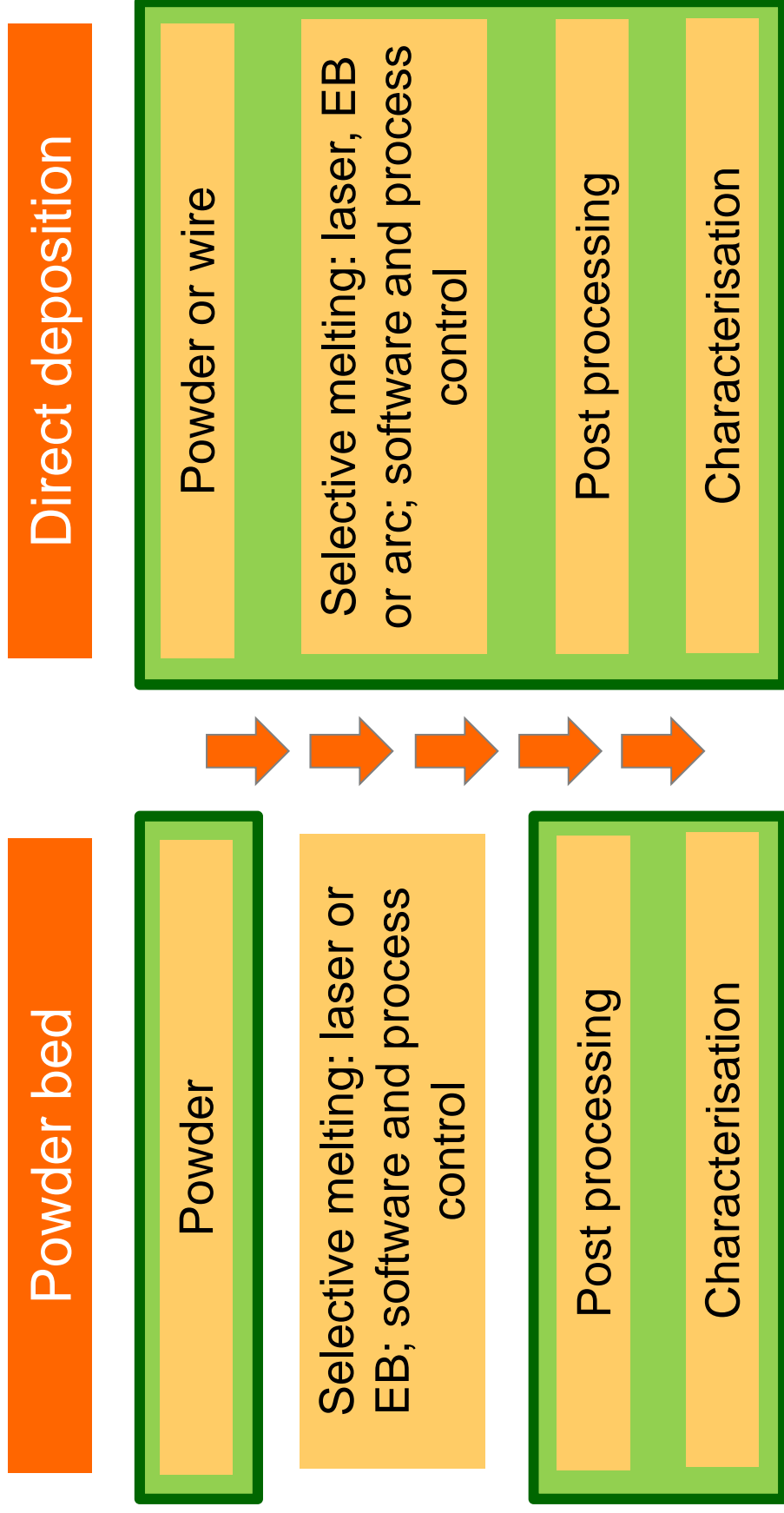


# Additive manufacturing in CRM Group?

- ⌘ The additive techniques open new ways of manufacturing metal parts. They also represent a **completely new metallurgy**
- ⌘ The CRM Group is and will be active in this field, focusing on key points that are part of its core business, namely:
  - ⌘ **Metallurgy**
  - ⌘ **Analysis and characterisation**
  - ⌘ **Process development as well as post-processing**
  - ⌘ **Study of parts production for industrial customers**

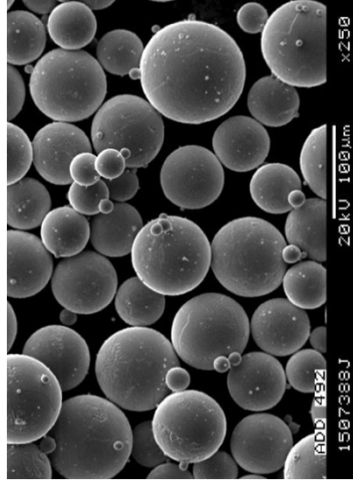
# What is the CRM Group study field ?

Our fields of activity in additive manufacturing



# Activities about the metallic feedstock

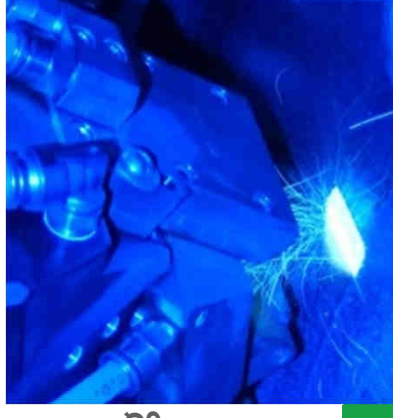
- ⌘ In powder bed technology:
  - ⌘ Characterisation of powders (chemistry, surface, size distribution, ...)
  - ⌘ Improvements of composition (metallurgy)
- ⌘ In direct deposition (powder and wire):
  - ⌘ Characterisation and improvement of powders
  - ⌘ Possible wire improvement (metallurgy) / development & small batch production of wire at CRM/MPC facilities



Ti6Al4V powder observed by SEM

# Activities about the AM process

- ⌘ *In powder bed technology:*
  - ⌘ *No internal experience while colleagues (e.g. Sirris) have strong expertise → no activity*
- ⌘ **In direct deposition (powder and wire):**
  - ⌘ **Metallurgy of welding** is in our core business + highly valuable expertise of Cewac colleagues
  - ⌘ Process control improvements insofar as working conditions influence metallurgy (deposit soundness, internal stresses, metallurgy, ...)
  - ⌘ Focus on the production of **large industrial parts**
  - ⌘ **In house laser source equipment (powder-fed)**
  - ⌘ **Productivity** is a key target
    - ⌘ → towards wire feeding : new investment ongoing



## Post processing to reach the right microstructure & properties

- ⌘ In both powder bed and direct deposition, to get the requested metallic phases is of primary importance
- ⌘ The control of temperature evolution during deposition as well as the heat treatments to be applied afterwards to reach the needed structures are the daily expertise of CRMGroup



# Post processing to reach correct surface state

⌘ In both powder bed and direct deposition, CRM Group has developed experience in a wide range of **surface processing techniques**

⌘ Available: abrasive polishing, electro-polishing, re-melting, chemical polishing, ... (\* Cornet or ESA funded projects)

Example of electropolished parts\*



Example of tribofinished parts (ref, 10h, 30h)\*

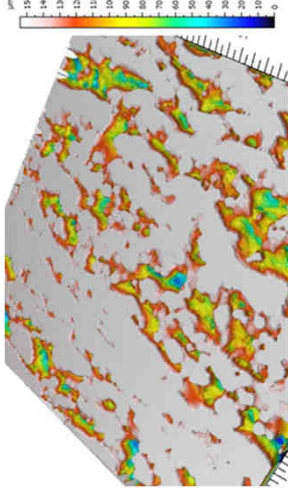
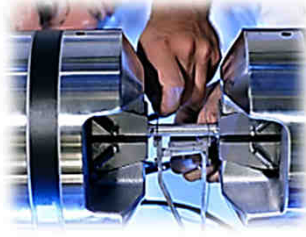
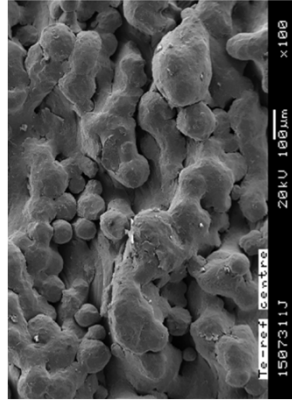


Original    Electropolished

⌘ Under development: **coating of complex 3D parts**

# Large possibilities of characterization

- ⌘ Parts have to attain targeted performances
- ⌘ This requires (i) characterisation (ii) in many cases, analysis of as-printed parts
- ⌘ At CRMGroup, both characterisation and analysis techniques are available:
  - ⌘ (i) Mechanical properties, fatigue, corrosion resistance in various conditions, ...
  - ⌘ (ii) Chemistry, surface, microstructure, ...



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Thanks for your attention

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market

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