

## Master of Engineering (Mechanical)

### Development of an optimal hydrodynamic environment to promote mussel spat retention

#### Details

Duration: 12 – 18 months

Scholarship: \$35K includes registration fees for 1 year

Benefits: Occasional, paid part-time employment and industrial experience

Location: Nelson

Participants: University of Canterbury, Trinder Engineering, Spat Innovations Ltd



#### Project description

Retention of small spat (juvenile mussels with a shell length of 0.3-5mm), within an incubation nursery, is the most significant bottleneck to productivity for the New Zealand Greenshell™ Mussel Industry. The primary aim of this project is to investigate and develop optimal hydrodynamic conditions to maximise spat retention and discourage them from drifting away on the sea's currents.

To achieve this goal, initial, small-scale control tests aimed at creating different water flow patterns and states within a spat nursery unit (modified growing tank) will be undertaken. Select flow patterns will then be applied to mussel spat attached to growing media and ranked according to their ability to promote spat retention and growth. The student will engage with aquaculture researchers throughout this phase of the project. In this early test phase, careful consideration will be exercised whilst measuring the seawater flow characteristics to ensure reproducible conditions can be verified in the upscaled prototype.

Once the optimal flow dynamics have been identified, a prototype nursery unit will be developed. Computational Fluid Dynamics (CFD) flow modelling will inform the optimised nursery unit design, prior to the production of engineering drawings and construction of the physical scaled-up prototype. Proprietary water pumping and flow control technologies will be simultaneously investigated to determine their suitability and potential for inclusion in the developed unit. The unit will:

- Reproduce the optimal conditions identified in preliminary tests.
- Consistently and uniformly deliver the desired flow patterns in a 'commercial' spat nursery unit via available, appropriate and cost-effective pumping and water flow control technologies.
- Provide a production unit for efficient and effective spat propagation

This project is a vital component of a large Greenshell™ Mussel Spat project aiming to solve the industry's present spat supply crisis. New Zealand aquaculture is projected to become a \$3bn industry by 2035 and will require extensive expertise in all forms to achieve this goal.

#### Student attributes and opportunities

The project is highly suited to a Mechanical Engineering graduate with R&D interests, strong practical skills and a solid academic record (notably in fluid dynamics). A generous scholarship is offered, including university registration fees for one year. Additional remuneration will be available occasionally by way of small, professional engineering tasks, undertaken within the Trinder Engineering design team.

This postgraduate study provides you with the opportunity to gain your ME, a great career launch and considerable CV 'currency' whilst working within a large, well-respected engineering firm. There's also the opportunity to live in one of the most desired corners of New Zealand - Nelson. Much of the project duration will be spent at Trinders and Spat Innovations spat nursery facility, whilst developing strong research connections with the University of Canterbury.

#### **Michael Robertson**

*BE(Hons), ME(Mgmt)*

**Mechanical Design Manager**

Email: michael@trinder.co.nz

Mobile: +64 21 143 2738

#### **Dr David Aitchison**

*BEng(Hons), MEng, PhD, CEng, MIMechE*

**Research and Innovation Manager**

Email: david@trinder.co.nz

Mobile: +64 21 181 6852