



University of
Nottingham

UK | CHINA | MALAYSIA

Powering the Future of Transport

University of Nottingham

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University of Nottingham

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Zero Carbon Cluster

This is the place that translates zero carbon research into real-world solutions.

Our vision is to accelerate the translation of zero carbon research into high-impact commercial and policy solutions – in partnership with industry and government.



Electrification, Hydrogen Propulsion, Manufacturing

Targeting regional strength, impact at scale and synergies across aero, auto, marine, off road

Marine

- Retrofitting - hybrid electric, high voltage hybridisation
- Zero emissions thermal power
- High-powered electrical generators and systems integration
- Novel solid-state fuel storage



Aerospace

- Performance & safety drives technology
- Potential for supply chain development
- Benefit from automotive learning



Automotive

- Solutions deployment scaling up now
- Growing interest in technology & prototyping
- Early impact and cross-discipline collaboration





Research & Technology challenges

Megawatt-class hydrogen and hydrogen-electric propulsion systems

The hydrogen propulsion system comprises in-vehicle use of hydrogen through to delivery of propulsive power

Structural design integrated with active systems

Material science, embrittlement

Liquid hydrogen storage, tank and re-fuelling

Supercooled electrical systems (2-5MW)



Operational conditions

Safety & reliability

Failure modes accommodation

Advanced manufacturing

Cryogenic pumps, valves, piping heat exchangers and thermal management (reliability to >10,000hrs)

Phase transitions, work recovery from compressed hydrogen



£75+ million in external funding

for hydrogen propulsion, electrification & manufacturing, incl industry co-investment



Multi-million funding injection for University of Nottingham facility brings net zero one step closer to reality

Thursday, 30 November 2023

The University of Nottingham, in collaboration with Loughborough University, has been selected to receive a significant funding boost from East Midlands Freeport to accelerate the translation of zero carbon research into high-impact commercial and policy solutions.



Over £70 million investment will allow the University of Nottingham to power future transport to net zero

Tuesday, 26 March 2024

The University of Nottingham has secured more than £70 million to establish new world-leading and open-access research facilities and programmes that will decarbonise future transport.





Jubilee Campus in Nottingham

Industry has open access to advanced zero carbon infrastructure and capabilities



UNIP - Ingenuity Centre
start-up, incubator space



PEMC Electrification Centre

**Research
Acceleration &
Demonstration
Building
Hydrogen**



Aerospace Technology Centre
Industry collaboration/co-location



GSK Carbon Neutral Laboratory
Centre for Sustainable Chemistry

***NEW* Hydrogen Propulsion Lab**



Advanced Manufacturing Building

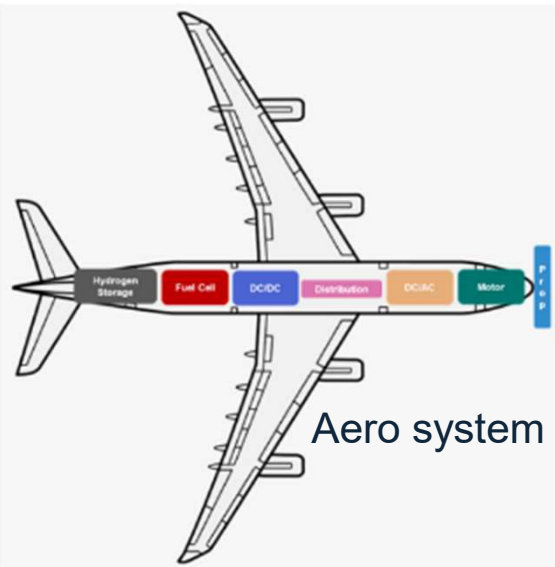


Building blocks of hydrogen propulsion systems lab

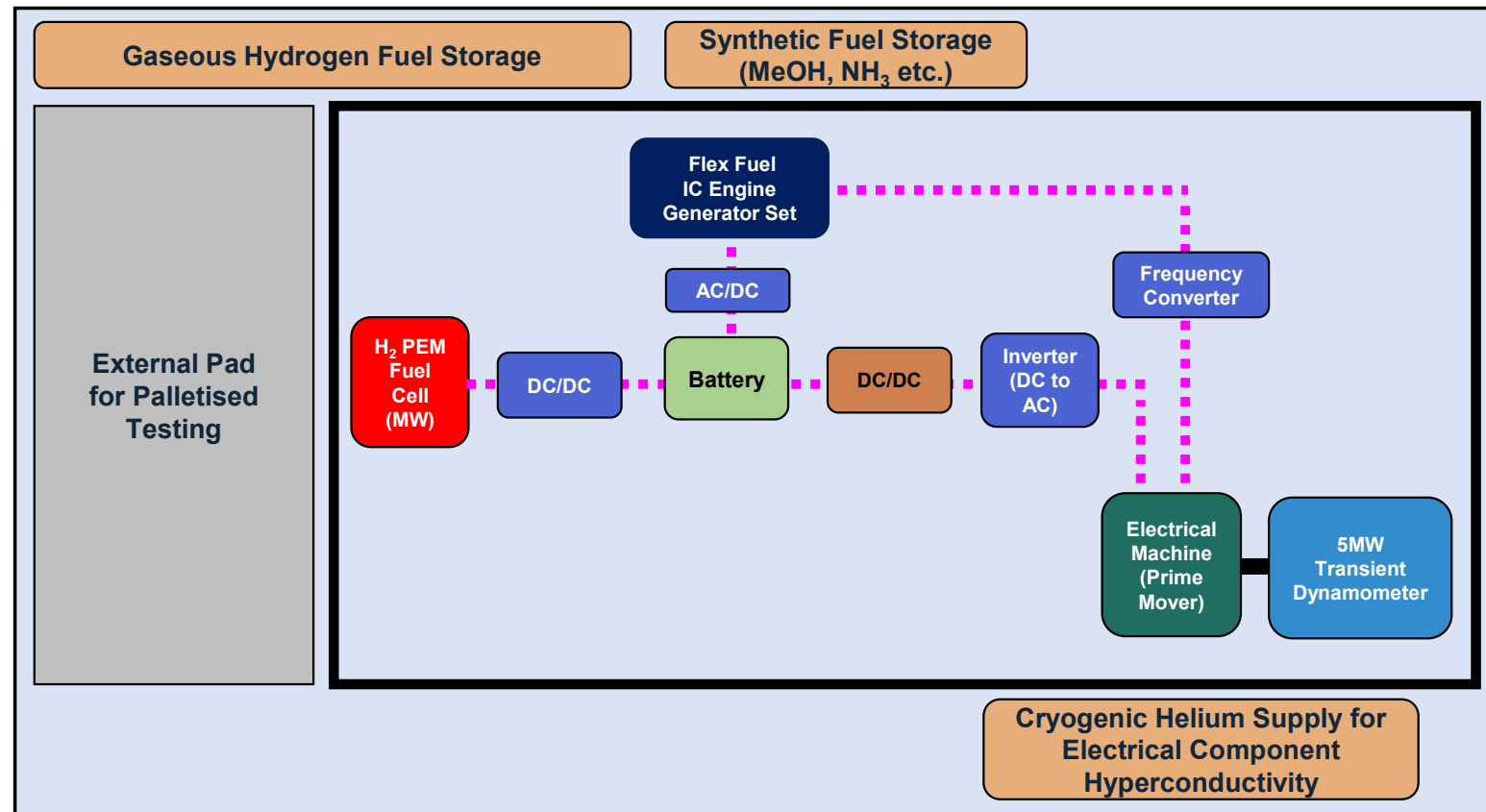
- 'Plug-and-play' heavy transport components, sub-systems or systems
- Performance evaluations under real-world environments



Marine system



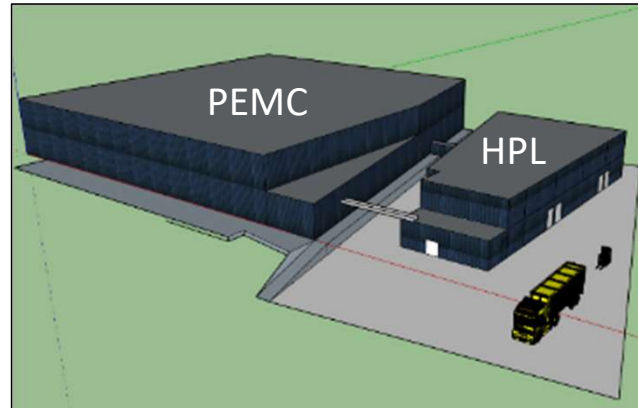
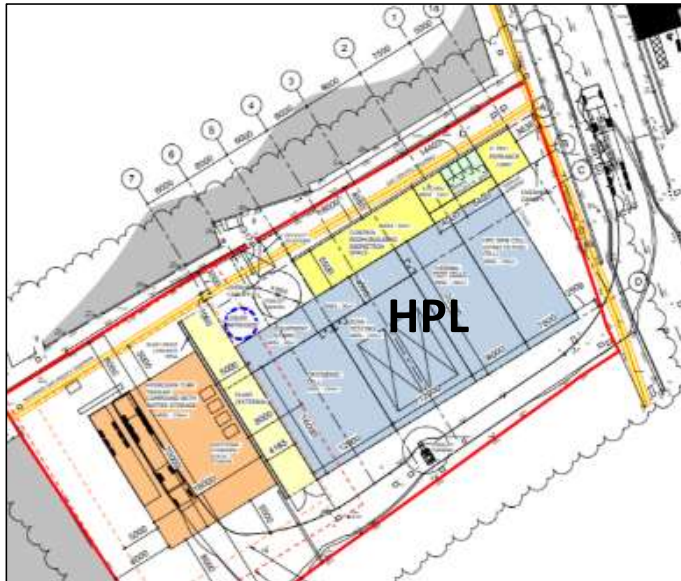
Aero system



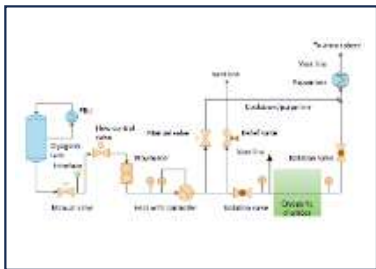


Hydrogen Propulsion Systems Lab (2025)

1,200m² laboratory housing MW scale hydrogen propulsion systems testing



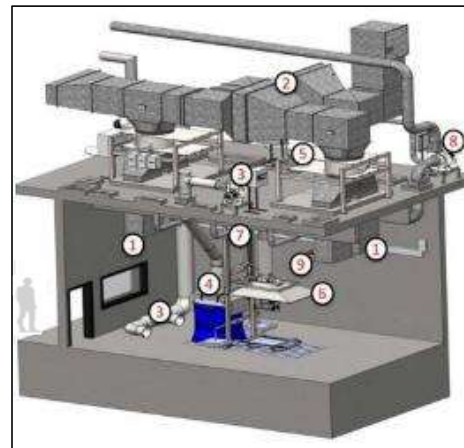
- Connected to electrification facility
- H₂ fuel cells or ICE component and hybrid-electric system test
- Validation testing under extreme environmental conditions
- Hydrogen, ammonia, other fuels



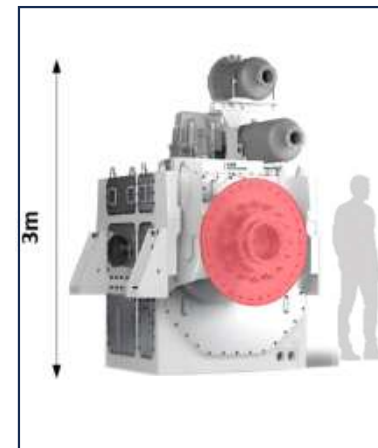
cryogenic test (-253 °C)



digital twinning lab



5MW systems integration lab



MW single cylinder rig



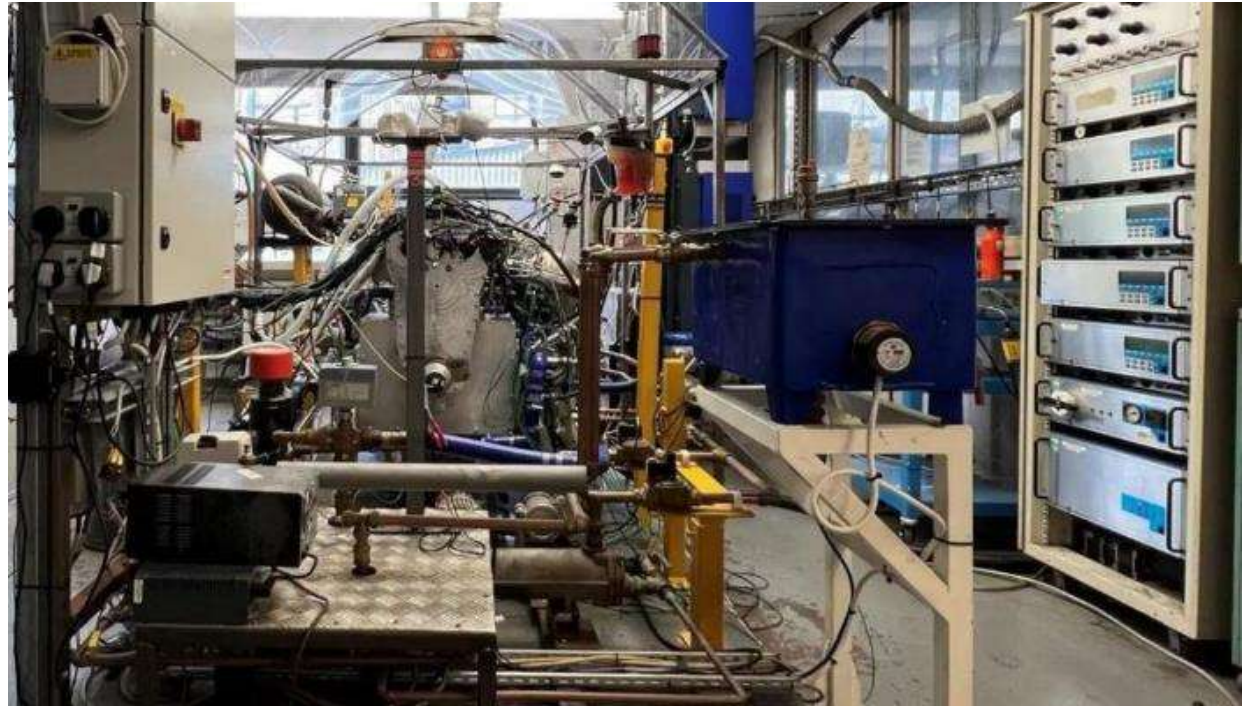
45kft altitude chamber



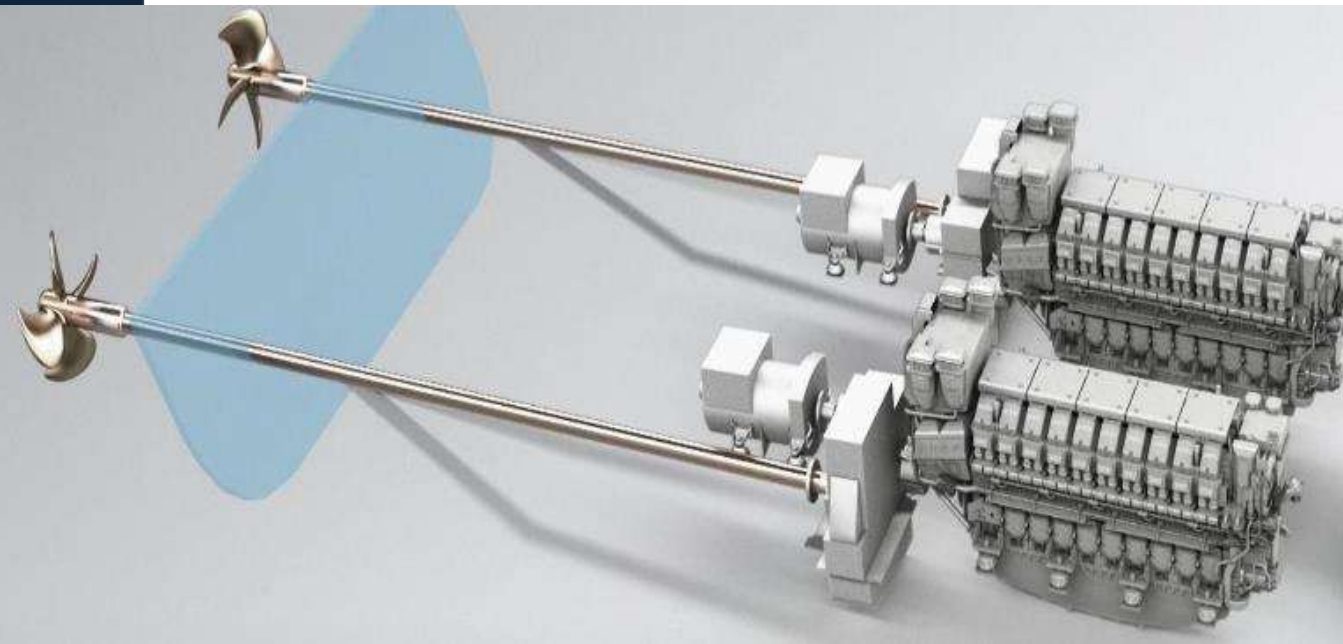
H₂ Hybrid Electric Propulsion Testing



Ammonia Cracker
Assembly (AFC Energy)



Flex Dual Fuel Engine with the novel Jet Ignition Combustion System
(MAHLE)



EPSRC “TITANZ”

- New £3.5M grant to commission a new, flexible large single cylinder
- MTU4000 - used in integrated electric propulsion systems at up to 3.2MWe (e.g. frigates, fast ferries, tugs, yachts etc.)
- Will enable research at scale of multiple fuels, disruptive combustion systems and emissions after-treatment



How we work with industry

High-TRL research projects with industry

Commercially contracted testing and R&D

Automated manufacturing line

Prototyping

Contracted testing services

Engineering consulting

Industry colocation

Incubator, lab & office spaces



Get in touch and learn more:



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