



# HyDEX Celebration Event showreel

Thursday 7 November 2024



Lead academic partners



# Agenda

## Time Morning session

9.30am	Registration and refreshments
10am	Welcome – Professor Mark Ormerod, Deputy Vice-Chancellor, Keele University
10.10am	Celebrating HyDEX – round-up of highlights of the programme. Professor Martin Freer, Academic Chair, HyDEX
10.35am	HyDEX influencing hydrogen policy
10.45am	Hydrogen innovators – projects, Q&A
11.45am	Refreshments – networking break
12.15pm	HyDEX skills and panel discussion

## Time Afternoon session

1.15pm	Lunch, plus showreel and videos
2.15pm	Keynote: The future of hydrogen in the Midlands. Sally Brewis, Head of Regional Development, Cadent
2.35pm	Panel discussion: The future of hydrogen in the Midlands <ul style="list-style-type: none"><li>• Panel chair: Sarah Windrum, Cluster Development Lead – Horiba-Mira</li><li>• Professor Martin Freer, Academic Chair – HyDEX</li><li>• Kelly Manders, Regional Development Manager – Cadent Gas</li><li>• Matt Barney, Chief Hydrogen Business Officer – GeoPura</li></ul>
15.10pm	Closing remarks. Beyond the HyDEX legacy

# Visit the exhibition on Floor 1, studio space



University of  
**Nottingham**  
UK | CHINA | MALAYSIA



UNIVERSITY OF  
**BIRMINGHAM**



British  
Geological  
Survey

The logo for FISHBONE, consisting of three blue and green arrows pointing right, followed by the word 'FISHBONE' in white capital letters on a dark blue background.

**FISHBONE**

**HI-ACT**

Hydrogen Integration for  
Accelerated Energy Transitions

**Belcan**

The logo for Midlands Innovation, featuring a stylized sun with rays in yellow and orange, followed by the text 'MIDLANDS INNOVATION' in dark blue capital letters.

**MIDLANDS  
INNOVATION**

The logo for IGEM, featuring a stylized flame in blue and orange, followed by the letters 'IGEM' in blue and orange, with a stylized human figure in blue and orange.

**IGEM**

Institution of Gas Engineers & Managers

The logo for Coventry University, featuring the text 'Coventry University' in blue, followed by a stylized blue swan.

**Coventry  
University**



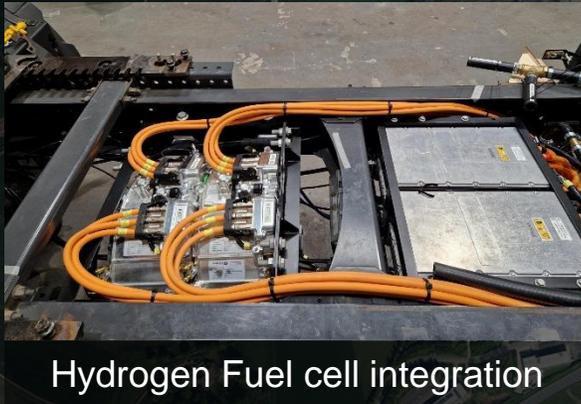
# MIRA



Get in touch



Hydrogen Ready Test Facilities



Hydrogen Fuel cell integration



Full vehicle digital twin capability



7MW Solar Array



1MW Electrolyser



Onsite Hydrogen Refuelling

# Hydrogen Skills for the East Midlands (UK)



## Understanding Hydrogen-related Skills & Knowledge Requirements in UK companies



Dr Hanlin Li, Loughborough University, [H.Li3@lboro.ac.uk](mailto:H.Li3@lboro.ac.uk)  
Sarah Gomes, Loughborough University, [S.Gomes@lboro.ac.uk](mailto:S.Gomes@lboro.ac.uk)

- The survey aims to understand the skills and knowledge that **East Midlands** & UK companies and employers prioritise when recruiting individuals for hydrogen-related work.
- Your responses will help us tailor educational programmes and training to better prepare the workforce for this growing sector, and ensure we are equipped with the talent needed to drive this clean energy transition.
- **Estimated time to complete survey: 20-25 minutes**

## ICEBreaker Hydrogen HGV offers new engineering approach to zero-emissions technologies

Combined expertise of Viritech, HORIBA MIRA and Intelligent Energy demonstrates new engineering approach to design, integration and operation of hydrogen FCEV drivetrains.

- Project delivers a technology toolset for light and heavy-duty commercial vehicle development aimed at meeting forthcoming Euro Green Deal CO<sub>2</sub> targets
- Fuel cell prime mover architecture verified for heavy-duty vehicles powered by two heavy-duty fuel cells configured in parallel
- Project proves critical hydrogen driveline componentry including high current DC-DC converters, bespoke high sampling rate battery management system and optimised battery pack, novel thermal management solutions and high-pressure (700 bar) hydrogen storage system
- Alongside hardware and software development, project has progressed whole vehicle integration, vehicle controllers and thermal management of an FCEV drivetrain
- HORIBA MIRA digital twin provides operators with a view of total cost of ownership and continuous drivetrain optimisation over the vehicle lifecycle



# ICEBreaker





# DELIVERING ELECTRIFIED EXCELLENCE IN PROPULSION TRAINING



Winner of the UK Transport Awards.

# Penn Engineered Solutions

Penn Engineered Solutions Ltd is an independent engineering and training consultancy providing transport propulsion and electrification engineering excellence for clients in a broad range of industry sectors both private and public sector. With more than thirty years' experience in transport propulsion systems we work with our clients to understand their skills and training requirements, map their knowledge gaps, and deliver solutions for upskilling and embedding competencies within the workforce.

**HYDROGEN –  
FUTURE FUEL FOR  
COMBUSTION  
ENGINES?**

RICHARD PENN  
NOVEMBER 2024

**HYDROGEN – FUEL  
CELLS NOW OR  
NEVER?**

RICHARD PENN  
NOVEMBER 2024

For more information, please contact [info@pennengineeredolutions.co.uk](mailto:info@pennengineeredolutions.co.uk)



[www.linkedin.com/company/penn-engineered-solutions-ltd/](https://www.linkedin.com/company/penn-engineered-solutions-ltd/)



# Clean Power Hydrogen plc

## Membrane-Free Electrolyser™

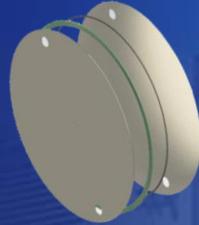


The technology combines our Membrane-Free Electrolyser™ (MFE) with cryogenic separation to deliver hydrogen and oxygen as separate gases.



**Qamar Khan**  
Business Development Manager

E: qamar.khan@cph2.com  
M: 07808 644428



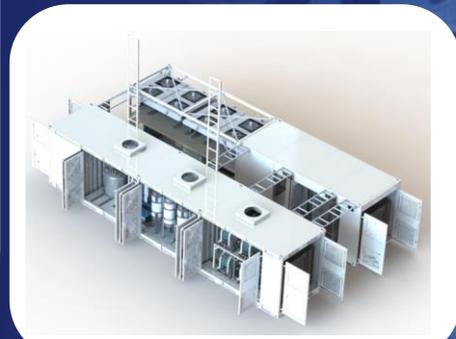
## Where?

Doncaster, South Yorkshire, United Kingdom



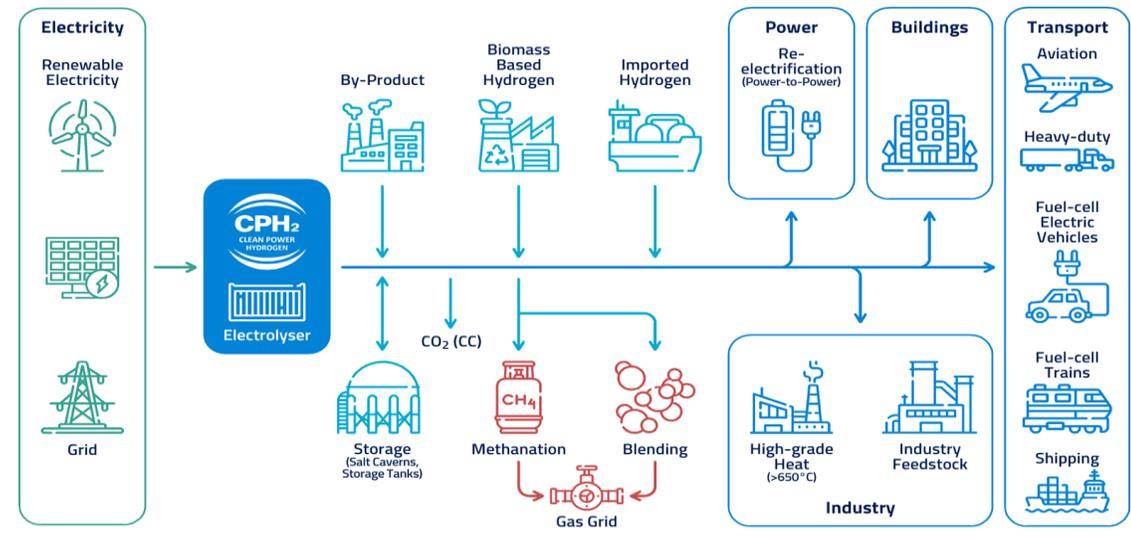
## What?

- No PGMs (Platinum Group Metals) → **Reduces OPEX** by removing the need to replace or maintain precious metals
- No membranes to degrade or fail → **Improves** reliability and performance
- Reduced stack complexity → **Easier** to maintain
- Less stringent water purity and minimal waste in process → **Reduces** water consumption and OPEX
- Oxygen by-product → **Reduces** OPEX via sale of by-product
- Constructed from readily available and reusable materials → **Reduces** waste to landfill



## How?

Supporting partners who want to produce electrolytic hydrogen



# Green Energy Project Delivery

**Gary Wain**

Strategy, Business Development & Innovation  
Director at Seacht Holdings Ltd.

Mobile: +44(0)7745 665 751

MS Teams Number : **+44(0)1425546750**

Email: [gary@seachtholdings.com](mailto:gary@seachtholdings.com)



UK BASED GROUP  
WITH OFFICES  
ACROSS THE UK



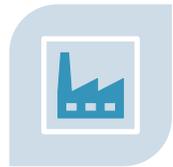
EXPERTISE IN SKID  
MOUNTED AND  
CONTAINERISED  
PIPEWORK SYSTEMS



GAS SYSTEMS AND HV  
DESIGN SERVICES



HEAT EXCHANGER &  
PRESSURE VESSEL  
MANUFACTURING



LARGE FABRICATION  
FACILITY NEAR  
SOUTHAMPTON



BUILD AND  
CONSTRUCTION



HEALTH AND SAFETY  
SERVICES



FULL TURN-KEY  
SERVICE AVAILABLE



**SEACHT**  
Holdings Group



Paul & Loughran Ltd



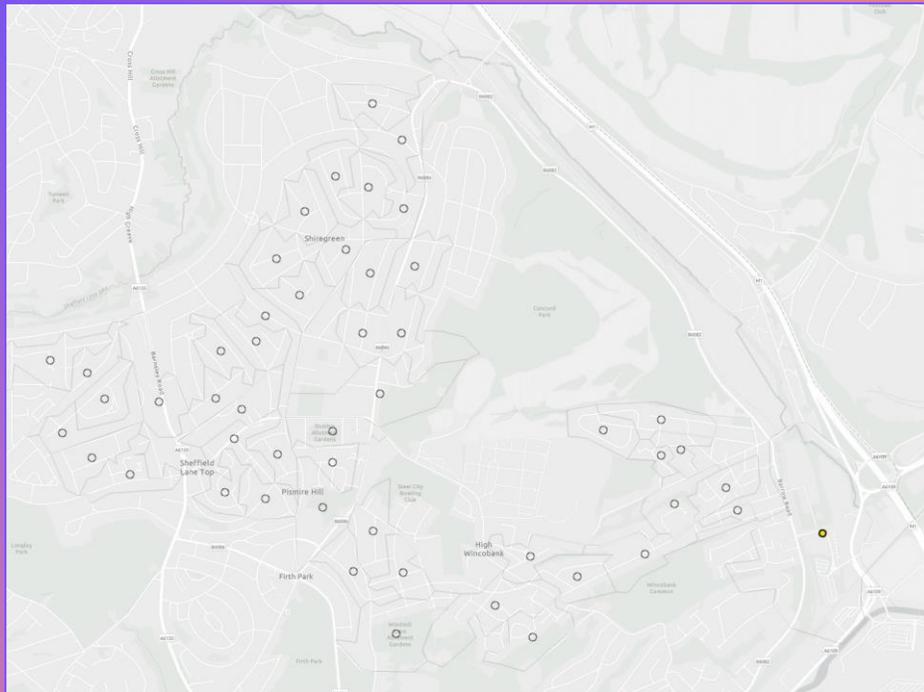
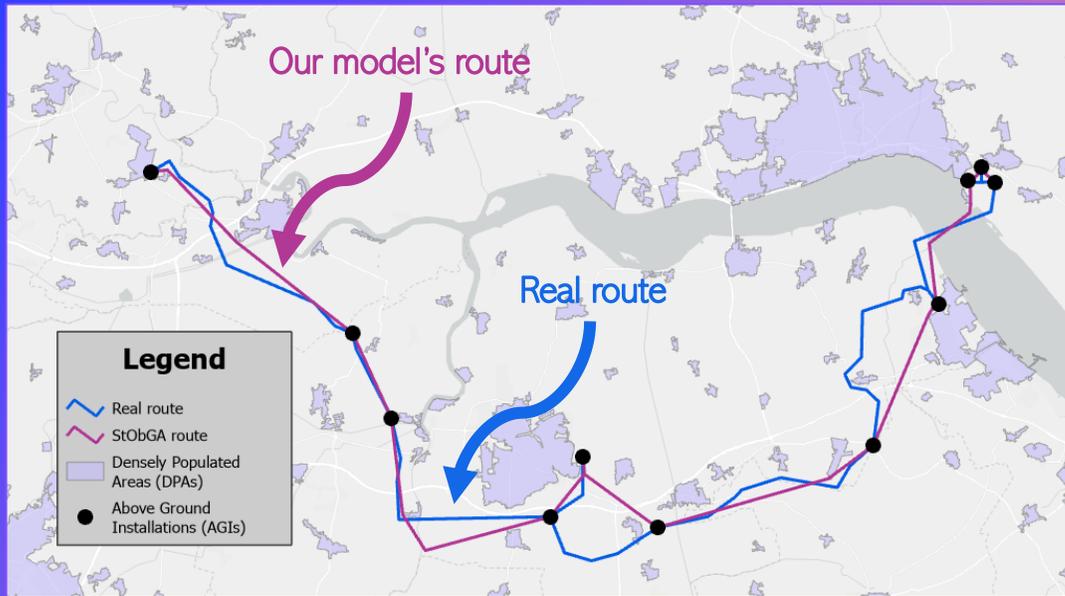
University of  
**Nottingham**  
Energy Institute



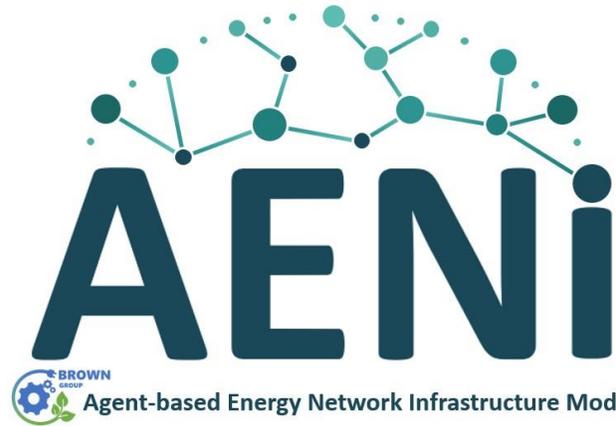
# University of Nottingham Energy Institute

Uniting multidisciplinary research





**Realistic designs**



Infrastructure planning and risk mitigation strategy analysis

To help with:

- Deep uncertainty in stakeholder decisions
- Lack of advanced forecasting and planning strategy tools



**Stakeholder forecasting**



**Pipeline network design**



**Dynamic forecasting**



**Risk analysis**

# British Geological Survey

<https://www.bgs.ac.uk/geology-projects/energy-storage/>

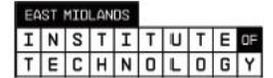
Please contact Edward Hough [eh@bgs.ac.uk](mailto:eh@bgs.ac.uk) for further information

- ❖ Hydrogen storage capacity estimates, regional and site-scale characterisation
- ❖ Natural (white) hydrogen studies
- ❖ Laboratory experimental capability: geochemical and microbial

# East Midlands Hydrogen



## Our Partners

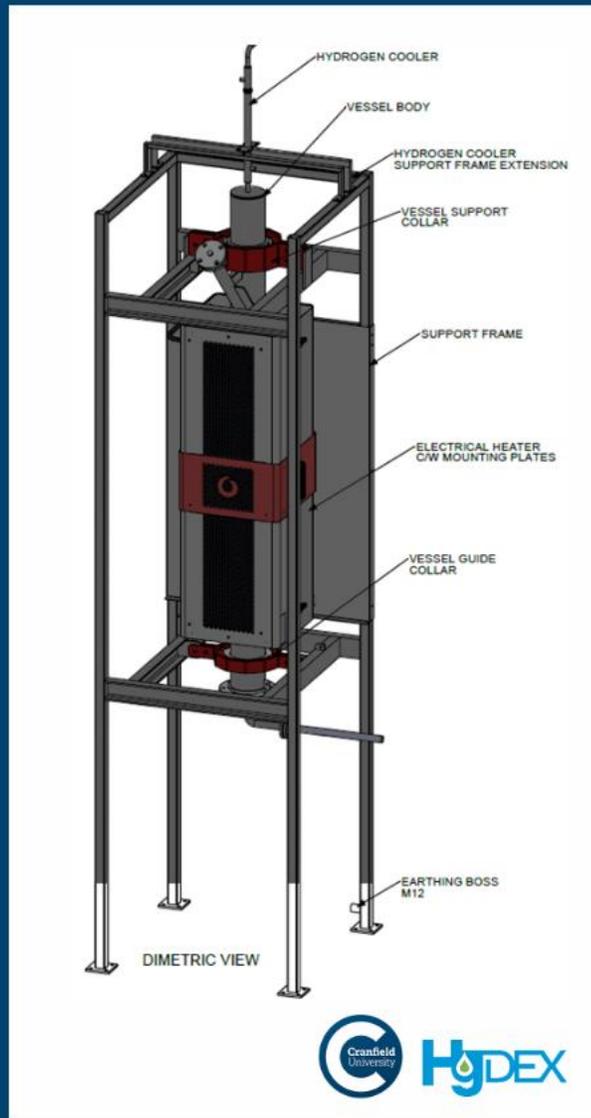


[www.eastmidlandshydrogen.co.uk](http://www.eastmidlandshydrogen.co.uk)





Blue Hydrogen Demonstrator



Turquoise Hydrogen Demonstrator



Bio-Methane Demonstrator



# Advanced manufacturing for hydrogen applications

*Unrivalled insight and facilities to take your hydrogen ideas further*

## Accelerating real-world solutions

- Combining industry-leading equipment with pioneering engineering minds under one roof
- De-risking projects utilising cross-sectoral engineering and industry expertise
- Supporting and enabling the hydrogen sector at every stage of the value chain
- Experience in privately-funded industrial projects, UK government and EU-funded programmes



## World-leading capabilities

- Manufacturing process and materials development
  - Additive manufacturing
  - Laser processing
  - Net shape processing
- Automation for assembly
- Design for manufacture
- Prototype build and testing
- Supply chain assessment
- Scale-up and factory optimisation
- Skills development
- Hydrogen-related componentry under active R&D:
  - Liquid hydrogen fuel distribution line components
  - Electrolysers
  - Pressure vessel for solid-state storage
  - Balance of plant systems design

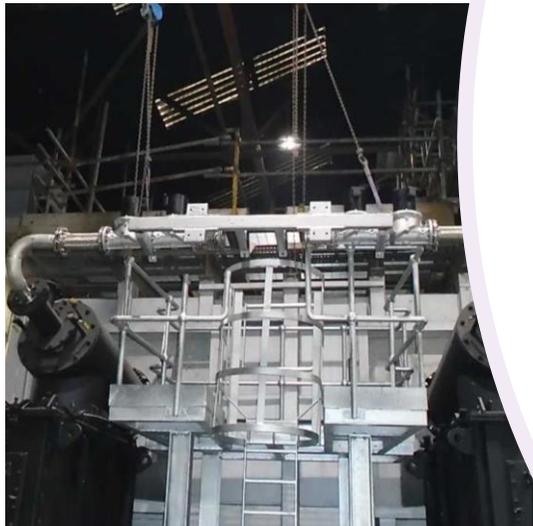
## About us

- Independent RTO – progressing innovation into industry
- Part of High Value Manufacturing Catapult
- c.1,000 staff
- Nationwide coverage

## Get in touch to accelerate your hydrogen project



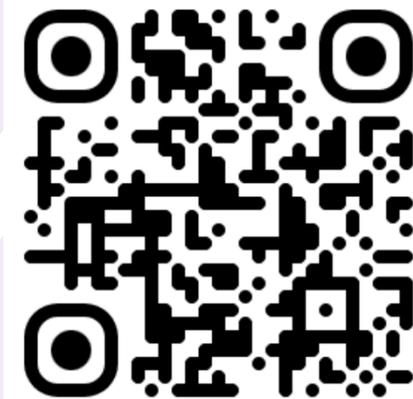
Chat with Huw, our hydrogen lead  
enquiries@the-mtc.org



SPECIALIST SERVICES FOR

# HYDROGEN EMERGENT TECHNOLOGY CHEMICAL & PROCESSING

ENGINEERING | CONSULTANCY | PROJECT DELIVERY



**WE ARE HERE TODAY!**

# Clean Ammonia on Demand

## Would you like to learn more about Nium?

Let's talk - please get in touch: [hello@wearenium.com](mailto:hello@wearenium.com)



 **We're Social**

Join us on [LinkedIn](#) for the latest updates from Nium. We also write a [newsletter](#) featuring nano-sized posts on our journey, the power of clean, green ammonia and its potential to help deliver a Net-Zero future.

[www.wearenium.com](http://www.wearenium.com)

### UK HQ

Unit A, 126 Olympic Avenue  
Milton Park, Abingdon  
Oxfordshire OX14 4SA  
United Kingdom

### R&D Labs

Research Complex at Harwell (RCaH)  
Rutherford Appleton Laboratory  
Harwell Oxford, Didcot  
Oxfordshire OX11 0FA  
United Kingdom



# Flex-Fuel Heavy-Duty Engine: H<sub>2</sub>, NH<sub>3</sub> ... and more!

Decarbonisation via  
Dual-Fuel Operation

**100% Diesel**  
Operation Possible!



University of  
Nottingham

UK | CHINA | MALAYSIA



Contact:

[Alasdair.Cairns1@nottingham.ac.uk](mailto:Alasdair.Cairns1@nottingham.ac.uk)

# East Midlands Infrastructure Partnership

Informing  
Infrastructure  
Investment



[adriancoy@btinternet.com](mailto:adriancoy@btinternet.com)



East Midlands  
**Councils**

# The Institution of Gas Engineers and Managers (IGEM)

You can find us at:

[www.igem.org.uk](http://www.igem.org.uk)

Or on this Qr code to find



# Pioneering Sustainable Solutions

**Tomato Sustainables** is leading the clean energy revolution and is well-positioned to meet the growing global demand for sustainable solutions.

We are not just participating in the energy transition; we are accelerating it. We are transforming how businesses approach sustainability through strategic innovation and industry-leading technologies.

We aim to be the trusted partner for organisations committed to a zero-carbon future. By blending cutting-edge technology with practical solutions, we're making renewable energy more accessible, efficient, and economically viable for businesses worldwide.



## Innovation portfolio

- Sustainable Aviation Fuel (esAF & BioSAF)
- Green hydrogen
- E-Methanol
- Green Ammonia
- Carbon capture technology
- Advanced materials (Green cement)



## Current projects

- Building 1MW Hydrogen PEM Electrolyser
  - ~400 kg/day Green H2 production
  - 90 cars/day fuelling capacity
  - Onsite e-Methanol production
  - Supply of H2 to e-SAF producers
- Setting up a **SAF innovation HUB** at the University of Oxford Innovation Park.



## Partner with us

- Joint development projects
- Commercial scale-up
- Grant funding collaborations
- Investments for TRL upgrade



## Connect with us

**Dr Sanjeev Gajjela**

Director of Sustainables

[sanjeev.gajjela@senapt.co.uk](mailto:sanjeev.gajjela@senapt.co.uk)



# Developing a market network model of the hydrogen economy in 2040

An opportunity to contribute to a better understanding of market and stakeholder involvement in hydrogen; the barriers and opportunities; looking forward to 2040.





## Value Add Services and Mission Critical Digital Solutions from Concept to Postproduction

### COMPANY FACTS



Founded in 1958



Network of ~10,000 Associates  
96% Employee Satisfaction



CMMC 2.0 Level 2 Certified



Cincinnati, Ohio HQ  
Over 50 Global Locations  
Business Execution in Over 30 Countries

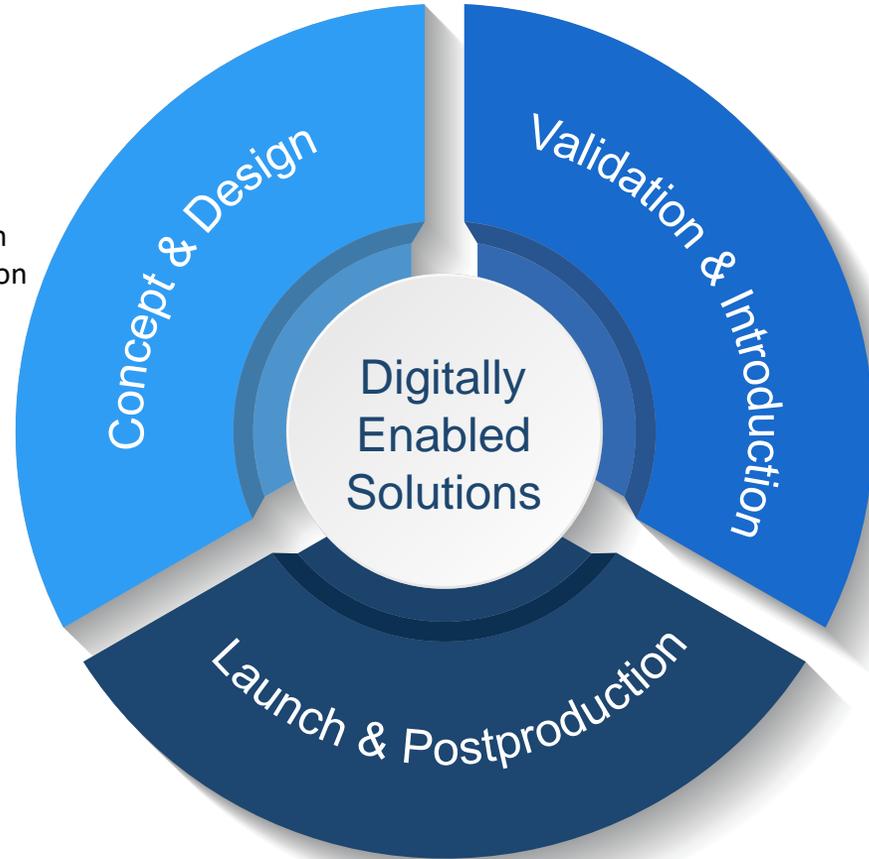


Over 500 Active Customers  
Decades-Long Relationships With Blue-Chip Clients  
98% Favorable Feedback from Clients



#### UK Offices in:

- Derby
- Bristol
- Runcorn
- Glasgow
- Cheltenham
- Southampton
- London



### Product Engineering

- Design & Development
- Engineering Analysis
- Validation
- Sustaining & Aftermarket



### Systems & Software

- Model-Based Engineering
- Embedded Systems
- Enterprise Software
- C5ISR



### Manufacturing & Supply Chain

- Manufacturing & Quality Engineering
- Sourcing & Procurement
- Supplier Development & Rapid Recovery
- Digital Supply Chain

### INDUSTRY EXPERTISE



Aerospace



Defense



Space



Marine



Automotive



Off-Highway



Government



Industrial

#### Quality accreditations:

- ISO9001/2015
- ISO 14001 & ISO45001
- AS9100
- Cyber Essentials +



# Gareth Rogers

## Ambition North Wales

The North Wales Growth Deal provides £240m combined Welsh and UK Govt. capital funding until 2035.

Looking to connect for:

- Green hydrogen project development
- Hydrogen offtake
- Investors, supply chain, skills

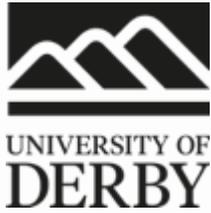
[garethrogers@uchelgaisgogledd.cymru](mailto:garethrogers@uchelgaisgogledd.cymru)

[www.linkedin.com/in/ghrogers](https://www.linkedin.com/in/ghrogers)



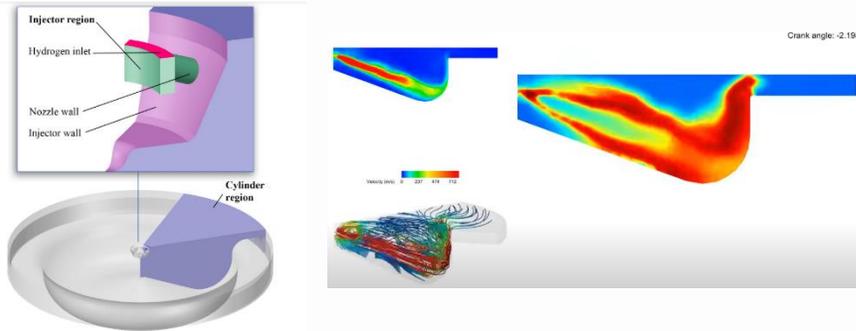
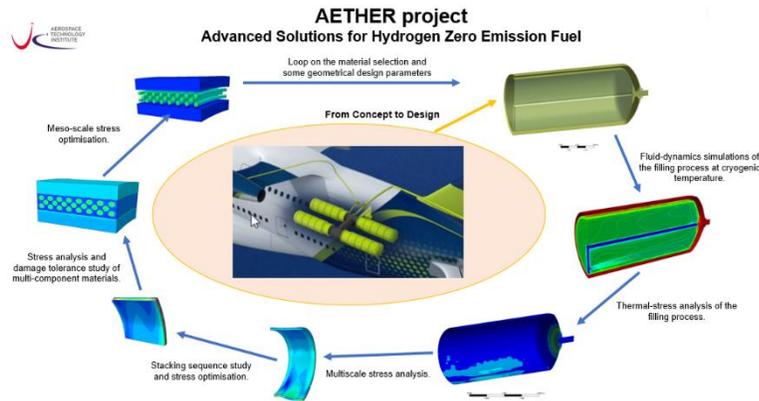
Uchelgais  
Gogledd Cymru  
Ambition  
North Wales





# Hydrogen storage system in cryogenic environment

Prof Stefano Valvano and Prof Angelo Maligno



## Modelling direct hydrogen injection

Dr Shahed Motaman

## Alkaline Water Centrifugal Electrolyser for hydrogen extraction

Derek Beacroft and Dr Amar Bousbaine



# Future Fuels Innovation @ UoD

## Hydrogen Awards 2024



High Commendation Trophy  
UK Universities' Award  
Excellence in hydrogen research and innovation"

For more information, contact:  
[S.Valvano@derby.ac.uk](mailto:S.Valvano@derby.ac.uk)



**cavagna group**

Wherever gas is used, we are there

# H<sub>2</sub> SOLUTIONS

**Cavagna Group has safely operated hydrogen equipment for multiple applications for over 45 years by focusing on:**

- Hydrogen Storage and Control
- Hydrogen Distribution
- Hydrogen Treatment
- Hydrogen for Transportation Applications



If you would like more information on our range of products suitable for H<sub>2</sub> applications, please contact:

Kelly Vasir on

[kellyvasir@uk.cavagnagroup.com](mailto:kellyvasir@uk.cavagnagroup.com)

07494396124





# Air Products – Immingham Renewable Hydrogen Facility

As the world’s largest hydrogen supplier, Air Products is taking **major steps to accelerate the energy transition with low-carbon and renewable hydrogen.**

**210 Tonnes** Of Hydrogen production / day  
(300 MW eq. = 3% of HMG 2030 target)

**320 GWh** Storage of readily-dispatchable energy

**580,000** Tonnes GHG reduction/yr

**£4.6 bn** GVA

**1,400** Regional jobs



## Our Higher Purpose:

Bringing people together to **collaborate** and **innovate** solutions to the world’s most significant energy and environmental sustainability challenges

*“Solving industry challenges through collaboration and technology”*



- Maintenance Optimisation & Life Extensions
- Risk Management
- Mechanical, Electrical and Systems Engineering Integration & Turn-Key Projects
- CAD Design, Structural Analysis and Drawings
- Safety Design and Assurance
- Logistics & Materials by Rail
- Cloud based data analytics platform
- Business Intelligence/ Big Data Analytics
- Project Management
- Operations Led Engineering



[www.fishbonesolutions.co.uk](http://www.fishbonesolutions.co.uk)



+44 (0)1332 899190

## Why MTI?

We simplify the process for the automotive industry to equip their workforce with the specialised skills essential for success;

Partnering with us offers several benefits:

- Flexible curriculum tailored to meet employer needs
- Comprehensive training solutions from a single source at all levels
- Opportunity to influence our training programs
- Continuous skill development within one organisation

## Current Hydrogen Related Courses

- The Impact of Hydrogen HGV to the world of logistics and automotive (3 days)
- Understanding Hydrogen HGV - Awareness and Behaviours (1 day)
- Hydrogen Fuel Cells and their Applications (1 day)
- IMI Level 1 Hydrogen Vehicle Awareness (1 day)

SCAN ME  
FOR MORE  
INFORMATION



GET STARTED

[WWW.MTI.AC.UK](http://WWW.MTI.AC.UK) [ENQUIRIES@MTI.AC.UK](mailto:ENQUIRIES@MTI.AC.UK)

Leaders in Pressure Control and Flow Measurement of Hydrogen

[enquiries@ftgascontrol.co.uk](mailto:enquiries@ftgascontrol.co.uk)

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[www.ftgascontrol.co.uk](http://www.ftgascontrol.co.uk)



ft gas control



Lead academic  
partners



Stakeholder Workshop  
on

# UK Hydrogen Supply Chain:

Capabilities, Readiness, and Strategic Challenges



Thursday, 5<sup>th</sup> December 2024



NAIC Building, University of Warwick

Scan it to register

Supported by:



Innovate  
UK

# Supply Chain Research Group





## **Coventry University Hydrogen Energy School**

- 3-day course designed for industry professionals to deepen their knowledge of hydrogen technologies and their role in a net-zero energy system
- The course combines theoretical knowledge with practical, hands-on activities conducted in the Hydrogen Energy Applications Laboratory

## **Collaboration Opportunities**

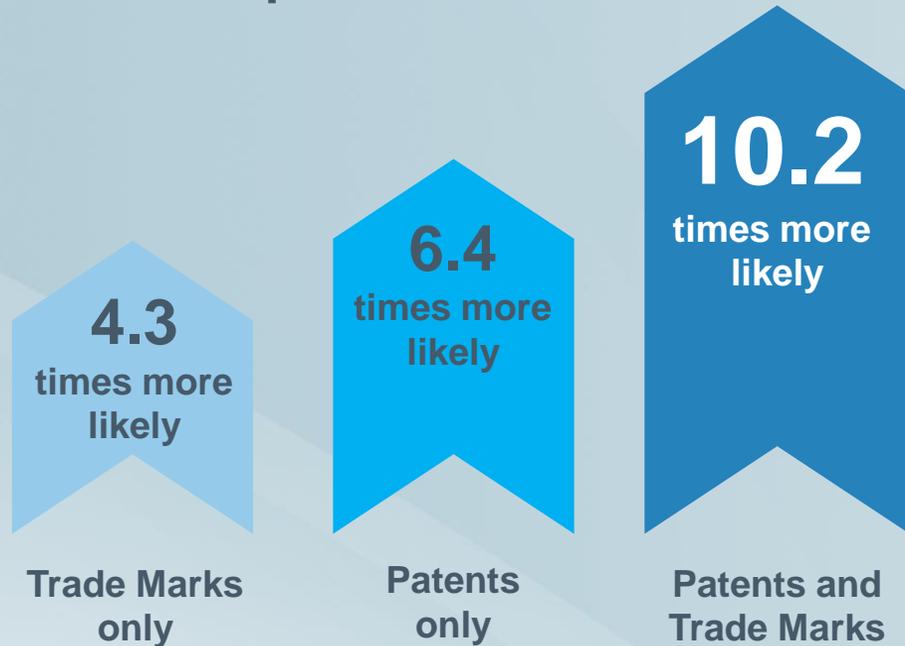
Partners required for forthcoming AWP 25 Calls opening in January 2025

Come and have a chat at our stand or e-mail:

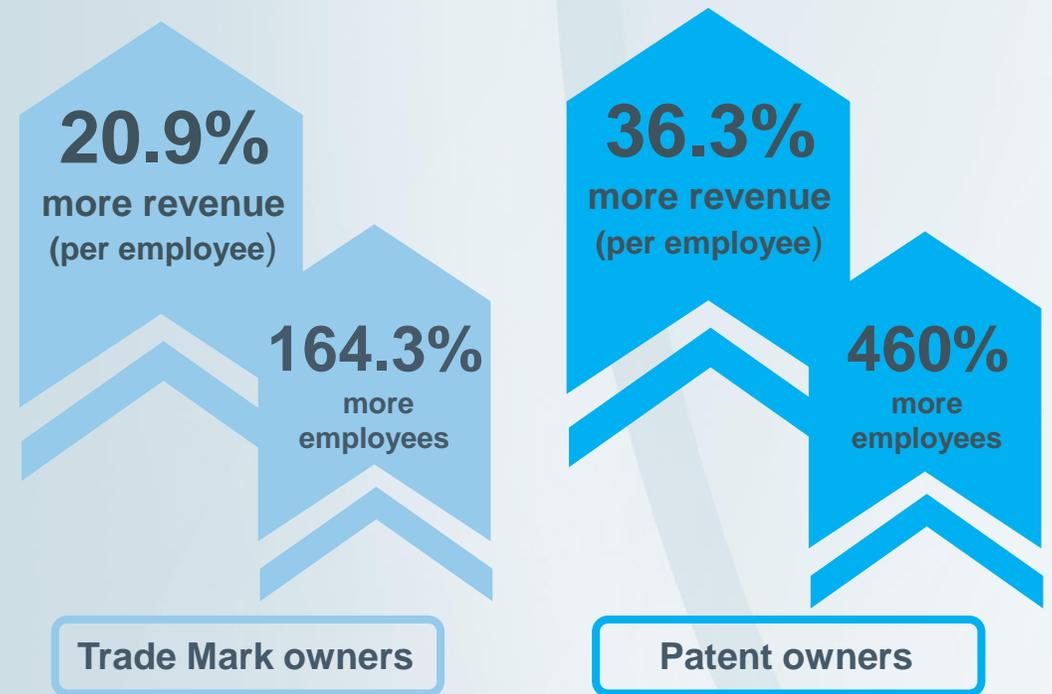
[o.curnick@coventry.ac.uk](mailto:o.curnick@coventry.ac.uk) or [j.graves@coventry.ac.uk](mailto:j.graves@coventry.ac.uk)

# The benefits of Intellectual Property Rights

## Increased likelihood of investment for start-ups



## Increased company size and revenue (IPR owners compared to non-owners)

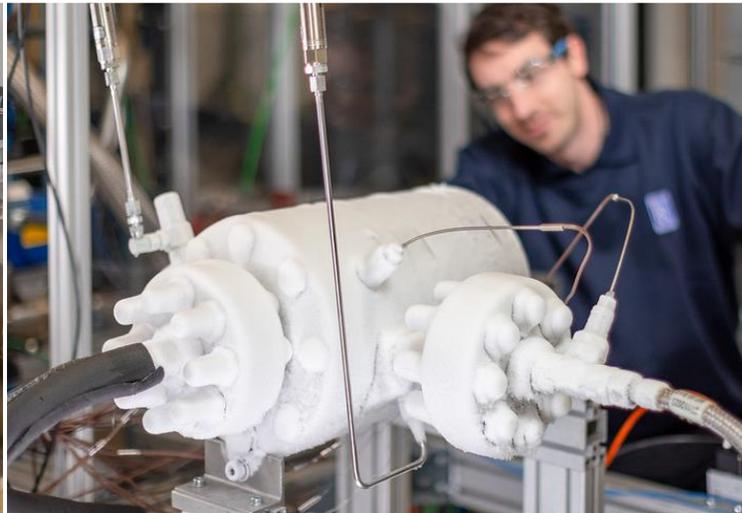
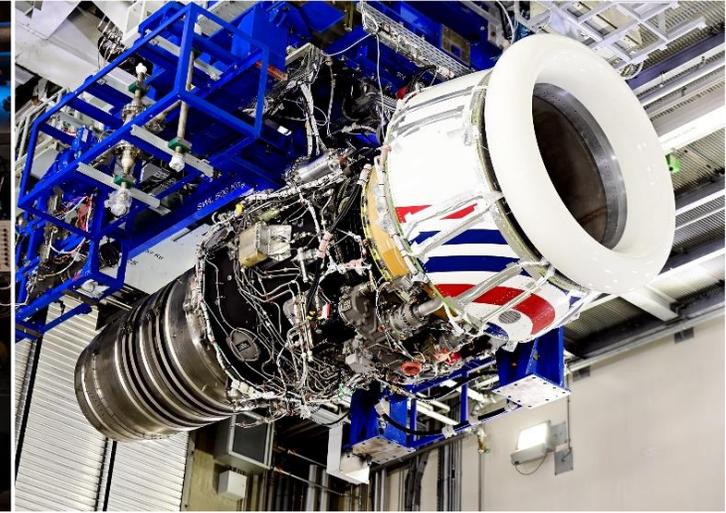
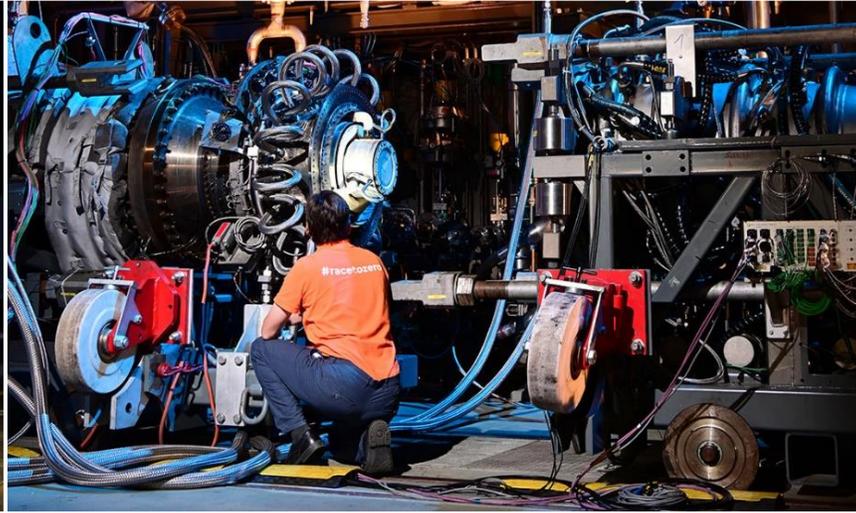


International Intellectual Property Experts  
Scan the QR code to get in touch with one of our IP experts for a FREE one-to-one consultation





# Our World leading hydrogen demonstrator programme





## Hydrogen Integration for Accelerated Energy Transitions

Our mission is to deliver impactful research, through co-creation with stakeholders, which delivers an evidence base for hydrogen integration in the future net-zero energy transition.

As well as technical integration questions, HI-ACT will also look at broader topics such as the development of cyber-physical architecture and the hydrogen supply chain, and how the perceptions of policy makers and the wider public will influence hydrogen rollout. (NOTE: we look at hydrogen and hydrogen based alternative liquid fuels (HALF)).

# PROVEN RESEARCH EXCELLENCE

**What we**

**do:**

**Catalyse research  
collaborations**

**Power economic  
growth**

**Tackle regional  
challenges**

**Positively impact  
communities**

**How we do it:**

**Championing**

**Facilitating**

**Partnering**

**Influencing**

# MI KEY PROJECTS:

- Energy
- Space
- Health
- Inclusive transformation
- Research infrastructure
- Skills
- Powering growth



# A strong track record of collaboration

Established in 2015, the Midlands Innovation (MI) partnership was created to build on a history of collaboration and strong partnership between its members.



**MI Health** created to coordinate the delivery of improved health and regional growth.



**Cranfield and Keele join MI.**



**MICRA**  
COMMERCIALISATION OF RESEARCH ACCELERATOR



**MI SPACE**

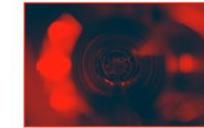


**C-DICE**, C-DICE established. Funded by UKRI with a focus on building postdoctoral skills for the infrastructure, cities and energy sectors.

**MI Immunology Network** set up to encourage research collaboration and build training opportunities.



**TALENT Commission** report published setting out the future vision for the UK's technical talent.



**Midlands MINDFORGE**



**Launch of Electron Microscopy Network.**

After a successful FDI pilot programme, the **Invest in UK University – Midlands Campaign** is launched with £1.5m ISPF funding matched by £1.5m from regional partners.

**2015**

**2016**

**2017**

**2018**

**2019**

**2020**

**2021**

**2022**

**2023**

**2024**



**HETS and Papin Prizes** for technical excellence launched.



**PAPIN PRIZES**



**Energy Research Accelerator (ERA)** launched with £60m of government investment and £120 from co-investment, creating the largest UK research network dedicated to accelerating clean energy solutions.

**Technician Commitment**

Eight MI partners become founding signatories of the **Technician Commitment**.



**MICRA** initiated to strengthen our spinout and start-up ecosystem, to accelerate innovations to market.



**SPACE Collaborative research group** formed, to explore opportunities to help shape the future of space technology.



Artist's view of a Galileo FOC satellite. Credit ESA. P. Carril



**TALENT programme** created to influence opportunity for technical skills, roles and careers.

**Inclusive Transformation** launched to focus on the social and economic challenges impacting communities.



**Mobilising Research to Tackle COVID-19** report published showing how the Midlands acted to deliver £90m of research to tackle the coronavirus pandemic.



**HyDEX** launched to support and foster the creation of a new Midlands hydrogen economy.



Research England Funds the national **Institute for Technical Skills and Strategy**.

MI secures funding from DSIT and the Midlands Engine to lead the **Universities as Drivers of Foreign Direct Investment (FDI) Pilot**, exploring the role universities can play in driving overseas investment into regional R&D.

**Midlands Mindforge** first phase of fundraising gets underway.





# CONNECTIVITY FOR THE HYDROGEN INDUSTRY



Pushing Performance  
Since 1945

PRODUCTION

PREPARATION

STORAGE

H<sub>2</sub>

DISTRIBUTION

REFUELLING

CONSUMPTION



## OUR CONNECTIVITY SOLUTIONS, YOUR BENEFITS:

- PLUG & PLAY
- MODULAR & SCALABLE
- INTRINSIC SAFETY FOR ZONE 1 & 2
- CUSTOMISED ENGINEERING COMPETENCES
- PROFESSIONAL LABORATORY SUPPORT

# Composites, done differently

## Higher Volume

## Lower Cost

## Sustainable

# Conformable Pressure Vessels

- Type 4/5 Pressure Vessels
- Currently TRL 4 – Developed under DFT TRIG Funding
- Improved Volumetric Efficiency for Complex Shaped Spaces (>15% improvement)
- Improved Gravimetric Ratio
- Looking for projects and partners to develop technology further

[enquiries@compositebraiding.com](mailto:enquiries@compositebraiding.com)

01332 480106

[www.compositebraiding.com](http://www.compositebraiding.com)



CompositesUK

Industry Awards 2024  
WINNER  
Sustainability Award: Circularity



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Industry Awards 2022  
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Sustainability Award: Net-Zero Initiative



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Industry Awards 2021  
WINNER  
Innovation in Composite Materials



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