



Australian Government

SFIAQU510 Design a recirculating aquaculture system

Release: 1

SFIAQU510 Design a recirculating aquaculture system

Modification History

Release	Comments
Release 1	This version released with SFI Seafood Industry Training Package Version 1.0.

Application

This unit of competency describes the skills and knowledge required to design or upgrade a recirculating aquaculture system. It requires the ability to determine system requirements, define budgets, infrastructure and labour requirements, and finalise the design.

This unit applies to individuals who have specialised knowledge and technical and/or management responsibility for setting up, reviewing or modifying a recirculating aquaculture system to suit changing circumstances.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Unit Sector

Aquaculture (AQU)

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine system requirements	1.1 Define specific water quality and environmental parameters required by stock 1.2 Determine optimum number and sizes of culture or holding systems required to achieve stocking and harvest objectives 1.3 Identify types of recirculating aquaculture systems that would provide the appropriate environment for cultured or held stock 1.4 Research mechanisation or automation of process or activity,

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	including the use of specialised contract services
2. Define system inputs and outputs	2.1 Document design or upgrade specifications and decisions into plans, specifications, procedure manuals and records or reports 2.2 Draw up work plans or schedules in consultation with senior personnel, taking budgeting, planning and operational requirements into consideration 2.3 Design, locate and orientate culture or holding structures or systems to conserve natural resources 2.4 Organise independent or specialist verification of design output against workplace objectives 2.5 Develop a construction plan according to accepted design principles and workplace requirements 2.6 Evaluate own and work team knowledge and skills against construction plan and work schedules to determine the need for external expertise or assistance
3. Determine capital expense budget	3.1 Determine and document materials, resource and supply provision requirements, including contingency options, from work plans, schedules and specifications 3.2 Document estimated labour requirements based upon documented work plans or schedules, allowing for variances 3.3 Negotiate and confirm external labour and hire equipment contracts with management, if required 3.4 Attribute costs based upon quoted information from suppliers to each component 3.5 Allow for contingencies for supply of materials, equipment and services in budget
4. Determine operating expense budget	4.1 Determine operating expense budget, indicating all input and output expenses for proposed system, including commissioning or start-up costs 4.2 Incorporate a break-even analysis and a sensitivity analysis of effects of changes in input and output costs in budget 4.3 Allow for contingencies for low or lost production in budget
5. Review and finalise system design and	5.1 Finalise selection of individual and combined components to provide optimal conditions for stock, and reliable and flexible systems

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
budgets	for intended production inputs and culture or holding activities 5.2 Review, update and finalise work plans or schedules, design specifications, construction plan or commissioning or start-up procedures 5.3 Review budgets for capital and operating expenses and revise, as required, to meet changing circumstances 5.4 Examine relationship between capital and operating costs, including a review of alternative water and energy sources 5.5 Benchmark work plans or schedules, design specifications and system inputs and outputs against appropriate existing operations 5.6 Review overall operation and output of proposed system to ensure that it meets the long-term directions and purposes of the business and is economically sustainable

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Researches and extracts technical information relating to recirculating aquaculture systems from a range of sources • Interprets and analyses documentation relating to water and energy efficiency and environmental and biological requirements of the cultured or held stock • Interprets business plans, specifications and drawings, equipment operation manuals and contracts
Writing	• Produces technical specifications, plans and drawings • Maintains operational and financial records
Numeracy	• Quantifies resource requirements and calculates costs associated with recirculating aquaculture systems • Analyses financial information in budgets • Applies formulae to determine flows, pump efficiency, dissolved oxygen and water requirements, and volumes and quantities of inputs and outputs of liquids, gases and solids

Skill	Description
Oral communication	Participates in verbal exchanges to explain information clearly using technical terminology and language appropriate for the audience
Navigate the world of work	Understands and checks compliance against regulatory requirements, including safety and environmental requirements, relating to own role and area of responsibility
Get the work done	- Plans and coordinates multiple, complex activities and resources related to forward planning and risk management; continuously monitoring actions against budget and specification parameters - Uses key features and functions of workplace digital systems and tools to access, organise and analyse costs, data and information relevant to recirculating aquaculture systems

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
SFIAQU510 Design a recirculating aquaculture system	SFIAQUA510B Select, plan or design a system or facility utilising high technology water treatment components	Updated to meet Standards for Training Packages Revised title and amendments to elements and performance criteria for clarity	Equivalent unit

Links

Companion Volumes, including Implementation Guides, are available at VETNet: -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=e31d8c6b-1608-4d77-9f71-9ee749456273>

Assessment Requirements for SFIAQU510 Design a recirculating aquaculture system

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Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.

There must be evidence that the individual has developed a design for a new recirculating aquaculture system, or upgrade of a recirculating aquaculture system, on at least one occasion, including:

- determining system requirements based on research and facility requirements
- producing technical specifications and procuring drawings or plans
- preparing detailed capital and operational budgets
- reviewing and benchmarking proposed system against existing systems.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- key features of aquatic engineering principles, hydrology and water dynamics
- mechanical and technical aspects of recirculation systems, including energy use, mass balance, water hydraulics and flow, and pumps and pipe work
- relationships between inputs and outputs of recirculation systems, particularly biomass, size classes and quantity of feed
- features of automatic control and monitoring systems
- waste management, effluent treatments and other by-product uses (e.g. hydroponics and fertilisers) and environmental issues
- insulation and temperature control in an indoor facility, including air flows and ventilation (e.g. condensation, carbon dioxide and ozone)
- methods of customisation and retrofitting of components
- purchase of off-the-shelf items or improvising with existing items
- biosecurity aspects of recirculating aquaculture system
- biology of stock, and environmental and husbandry requirements within recirculating aquaculture systems to achieve growth targets

- importance of optimised production to achieve sound economic outcomes
- opportunities for cost reductions
- laws and regulations relating to permits and operation of aquaculture facilities
- risk identification, assessment and mitigation or management related to aquaculture systems
- forward planning and risk management for events, such as blackouts, brownouts and equipment breakdowns.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
 - skills must be demonstrated in an aquaculture workplace or an environment that accurately represents workplace conditions
- resources, equipment and materials:
 - technology for researching and preparing and presenting information
- specifications:
 - plans and specifications for a recirculating aquaculture system
 - specifications for high technology water treatment components
 - workplace business plan and budget.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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