



1<sup>st</sup> Workshop of ARIES  
WP17 PowerMat  
Politecnico di Torino, Turin (IT)  
27-28 November 2017

# ARIES WP14 – Task 14.4: Industrial production of materials for extreme thermal management

F. Carra<sup>1</sup>

<sup>1</sup>CERN – European Organization for Nuclear Research





# WP task 14.4

- **WP14:** Promoting Innovation (PI) – WP leader M. Losasso (CERN). Close relation to industry, final aim to provide society with identified commercial applications of the supported research potential.
- **Task 14.4:** Industrial production of materials for extreme thermal management
  - Contribute to material development in collaboration with **WP17** (PowerMat)
  - Produce at least 10 samples of  $MgB_2$  by Additive Manufacturing on Copper substrate for characterization of the R&D → applications in critical accelerator environments (beam pipes, RF cavities) and other technical domains
  - Demonstrate feasibility of production for industrialisation (with large dimensions, small tolerances)
- **Production objectives:**
  - 30 samples of  $MgB_2$  on metal substrate
  - 30-50 samples of CuCD
  - 40 samples of metal-diamond composite for luminescence studies
  - 50 samples of carbide-graphite or metal-graphite composites
  - 1 large size block of carbide-graphite or metal-graphite composite with tight mechanical tolerance to proof industrialisation

} RHP  
CERN with industrial partner (BrevettiBizz)





# Deliverable

Deliverable Number	Deliverable Title	Lead beneficiary	Type	Dissemination level	Due Date (in months)
D14.3	Production of material samples of carbon-based composites and metal-diamond composites	CERN	Demonstrator	Public	24



## **D14.3 : Production of material samples of carbon-based composites and metal-diamond composites**

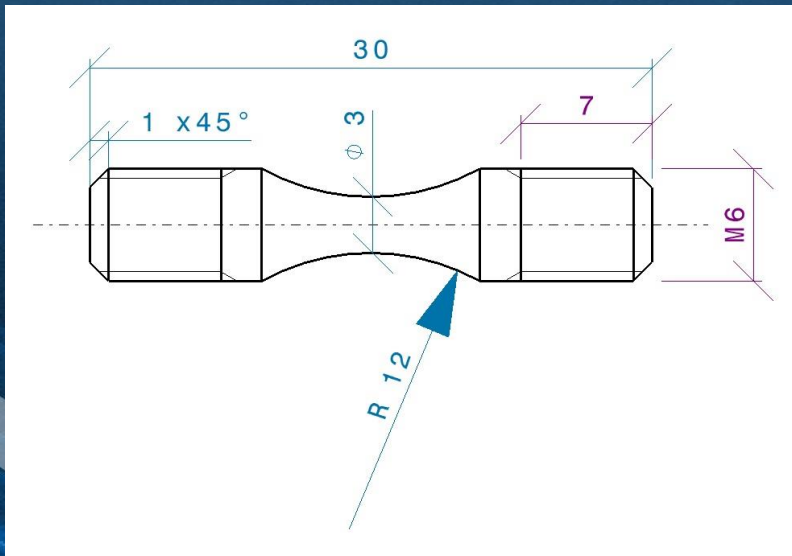
- Production of: 50 samples of carbon-based composites with different production cycles and 30 samples of metal-diamond composites, 20 for high energy impact studies and 10 for luminescence studies

Our goal: complete it by month 12, to provide inputs for WP17



# Deliverable Status

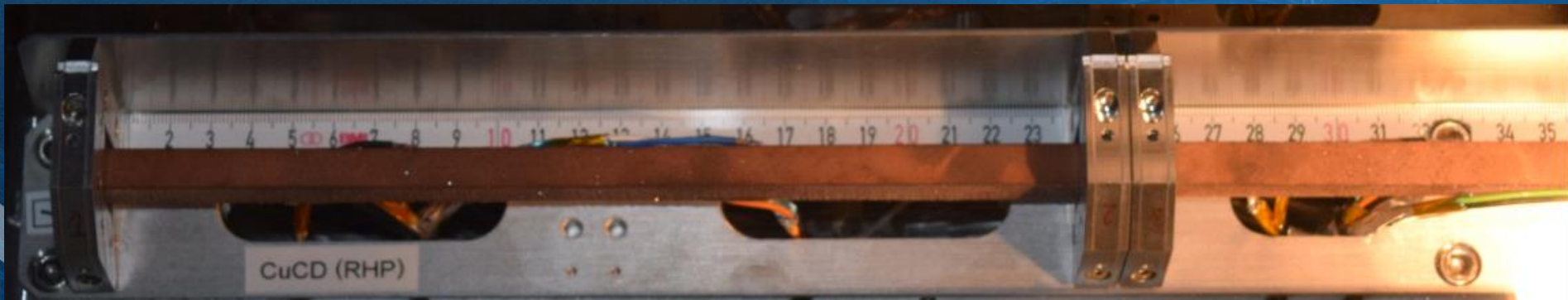
- **Brevetti Bizz:** 50 samples of ceramic carbide – graphite
  - **December 2017:** 25 threaded samples of MG6403Fc (or equivalent), for dynamic characterization at PoliTo
  - **Mid 2018:** 25 threaded samples of another material, composition to be decided
  - **2020?:** Industrialization (not in the scope of the deliverable), can we go to 45 mm thick (and longer/larger) blocks?





# Deliverable Status

- **RHP:** 20 samples of copper-diamond for high-energy impact studies, 10 samples for luminescence
  - **July 2017:** 10 rods 247x10x10 mm produced for tests in Multimat ✓
  - **End 2017, 2018:** can we identify a suitable geometry for dynamic testing at PoliTo and produce samples?
  - **Luminescence:** several samples produced, 6 delivered to GSI (important to document the production for the deliverable).
  - **MgB<sub>2</sub>** (not in the scope of the deliverable): production plan drafted, to be discussed with M. Losasso at the WP14 kickoff meeting (8<sup>th</sup> December 2017)





ENGINEERING  
DEPARTMENT

Next: WP14 KoM  
CERN, 8<sup>th</sup> December 2017





# Budget

Beneficiary short name*	Person - months	Monthly personnel costs	Personnel direct costs	Travel direct costs	Equipment and consumables	Other direct costs	Sub-contracting costs	Material direct costs	Total direct costs	Total indirect costs**	Total costs (direct + indirect)	EC requested funding
CERN	3.00	8'000.00	24'000.00	3'000.00	0.00			3'000.00	27'000.00	6'750.00	33'750.00	9'312.50
Bizz Brevetti	6.00	3'500.00	21'000.00	5'000.00	50'000.00	10'000.00		65'000.00	86'000.00	21'500.00	107'500.00	60'000.00
RHP	6.00	3'500.00	21'000.00	5'000.00	110'000.00	10'000.00		125'000.00	146'000.00	36'500.00	182'500.00	91'250.00
<b>Total</b>	<b>15.00</b>	<b>59'365.00</b>	<b>66'000.00</b>	<b>13'000.00</b>	<b>160'000.00</b>	<b>20'000.00</b>	<b>0.00</b>	<b>193'000.00</b>	<b>259'000.00</b>	<b>64'750.00</b>	<b>323'750.00</b>	<b>160'562.50</b>