



# VENTUREFEST

SOUTH WEST

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**MARINE TECHNOLOGY:  
CASE STUDIES OF  
EXCELLENCE AND OPPORTUNITIES**

# Teignbridge Propellers International

A Dedicated Test Vessel for Marine Technology  
Innovation

Venturefest SW, 18 October 2016

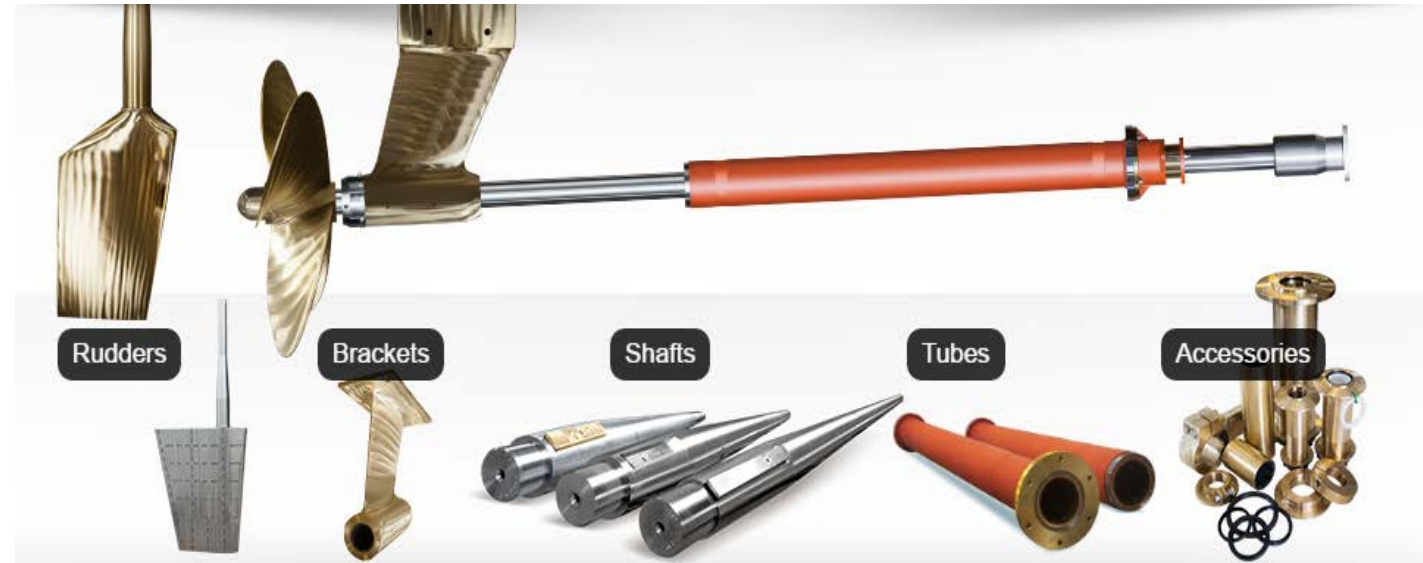
**Ian Godfrey** CEng  
Development Design Engineer



# Teignbridge Propellers



- ✿ Over **40 years** experience (est. 1974)
- ✿ 65,000 sq ft factory
- ✿ Brunel engine shed in Newton Abbot, Devon
- ✿ Up to **2.55 metres diameter** propellers
- ✿ Up to **400mm** diameter shafts
- ✿ Aluminium bronze and duplex steel
- ✿ **On site foundry** – ability to pour up to **4 tonnes**
- ✿ Commissioning Indian factory this week
- ✿ **Export over 85%** of products
- ✿ **85** employees
- ✿ Turnover c.**£8 million**



# Innovation



## Traditional industry that values

- ✿ Reliability
- ✿ Safety
- ✿ Redundancy
- ✿ Low costs

## New, additional industry drivers

- ✿ Energy Efficiency Design Index
- ✿ Pollution – air and sea
- ✿ Land pressure pushing industry offshore
  - Pharmaceuticals
  - Food
  - Minerals
  - Energy
- ✿ Security

Maritime transport emits ~1000 million tonnes of CO<sub>2</sub> annually.

**2.5% of global greenhouse gas emissions** (3<sup>rd</sup> IMO GHG study).

Shipping emissions are predicted to **increase between 50% and 250%** by 2050.

Situation incompatible with the internationally agreed goal of keeping global temperature rise below 2°C compared to pre-industrial levels, which requires worldwide emissions to be at least halved from 1990 levels by 2050.

Global impact on climate change

Growth of UK maritime industry

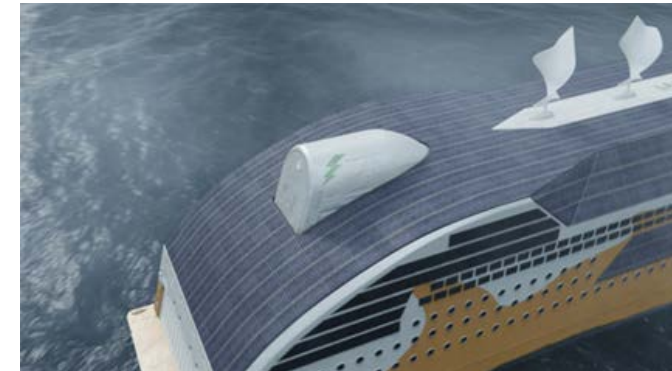
Regional and national growth in jobs and economy

On our doorstep and in our heritage

# Innovation

## Marine environment ripe with opportunity

- ✿ Electric and hybrid propulsion
- ✿ Podded propulsion – control, flexibility, efficiency
- ✿ Offshore renewable energy generation and use
- ✿ Sails, kites, Flettner rotors, solar panels
- ✿ Logistics, planning and infrastructure
- ✿ Vessel autonomy
- ✿ Integrated marine information technology
- ✿ Global, high speed internet coverage – 3G standard currently costs £50k upfront cost and 1,000MB for £1k/month
- ✿ Manufacturing, processing and distribution hubs at sea



# Teignbridge Test Vessel

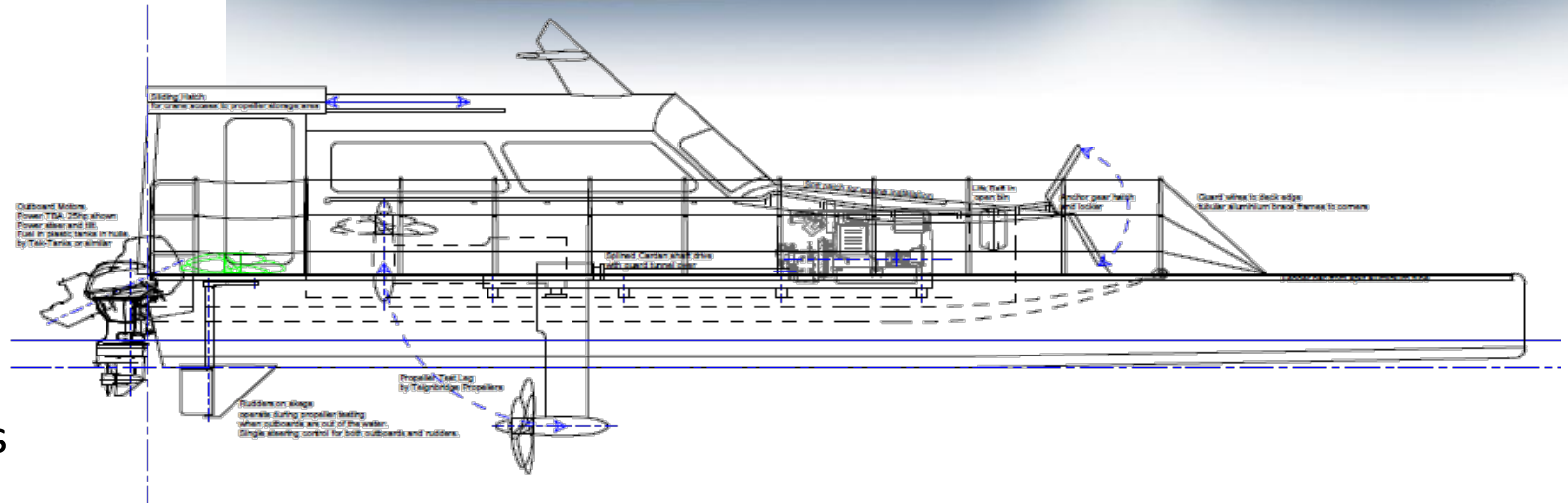


Facility to test and evaluate marine components in high-flow environments – refining existing propeller designs and developing new technology including tidal and run-of-river current turbines.

Prototype, test and validation tool to complement onshore hydrodynamic and numerical testing.



- ✿ Length **13.5 m**
- ✿ Beam **5.3 m**
- ✿ Displacement **5.0 tonnes**
- ✿ Test payload **~0.5 tonnes**
- ✿ Powertrain **370 kW**
- ✿ Speed up to **40 knots**



**AVAILABLE FOR HIRE FROM SUMMER 2017**

**TALK TO US ABOUT YOUR PROJECT**

# Teignbridge Test Vessel



## The alternatives

**Full scale testing** – expensive, vessels engaged on commercial work, risk too high

**Part scale testing** – scaling challenges well understood, but still limiting

**Numerical testing** – improving all the time, but currently expensive. Always needs validation in the real world.

## The Teignbridge Test Vessel advantage

Fills a gap between part scale and full scale testing – up to 1.3m diameter

Reduces commercial risk associated with development on customer products

Provides a platform for rapid prototyping new concepts and their variations

## The design brief

**Modular powertrain** – podded thruster with clear water onto propeller

**Rapid component change** – pod raised into vessel through moon pool

**Flexible** – vessel speed, vessel resistance, 6 speed gearbox

**Highly instrumented** - engine performance, environmental characterisation, ship motions, propeller visual inspection and load data

Nov 2016 – vessel build by Exeter Fabrication Ltd

Feb 2017 – powertrain installation and pre-commission

Mar 2017 – fit out including electrical systems

Mar 2017 – hull and superstructure build completion

Apr 2017 – Inshore commission

May 2017 – offshore commission

June 2017 – first research project underway

# Making industrial innovation work

## Established Industry

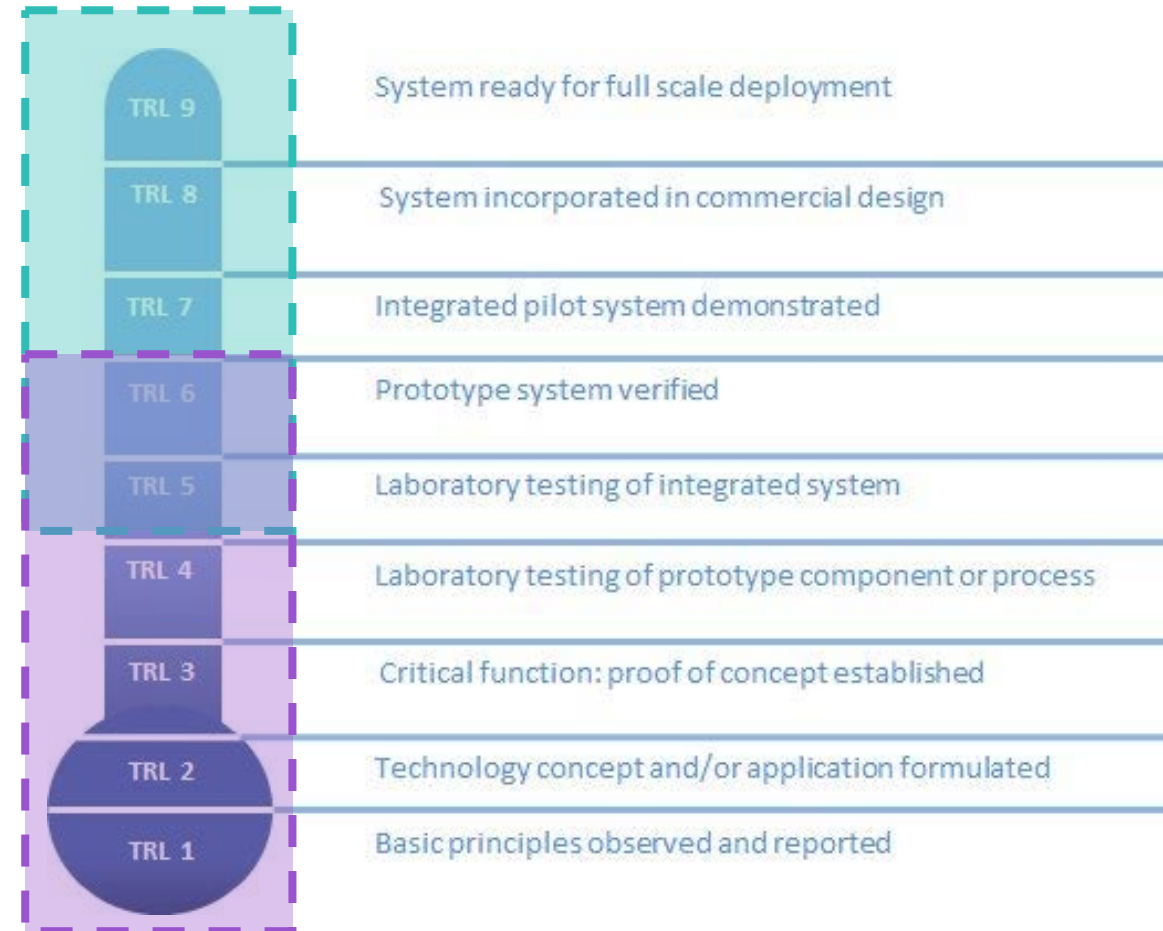
- Recognise new routes to new products and markets
- Establish working relationships with academia
- Recognise gaps in expertise

## Academia, R&D, Technology Developers

- Recognise gaps and establish links with companies
- Industry led research with commercial impact
- Engage industry earlier in the process

## Government and third sector

- Create the right environment
- Foster partnerships – clusters of companies
- Identify common challenges and highlight opportunities





# Making industrial innovation work



## Experience

- Design for specific environments – corrosion, load scenario building, failure data
- Designing to highly regulated systems
- Engineering feel
- Alternative materials

## Staff and capability

- Design for manufacture
- Engineering
- Highly skilled labour – achieving quality, precision, safe working
- Casting, machining, assembly, inspection

## Assets and facilities

- Teignbridge Test Vessel
- Tools (Hurco) – 3.0 x 1.8m
- Material test laboratory
- Faro arm 3D inspection and scanning
- Workshop space

## International Reach

- Sales and distribution
- Engineering and maintenance
- Partner suppliers
- Customers

## Investment

- Materials
- Prototyping



**UK Manufacturing** – “we don’t make anything any more”

- 11<sup>th</sup> largest manufacturing country in the world and a reputation for quality
- 25% GDP, 2.6 million people, 10% UK GVA, 44% all exports

# Thank you for listening

Venturefest SW, 18 October 2016

**Ian Godfrey** CEng  
Development Design Engineer





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KEEP IN TOUCH**