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# Centrifugal Pump Sizing and Selection Calculations Training Course

5 – 9 April 2027
Dar es Salaam

# Centrifugal Pump Sizing and Selection Calculations Training Course

**Ref:** 1398_52328 **Date:** 5 – 9 April 2027 **Location:** Dar es Salaam **Fees:** 7900 GBP

Centrifugal Pump Sizing and Selection Calculations is a 1-week training course for mechanical design and process engineers who specify pumps for new units and replacements, ending with a pump sizing and selection datasheet for a real duty. Energy costs, tighter project schedules and recurring cavitation or seal failures mean that a pump chosen from a quick estimate costs more over its life than the time saved. The course is delivered by Jupiter Prime Training.

## Why Centrifugal Pump Sizing and Selection Calculations Matters Now

Pumps are often the largest electricity users on water, chemical and oil and gas sites, and oversized machines running far from their best efficiency point waste energy and wear quickly. Project teams ask engineers to issue pump enquiries early, before piping is final, so assumptions must be explicit and revisable. Maintenance departments then live with the consequences: recirculation damage, low-flow vibration and short seal life. The course connects hydraulic calculations to whole-life decisions using EN 13306 terminology for maintainability and ISO 55001 thinking on asset life-cycle cost.

## Who Gains Most from Centrifugal Pump Sizing and Selection Calculations

- Engineers who calculate system head and flow for new pumping duties
- Engineers who prepare pump datasheets and technical enquiries for vendors
- Engineers who evaluate vendor bids, curves and performance data in tenders
- Engineers who review replacement pumps for existing plant after repeated failures
- Engineers who select motors, variable speed drives and couplings for pump trains

Design offices gain most when process and mechanical engineers from the same project attend together and agree one sizing method and margin policy.

## Centrifugal Pump Sizing and Selection Calculations Capabilities

Participants work from pipe routing and fluid properties to a pump, impeller, material and driver choice they can defend at bid evaluation.

- Calculate static and friction head to build a system curve — fixing the duty point
- Calculate NPSH available and compare it with NPSH required — protecting against cavitation
- Apply specific speed and suction specific speed — choosing the impeller type and stage count
- Assess pump curves against preferred and allowable operating regions — informing vendor selection
- Specify casing, impeller and seal materials for the fluid — balancing corrosion, erosion and cost
- Weigh fixed-speed and variable-speed drivers — reducing energy use for the operations team

## Key Centrifugal Pump Sizing and Selection Calculations Terms

- System head curve — the head a piping system needs at each flow, combining static lift and friction losses.
- Net positive suction head NPSH — the margin of suction pressure above vapour pressure, measured as head of liquid.
- Best efficiency point BEP — the flow at which a pump converts shaft power to hydraulic power most efficiently.
- Specific speed — a number combining speed, flow and head that indicates the impeller shape suited to a duty.
- Affinity laws — relationships showing how flow, head and power change with impeller speed or diameter.
- Minimum continuous stable flow — the lowest flow a pump can run at without damaging vibration or heating.

## Centrifugal Pump Sizing and Selection Calculations Day by Day

### Day 1: Pumping Duties and Fluid Behaviour

- Fluid Properties, Viscosity and Vapour Pressure — Defining the Pumping Duty
- Pump Types and Their Application Ranges — Narrowing the Candidate Designs
- Bernoulli Equation and Head Concepts — Converting Pressure, Elevation and Velocity
- Life-Cycle Cost Thinking With ISO 55001 — Weighing Energy Against Purchase Price
- Lessons From Failed Water and Hydrocarbon Pumps — Tracing Errors to Sizing

### Day 2: System Head Curve Calculations

- Pipe Friction With Darcy-Weisbach and Moody Chart — Estimating Line Losses
- Fittings, Valves and Equipment Losses — Completing the Resistance Picture
- Static Head and Tank Level Cases — Bracketing Minimum and Maximum Duties
- Parallel and Series Pump Arrangements — Matching Variable Demand
- Design Margins on Flow and Head — Avoiding Oversized Pumps

### Day 3: Suction Conditions and Pump Curves

- NPSH Available Calculation — Setting Vessel Elevation and Suction Line Size
- NPSH Required and Margin Ratios — Preventing Cavitation Damage
- Specific Speed and Suction Specific Speed — Selecting Impeller Geometry
- Reading Head, Power and Efficiency Curves — Locating the Operating Point
- Affinity Laws and Impeller Trimming — Adjusting Duty Without Replacement

### Day 4: Materials, Seals and Drivers

- Casing and Impeller Material Selection — Resisting Corrosion and Erosion
- Mechanical Seal Arrangements and Flush Plans — Extending Seal Life
- Motor Sizing and Service Factor — Covering End-of-Curve Power
- Variable Speed Drive Versus Throttling — Cutting Energy Use
- Minimum Flow Protection and Recirculation Lines — Safeguarding Low-Load Operation

## Day 5: Practising the Pump Sizing and Selection Datasheet

- System Curve Exercise — Applying Day 2 Friction and Static Head Methods
- Suction Check Exercise — Applying Day 3 NPSH and Specific Speed Limits
- Driver and Material Exercise — Applying Day 4 Seal, Motor and Drive Choices
- Vendor Bid Comparison Matrix — Ranking Curves, Efficiency and Life-Cycle Cost
- Pump Sizing and Selection Datasheet — Completing Duty, Curves, Materials and Driver

## Applying Centrifugal Pump Sizing and Selection Calculations After the Course

- Recalculate the system curve and NPSH margin for one existing pump with a failure history.
- Rewrite the pump datasheet template so every margin and assumption is stated explicitly.

## Centrifugal Pump Sizing and Selection Calculations Questions FAQ

### What is centrifugal pump sizing and selection calculations and why does it matter now?

It is the method of calculating system head, suction margin and power to choose the right pump, impeller, material and driver. Energy and failure costs make accurate sizing essential.

### Which roles gain most from centrifugal pump sizing and selection calculations?

Mechanical design engineers and process engineers who specify, evaluate or replace pumps gain most.

### How does centrifugal pump sizing and selection calculations differ from a pump maintenance course?

This course concentrates on hydraulic calculations and specification before purchase. A maintenance course covers overhaul, alignment and field repair of pumps already installed.

### What do you bring back from centrifugal pump sizing and selection calculations?

You bring back a completed sizing and selection datasheet for a real duty, plus a vendor bid comparison matrix.

## Centrifugal Pump Sizing and Selection Calculations: The Way Forward

The pump sizing and selection datasheet first informs the vendor enquiry: duty point, margins, materials and driver. Process and mechanical engineers share it, and procurement uses it at bid evaluation. After commissioning, compare measured flow, head and power with the datasheet, because that comparison shows whether the margin policy needs tightening on the next project.