

# Wave Energy Transmission Module

Wave Energy Scotland PTO Inception  
Workshop

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17 November 2015

# Goal

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- Develop a PTO Module comprising a **gearbox and generator** capable of converting the reciprocal motion of a **variety of wave energy converters** into grid-compliant electricity at a **low Cost of Energy**.

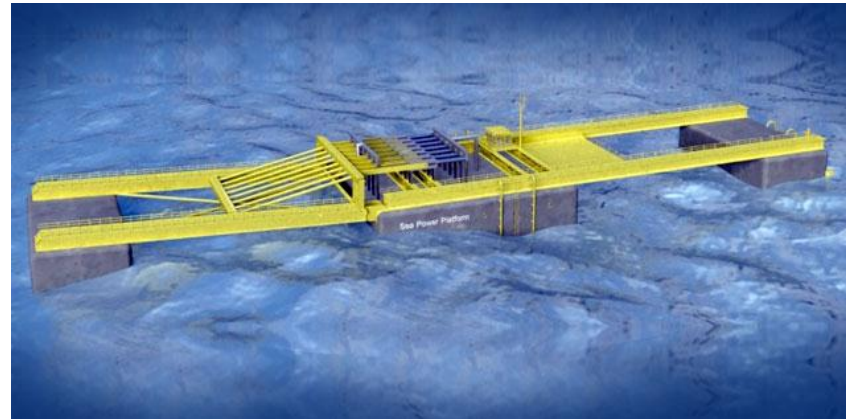
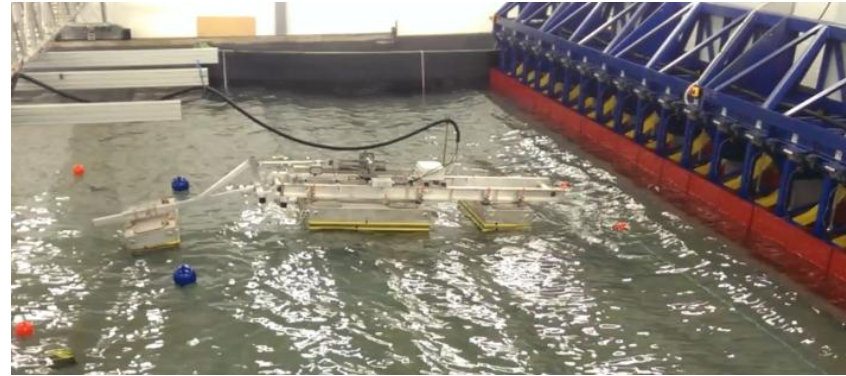
# Who we are

- Sea Power Ltd
- Limerick Wave
- Pure Marine Gen Ltd
- Romax Technology Ltd (lead partner)



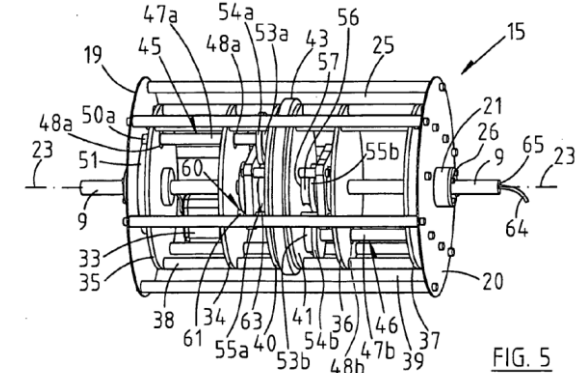
# Sea Power Ltd

- Developers of the SeaPower Platform.
- Extensive scale testing and numerical modelling already carried out.
- Strong ongoing development plan supported by WES and other funding.



# Limerick Wave

- Patent holders for a novel mechanical PTO configuration which incorporates:
  - Mechanical rectification of rotation direction.
  - Inertial energy storage/smoothing.
  - Robust enclosure.



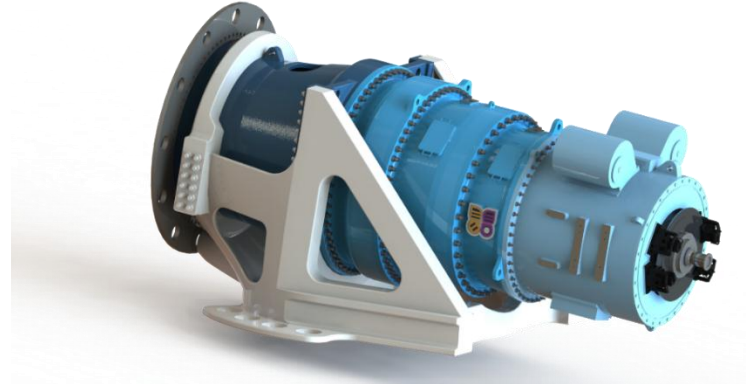
# Pure Marine Gen Ltd

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- Technology, research, and project delivery services to the marine energy sector.
- Mechanical-hydrodynamic modelling of wave energy devices for performance analysis.
- Extensive experience in marine energy.

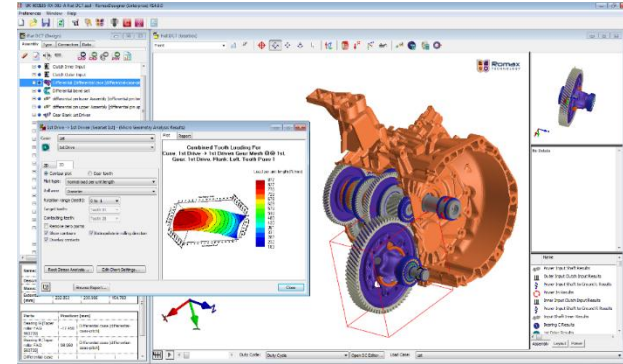
# Romax Technology Ltd

- Design and delivery of transmission solutions
  - Bespoke and licensed designs
  - Build and test support
  - Supply chain audit
  - Certification

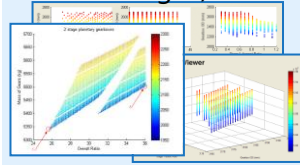


# Romax Technology Ltd

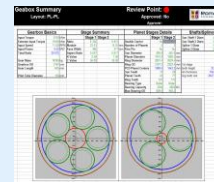
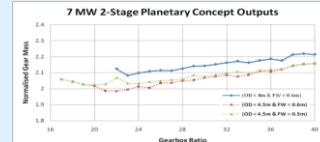
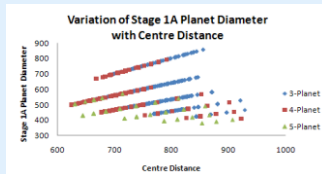
- Drivetrain Simulation
- Concept Development
- Cost of Energy modelling



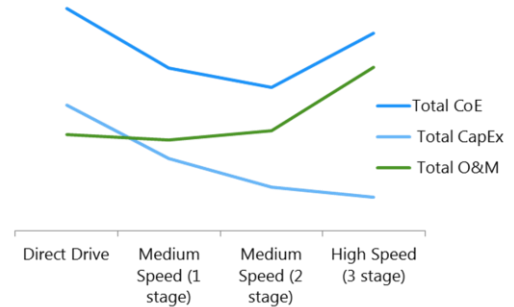
Generate possible concepts (**10,000+** designs)



Remove unfeasible designs (**1000+** designs)



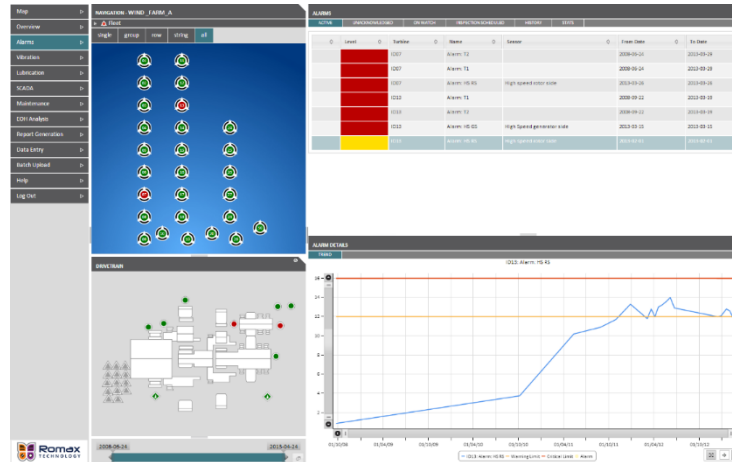
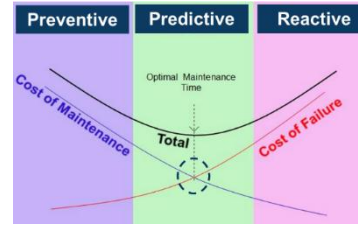
Down-select to **<10** preferred concepts





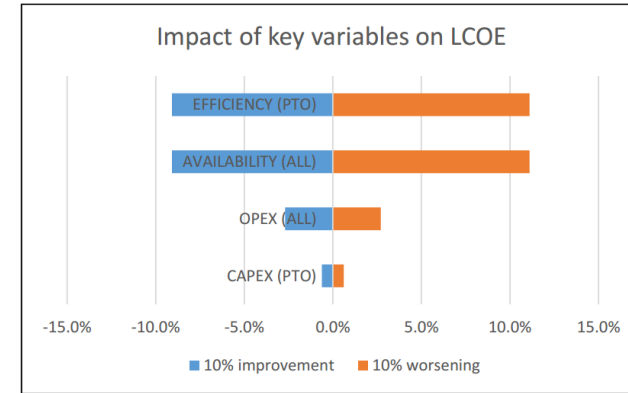
# Romax Technology Ltd

- Operator support, field services, inspection and condition monitoring.

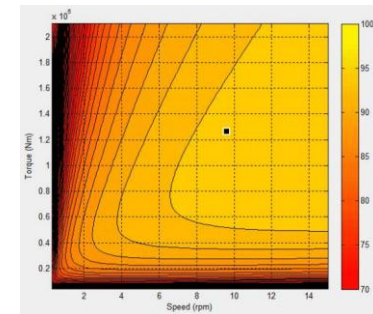


# Why a geared PTO?

- Efficiency
  - Comparable wind turbine transmissions deliver <3% mechanical losses.
  - Limerick Wave configuration has potential to reduce generator operating speed range.
    - Increased efficiency
    - Increased time connected to grid



(Source: WES PTO Call Guidance)



# Why a geared PTO?

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- Availability
  - Modular, self-contained design
  - Rotary input with no travel limitations
  - Technology and design methods proven in Wind Energy industry
  - Condition monitoring and predictive maintenance

# Why a geared PTO?

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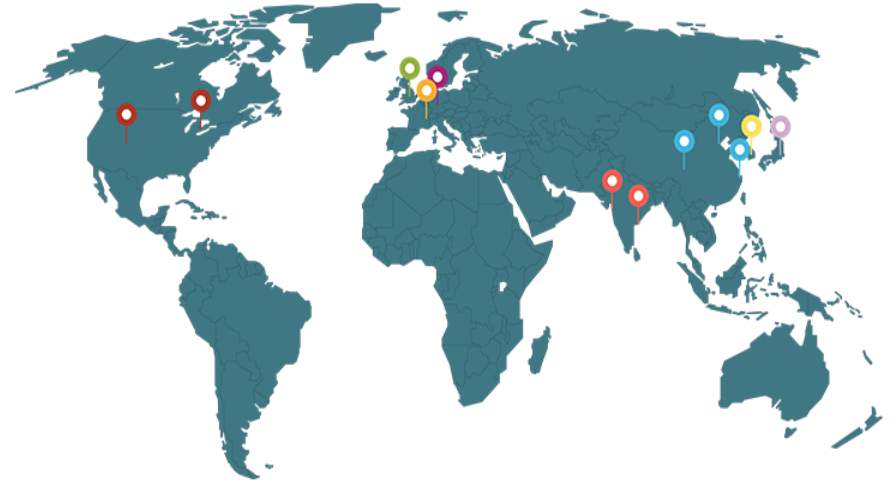
- OpEx
  - Lessons learnt from wind energy.
  - Condition monitoring and predictive maintenance.
- CapEx
  - Well-established global supply chain for wind turbine gearboxes.

# Stage 1 Aims

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- Demonstrate the feasibility and LCoE benefits of a geared PTO in general, and the Limerick Wave rectifying arrangement in particular.
- Select a preferred concept for further development alongside the SeaPower Platform.
- Develop the design and simulation methods to carry out concept optimisation of a geared PTO for any WEC device/scale.

# *Solutions to drive business and sustainability*



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