Additive manufacturing for accelerators - outlook and perspectives

Toms TORIMS (Riga Technical University / CERN)
... on behalf of the whole AM team of WP10

Outlook – where we stand with AM?

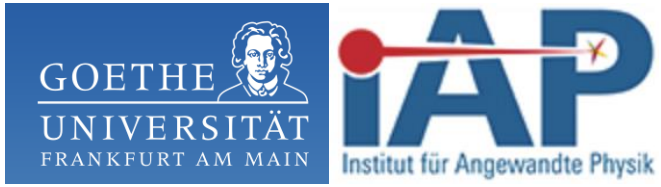
Outlook – where we stand with AM?

- Our **strategy was right** – as predicted **AM is proliferating fast** also in our community. Technology is in our labs and on our *menu* today.
- Challenges and bottlenecks are being addressed as a collective effort and we will be having **more AM and applications in future**
- In the open and collaborative spirit we are uniting our efforts, exchanging knowledge within I.FAST and far beyond – **strong human and institutional framework** is established
- Exceeding **the original** Milestones and Deliverables
- Numerous **scientific publications** of conference presentations

Outlook – where we stand with AM?

- Superb collaboration and **co-creation** with our industrial partners

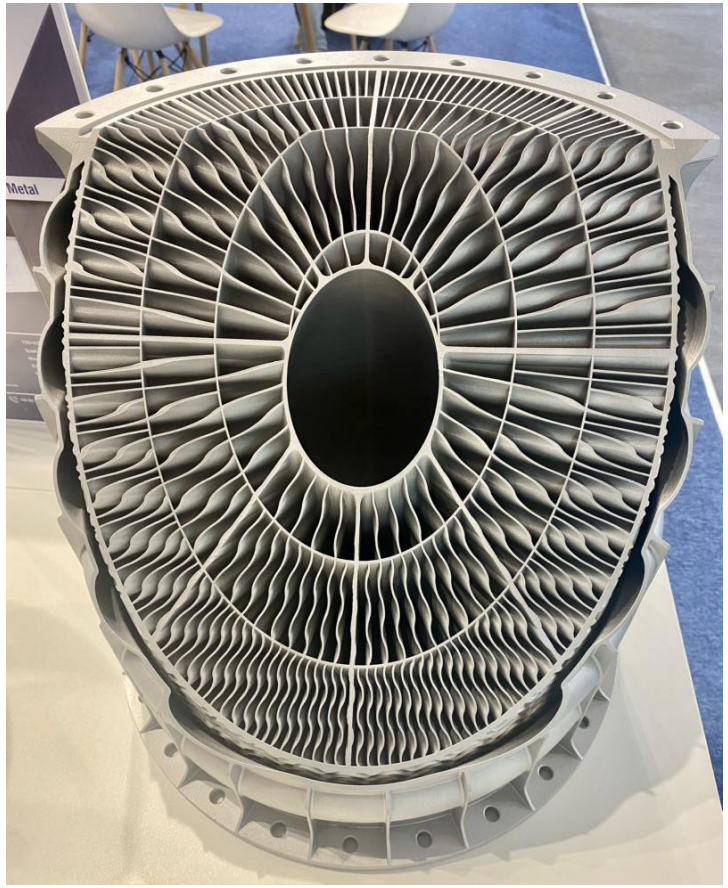
- We have embraced **new collaborators** from academia and industry



- Nice link to **other WP** of I.FAST, especially working with

What are perspectives?

- AM machines are getting bigger, less-expensive, more open



formnext

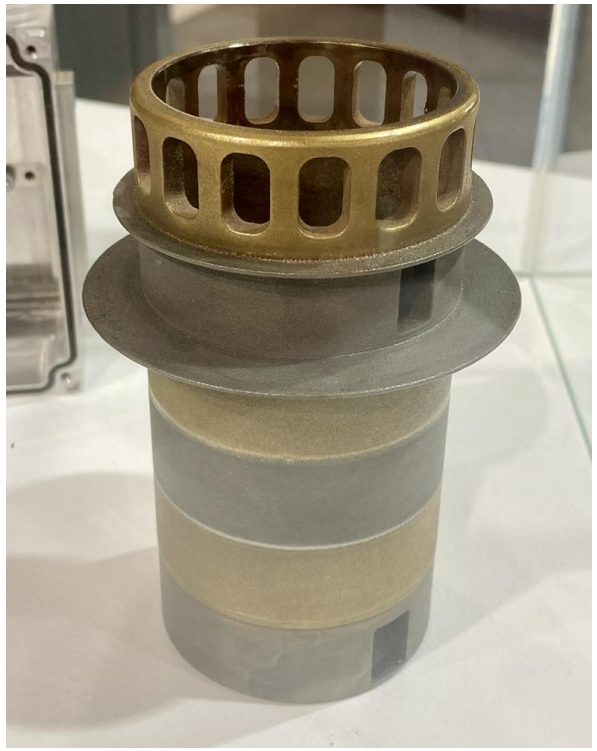
Frankfurt, Germany,
7–10 November 2023

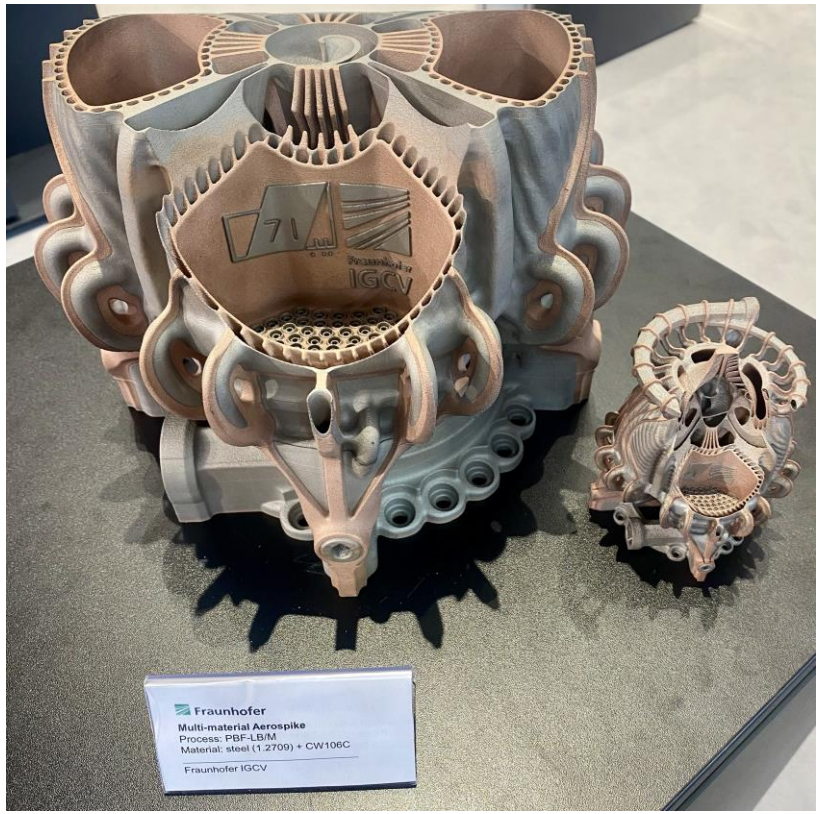
What are perspectives?

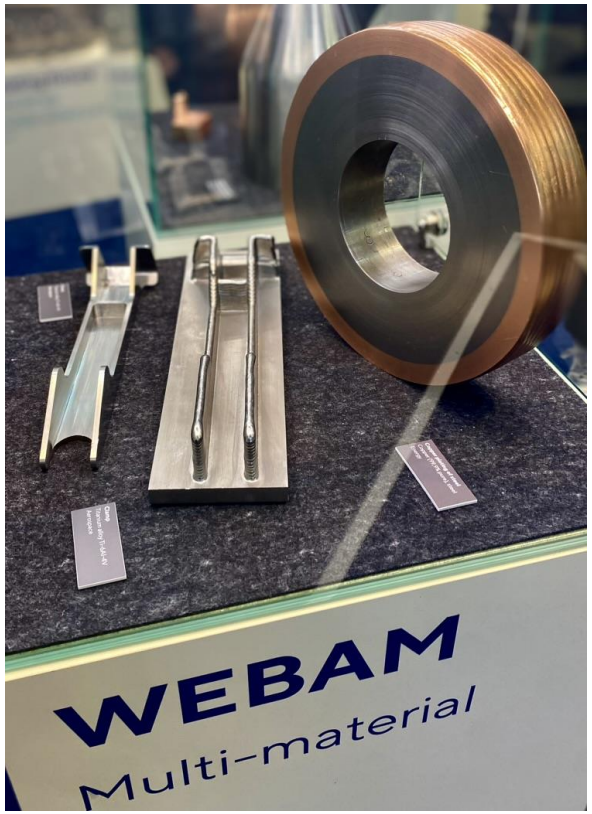
formnext

Frankfurt, Germany,
7–10 November 2023

- Multi-materials are possible

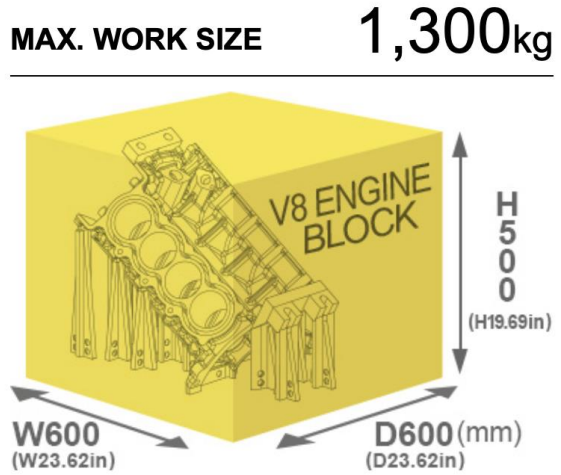






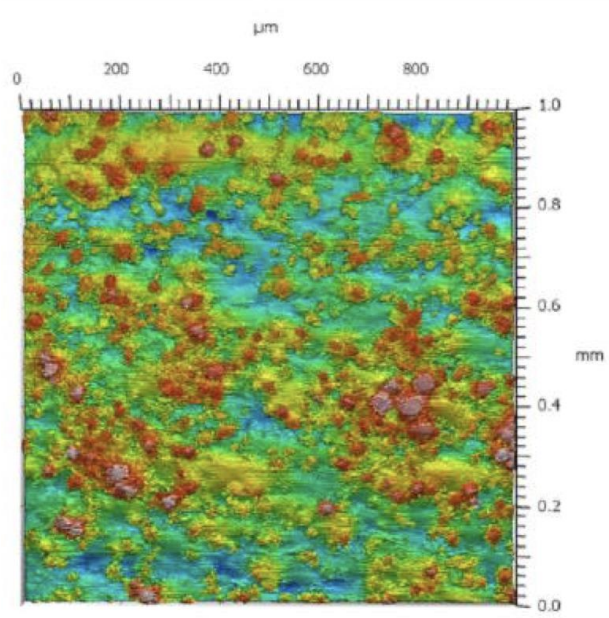
What are perspectives?

- Multi-machining / combined technological processes

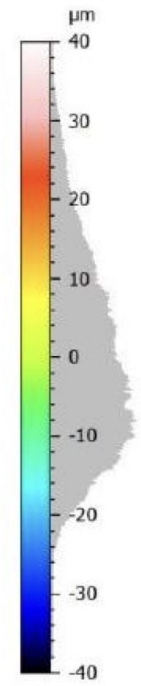


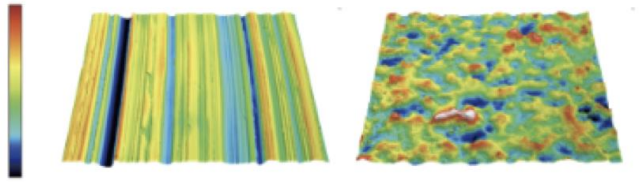
What are perspectives?

- Impact to the surface texture or 3D surface roughness

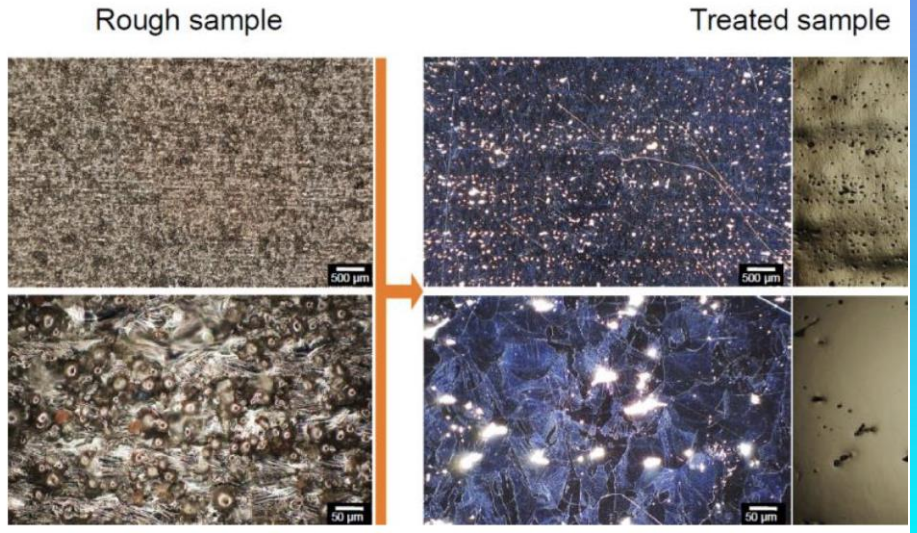


$S_a = 9{,}15\ \mu m \quad S_z = 77{,}97\ \mu m$





Sq	1 µm	1 µm
Sa	0.8 µm	0.81 µm
Sz	5.53 µm	8.57 µm
Sp	1.98 µm	4.04 µm
Sv	3.55 µm	4.53 µm



What are perspectives?

- Initial **challenges are addressed**: surface roughness, geometrical precision, vacuum tightness, Voltage holding
- **RF tests** are envisaged
- Behaviour in **ultra low temperatures** is being investigated
- Next step is to produce the complex accelerator structures and to perform **tests in-situ**
- Several prototypes **to be tested in real conditions** – i.e. RFQ's and beyond – tests with the real beam
- … **very exciting journey** is ahead of us… you will hear soon more

What are perspectives?

3D-Printed Autonomous Electric Ferry to Operate on the Seine for Paris 2024 Olympics

… it takes some time to be accepted…

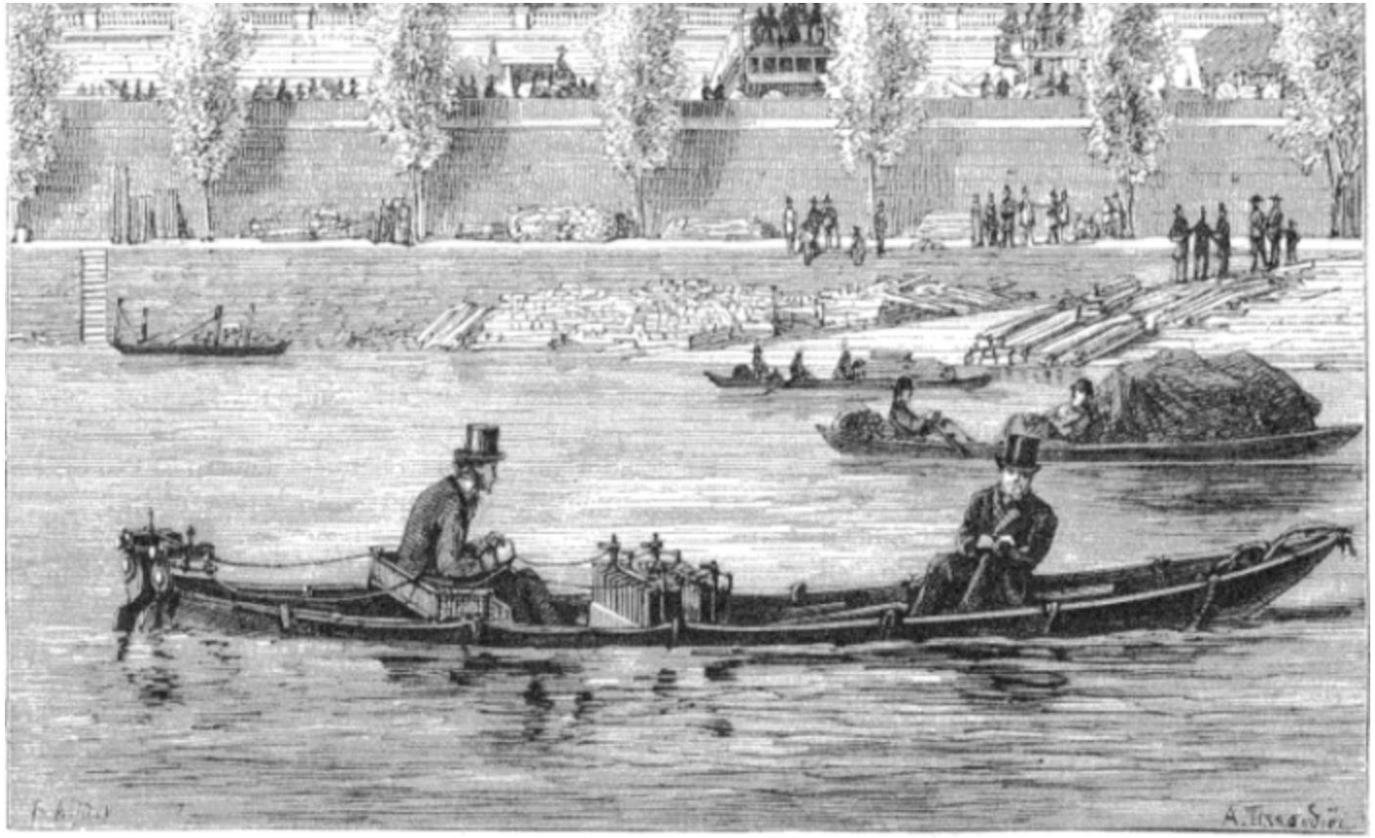
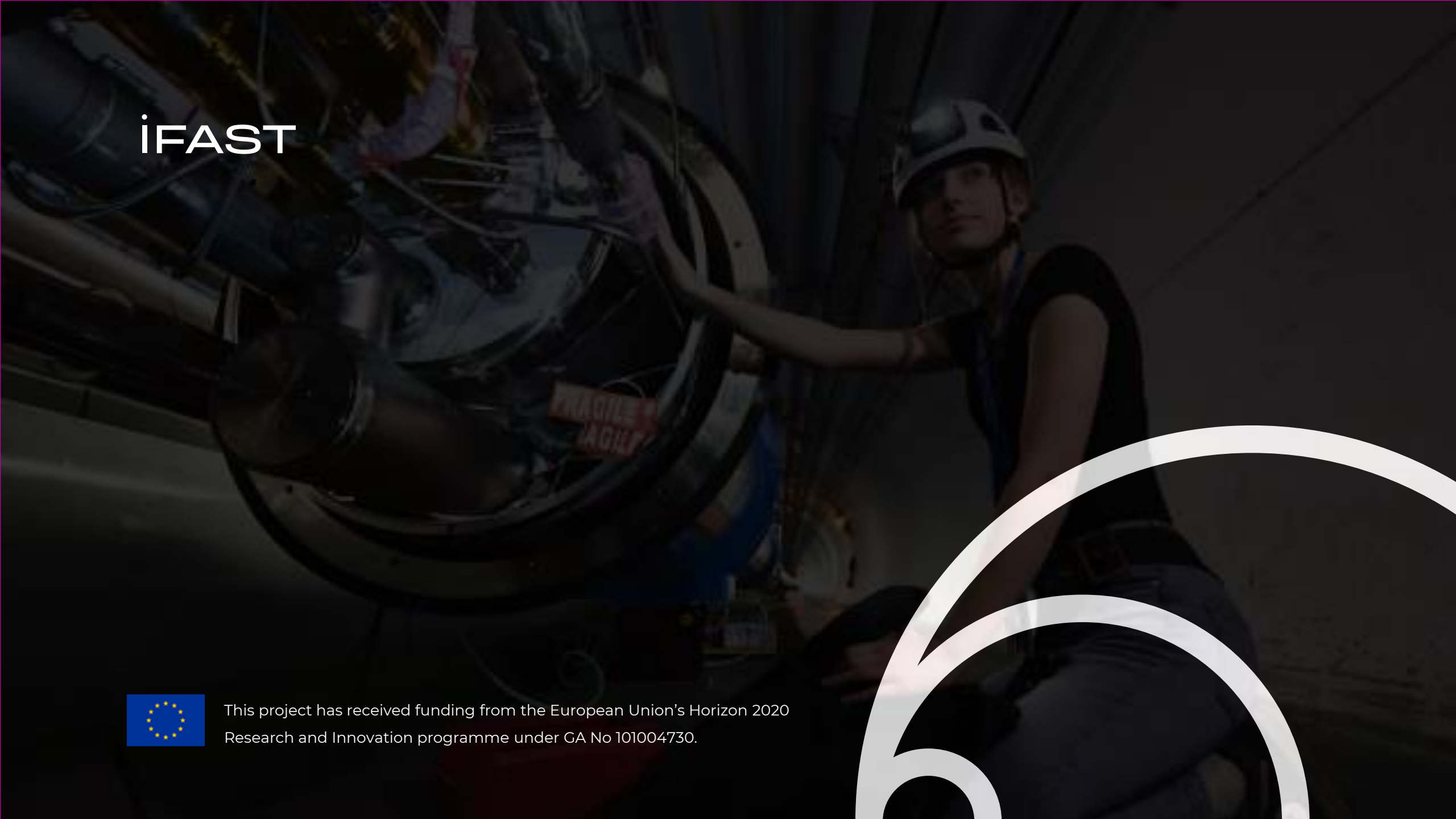


Fig. 2. Le canot électrique de M. G. Trouvé, lors de la première expérience exécutée sur la Seine à Paris, le 26 mai 1881.

Gustave Trouvés First Electric Boat, Showing Battery Cells (Albert Tissandier BY Public Domain)

… sometimes 143 years …



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.