



*Specialist for Pumping Technology*

**Session 45 –  
Understanding  
Customer Specification  
Requirements**

*Simon Smith December 2025*





# Presenter Profile – Simon Smith

Simon graduated with an honours degree in Chemical Engineering from the University of Surrey in 1978 and began a long career in the engineered pump industry spanning 44 years (so far!) with Peerless Pump, BW/IP International / Flowserve, SPP Pumps, Ruhrpumpen and Ebara Cryodynamics.

Over his long career he has filled various roles as Applications Engineer / Manager, Project Manager, Key Account Specialist, Vertical Pump Product Specialist, International Sales Engineer / Manager / Director and he has considerable experience in Training & Mentoring young engineers.





# RuhRPumpen Short Courses

**Here is a listing of all the previous courses in the last two years.**

- No 23 – Pumps for the Desalination Market
- No 24 – Cryogenic Pumps
- No 25 – Magnetic Drive Pumps
- No 26 – Mechanical Seals & Systems
- No 27 – The Importance of System Curves
- No 28 – NPSH & Nss Made Simple
- No 29 – Curve Shape, Head Rise & Allowable Tolerances
- No 30 – Selecting the Right Pump for the Application
- No 31 - Comparison of API610 12<sup>th</sup> & 11<sup>th</sup> Editions
- No 32 - Pump Instrumentation
- No 33 - Handling Viscous Fluids with Centrifugal Pumps
- No 34 - Fire Pumps for the Oil & Gas Industries
- No 35 - Vertical Sump Pumps (Type VS4)
- No 36 - Engineered Systems
- No 37 - BB5 Double Case Barrel Pumps
- No 38 - Start-Up, Commissioning & Trouble Shooting
- No 39 – Positive Displacement Pumps
- No 40 – Vertical Pumps Part 1 VS1,2,3
- No 41 – Vertical Pumps Part 2 VS4,5,6,7
- No 42 & 43 – Performance Testing & Inspection of API610 Pumps
- No 44 – Non-Destructive Examination

Any you have missed you can get from our website [www.ruhrpumpen.com](http://www.ruhrpumpen.com)

and follow the menu bar link to [RP Short Courses](#)



# RuhRPumpen Short Courses

[www.ruhrpumpen.com](http://www.ruhrpumpen.com)



## More Articles

- Coolant System Maintenance
- Fire Watch: World Updates
- ZMS pumps selected for water station in Oman
- Newsletter Ruhrpumpen Fire Systems - December 2022
- Ruhrpumpen's Spotlight
- North America Sales Team Visit to Ruhrpumpen Systems
- May was National Electrical Safety Month
- New life to old vertical pump
- RP supplied HSD split case pumps to cement plant in record time
- Introducing the RP ANSI Process Pump Range



## All Courses

Don't miss our Short Course #42

**Performance Testing & Inspection of Centrifugal Pumps - Part 1**  
Thursday, September 11th, 2025.

**Register below** ↓



Simon Smith  
Solutions Expert

You're cordially invited to the session No. 42.



# RuhRPumpen Short Courses

## SHORT COURSE 41

### Vertical Pumps Part 2 (VS4, VS5, VS6 & VS7).

- Full Session
- Download presentation
- Q&A Report

## SHORT COURSE 42

### Performance Testing & Inspection of Centrifugal Pumps.

- Full Session
- Download presentation
- Q&A Report
- Test Lab Monterrey
- Test Lab Tulsa
- Test Lab Others

## SHORT COURSE 43

### Performance Testing & Inspection of Centrifugal Pumps - Part 2

- Full Session
- Download presentation
- Q&A Report

## SHORT COURSE 44

### Non-Destructive Examination

- Full session
- Download presentation
- Q&A Report



# RuhRPumpen Short Courses

## Session 45 –

### “Understanding Customer Specification Requirements”

*Aimed at Process and Mechanical Engineers, and Consultant Engineers who specify pumping equipment as well as Applications & Sales Engineers selecting and quoting them.*

*This course is intended to help purchaser engineers and pump vendor engineers understand one another better.*

- *“What is the difference between an extended warranty and a deferred warranty?”*
- *“Is a vendor “clarification” to a specification really an exception?”*
- *“Witnessed or Observed – what’s the difference?”*
- *“Three Year Uninterrupted Operation” Is this an issue for the pump supplier?*

*And many more.*



# Understanding Customer Specification Requirements

## CONTENTS

1. What is the difference between an Extended Warranty and a Deferred Warranty?
2. Is a vendor “Clarification” to a Specification really an “Exception”?”
3. Witnessed or Observed – what is the difference?
4. Three Year Uninterrupted Operation – Is this an issue for the pump supplier?
5. Impeller and Rotor Balancing
6. Sound Level Guarantees & Testing
7. Weld Procedures
8. Weld Repairs
9. Site Performance Test & Guarantee
10. Hazop / SIL Studies
11. Paint
12. Material Test Reports - Types 2.2, 3.1, 3.2
13. Suction Specific Speed Limitation



# Understanding Customer Specification Requirements

## 1. What is the difference between an Extended Warranty and a Deferred Warranty?”

### Standard Warranty

12 months from commissioning or 18 months from shipment whichever is first.

Assumes 6 months to install the pumps.

This is fine for supply of one or two pumps but probably not for a large project where startup could easily be 2 years after shipment.

So it is tempting to say “We need a 3 year **EXTENDED** warranty”

Actually what you need is a standard 12 month warranty **DEFERRED** for 2 years while the pump is sitting there doing nothing.



# Understanding Customer Specification Requirements

## 1. What is the difference between an Extended Warranty and a Deferred Warranty?”

### Deferred Warranty

Warranty period is still 12 months but the commencement date is further in the future.

Maybe 2 years.

The pump vendor's preference will be for the complete pumpset to be put in warehouse storage until needed.

The contractor's preference will be to install the complete pumpset and have it sitting idle.

A hybrid option might be to install the baseplate, pump, motor & sealing system, carry out alignment checks then remove the pump and the motor to warehouse storage or (more likely) re-box it and keep it under a shelter for 2 years.



# Understanding Customer Specification Requirements

## 1. What is the difference between an Extended Warranty and a Deferred Warranty?”

### Deferred Warranty

Pump vendors will offer you a range of options and prices depending on how well you look after their equipment.

If it is fully installed they will probably want to have a service engineer look the pump over every six months, rotate the shaft, check the preventive maintenance logs, replace the oil, and have anything that has been damaged fixed.

If it has been warehouse stored or boxed and stored under a shelter they will probably only want to inspect it when it is being installed prior to commissioning and be present during commissioning at which point the 12-month warranty period commences.



# Understanding Customer Specification Requirements

## 1. What is the difference between an Extended Warranty and a Deferred Warranty?”

### Extended Warranty

It could be that you **do** want an extended running warranty. Maybe 2 years instead of 1 year. Pump vendors will often agree to this provided a service engineer is hired during installation, commissioning and every 12 months to inspect the pumps in service and check the operation and maintenance logs to see that the pump is being operated as specified (e.g. within the allowable operating range, temperatures, pressures etc).

Pump vendors will normally quote you their daily rates for service engineers to cover all the above options (both Extended & Deferred).

Sub-suppliers (motors, gearboxes, VFDs etc.) will need to be consulted too



# Understanding Customer Specification Requirements

## 1. What is the difference between an Extended Warranty and a Deferred Warranty?”

### Deferred & Extended Warranty

How many days and how many trips of a service engineer do you need to allow (for bid evaluation purposes)?

Speak to a trusted supplier to get a realistic estimate of number of days/trips required and apply that estimate to **all** the bidders while also evaluating each bidder on their service capabilities in the location.

Some may have a local service centre, others may have to fly a service engineer in, or subcontract it locally. You need to evaluate that.



# Understanding Customer Specification Requirements

## 2. Is a vendor “Clarification” to a Specification really an “Exception”?”

Advice we give to our sales engineers:

“When it comes to comments in our quote, think “does it really need a comment?”

If there is no reason for a comment it should not be there.

A comment should never be an affirmation of what is specified.

If we meet the specification, then there is no need to comment.

All this does is create more work for our customers as they must then re-review their specs to interpret why we made a comment and/or create doubt as to why we would confirm we are adhering to a specific area of the specification.”



# Understanding Customer Specification Requirements

## 2. Is a vendor “Clarification” to a Specification really an “Exception”?”

More advice we give to sales engineers:

“It is good practice to show some specified items as optional adders in our quotation (so that customer is aware of financial impact of some requirements). Remember any time we show an optional adder in our quotation we **MUST** also include a comment as to why we are showing this specified item as an option.

Nothing is more frustrating for the customer than when a vendor shows options but has no comments as to why they are showing as optional. The customer engineer will then either add all the optional prices into the base price or invest time in discussing with vendors why it was shown as an option; was the item indeed required by the specification, etc.”



# Understanding Customer Specification Requirements

## 2. Is a vendor “Clarification” to a Specification really an “Exception”?”

More advice we give to sales engineers:

Offering Alternatives to specified items.

Make it absolutely clear what you are offering and why. What is the advantage or benefit.

Example: Material of Construction

316SS impeller material specified. RP is providing Duplex SS, which superior to specified material for this application and is the most competitive for you, our customer as we stock this pump size in this material.



# Understanding Customer Specification Requirements

## 3. Witnessed or Observed – what is the difference?

As far as the pump supplier is concerned – no difference at all.

With both Witnessed and Observed tests & inspections we schedule the test and give 5 days' notice to the client.

With an Observed test, if the customer inspector does not show we can carry on

With a Witnessed Test, it is a HOLD point and we cannot proceed without the inspector

You will find that vendors charge the same for Observed or Witnessed. To us there is no difference.

In both cases we have to carry out a pre-test; we have to give 5 days' notice; and we have to carry it out during normal working hours; we cannot slot it in at a few hours' notice on second shift or on a week-end, as we might do with a Non-Witnessed test.



# Understanding Customer Specification Requirements

## 4. Three Year Uninterrupted Operation – Is this an issue for the pump supplier?

It kind of sounds like a 3 year warranty doesn't it?

But not really.

Three-year uninterrupted operation without shutting down equipment for vendor-specified maintenance or inspection was introduced in API 11<sup>th</sup> Edition (and removed in 12<sup>th</sup>). This is easily achievable for pumps with either oil mist or force feed lubrication systems; however, for standard OH and BB pumps with standard ring-oil lubrication methods, yearly oil changes complicate matters slightly.

But since most pumps have duty/standby units the oil change can usually be scheduled for when that pump is on standby duty.



# Understanding Customer Specification Requirements

## 5. Impeller and Rotor Balancing

(API 610 6.9.4.1 & 4)

ISO 21940-1 Grade 2.5 is API standard and there is an option for Grade 1.0

This is one of those things “API610 got wrong”! (per Simon Bradshaw – Pump Guru)

It is frequently specified as people assume that it “must be better”

But not only are the results unrepeatable (if you balance the part, take it off the arbor, put it back on again and check.... It will give a different reading),

**BUT ALSO** per the referenced standard ISO21940 it is inappropriate!



# Understanding Customer Specification Requirements

## Balance Grades per ISO 21940

BALANCE QUALITY GRADE G	MAGNITUDE e per $\Omega$ mm/s	MACHINERY TYPES – GENERAL EXAMPLES
G 6,3	6,3	<ul style="list-style-type: none"><li>• Aircraft gas turbines</li><li>• Centrifuges (separators, decanters)</li><li>• Electric motors and generators (of at least 80 mm shaft height), of maximum rated speeds up to 950 r/min</li><li>• Electric motors of shaft heights smaller than 80 mm</li><li>• Fans</li><li>• Gears</li><li>• Machinery, general</li><li>• Machine tools</li><li>• Paper machines</li><li>• Process plant machines</li><li>• Pumps</li><li>• Turbo chargers</li><li>• Water turbines</li></ul>
G 2,5	2,5	<ul style="list-style-type: none"><li>• Compressors</li><li>• Computer drives</li><li>• Electric motors and generators (of at least 80 mm shaft height), of maximum rated speeds up 950 r/min</li><li>• Gas turbines and steam turbines</li><li>• Machine-tool drives</li><li>• Textile machines</li></ul>
G 1	1	<ul style="list-style-type: none"><li>• Audio and video drives</li><li>• Grinding machine drives</li></ul>



# Understanding Customer Specification Requirements

## 5. Rotor Balancing

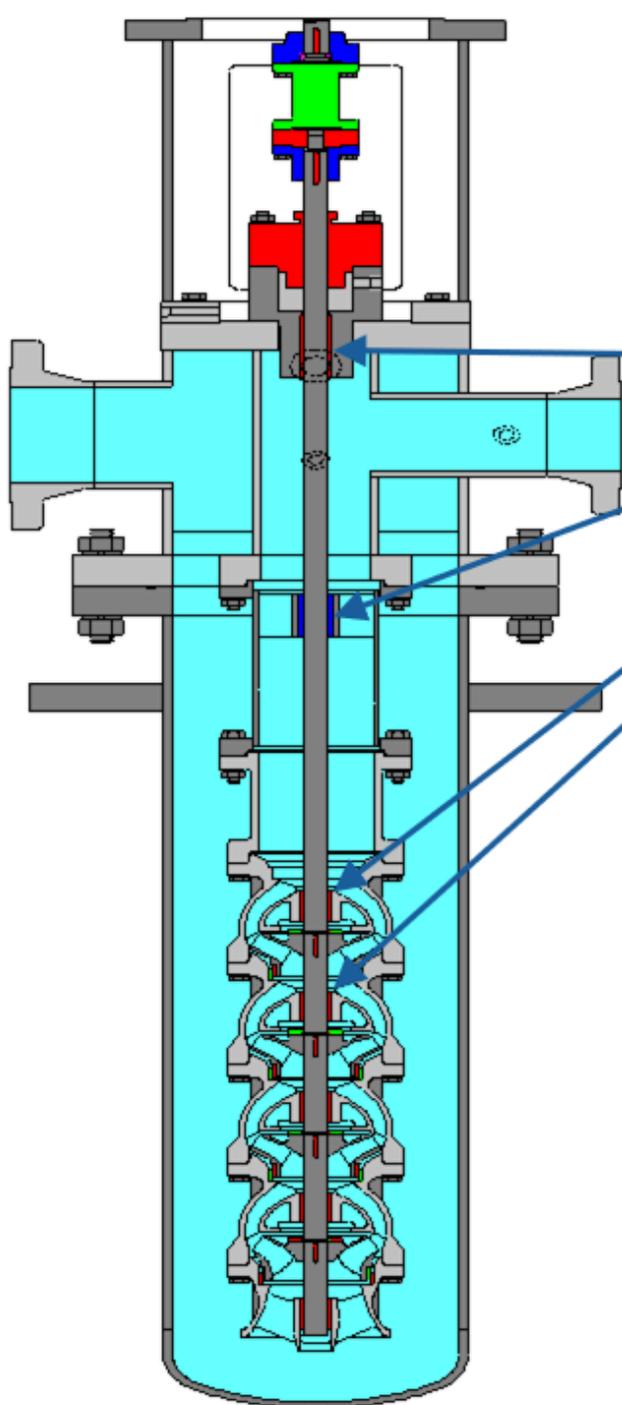
Complete Rotor balancing is standard on multistage horizontal pumps or high speed pumps

It is not really possible on an OH2 pump because during balancing the shaft needs to be supported either side of the impeller in the balance machine, but the overhung shaft (rotor) is designed to run supported from one side only.

So don't specify it for an OH2 pump

The complete rotors of VS6 pumps cannot be balanced either. Here is why.

## 5. BALANCING VS6 ROTOR – WHY IMPOSSIBLE



### Support Bushings

VS1, VS6 (&VS4) pumps have long skinny shafts which are designed to operate in the vertical plane. Balance machines will only take a rotor mounted horizontally and supported at either end.

VS6 rotors are assembled stage by stage inside the diffusers (or bowls) which have a bearing bushing at each stage.

An assembled rotor without the diffusers and bushings and mounted horizontally supported at either end will look like a banana and not be anything like representative of the assembled pump.

So don't specify Rotor Balancing for a VS1, VS6 (or VS4) Pump.



# Understanding Customer Specification Requirements

## 6. Sound Level Guarantees & Testing

Limit of 85 dB(A) @ 3000/3600rpm

All pumps with motors below 100kW (150HP) will be within noise limit.

Limit of 80 dB(A) @ 3000/3600rpm

All pumps with motors below 75kW (100HP) will be within noise limit.

Pump sound levels can be estimated using Programs such as RP's "Octband"  
(most pump manufacturers have a similar program)



# Understanding Customer Specification Requirements

## 6. Sound Level Guarantees & Testing

Sound levels can be measured during testing

**BUT**

Noise level readings taken during performance test are indicative only. A useful reference. They cannot be guaranteed.

In the test shop there is a lot of background noise, machine shop noise, and especially noise from the throttling valve on the pump discharge and temporary piping runs for the test.

It is still a useful metric.

If, for example, a pump on factory test is giving readings of 87dB (including background noise) and at site it is giving 92dB it suggests something is wrong!



# Understanding Customer Specification Requirements

## 7. Weld Procedures

RP (certainly) & probably all other Pump Manufacturers of API pumps will have a range of weld procedures compliant with API610 and ASME VIII, suitable for all the API materials we normally manufacture in.

If required we will send the relevant WPS & PQR documents to you in the early weeks of the order so your welding experts can satisfy themselves that we are compliant.

This should not be taken as an opportunity to write all over them and expect us to change them to suit the whim of a welding expert. Again – they are API and ASME compliant for the materials being welded.

(Contd)



# Understanding Customer Specification Requirements

## 7. Weld Procedures

If you insist on us making changes then in all probability this will require issuing and possibly qualifying a new procedure. This WILL cause significant delays, cost uplifts and change orders.

You can expect to see a comment like this in the proposal

*“RP weld procedures (and related documents such as procedure qualifications) will be submitted for information/review only, not for approval/comment. Production will proceed with no hold for approval. In case of customer comments on weld procedures - production will be placed on hold while comments are resolved. Production will be released after final approval of weld procedures and delivery time extended accordingly. In case welding has already been done a price adder for re-work/changes may apply”*



# Understanding Customer Specification Requirements

## 8. Weld Repairs

Weld Repairs are a different matter.

If it is a major weld repair (based on size and/or if it is surface breaking – a hydrotest failure) then this is a Hold point.

We send you the WPS & PQR, a specific weld repair procedure and a weld map and await your approval. Normally the WPS & PQR will have been sent you in the early weeks of the order, so it is basically the specific weld repair procedure that you are being asked to approve which should be a fairly quick procedure and we would ask you to fast track it to avoid delays.

Minor weld repairs do not need individual approval, but they must be documented in the Pump Record Book.



# Understanding Customer Specification Requirements

## 9. Site Performance Test & Guarantee

Some specifications ask for a site performance test and guarantee.

We can only offer a ***qualified*** performance guarantee at site.

The performance guarantee is always based on a factory performance test under controlled conditions on a calibrated test loop.

You do not have this at site. You probably have very limited instrumentation.

We will demonstrate that the pump is apparently operating as expected.

You can probably measure the suction and discharge pressure, probably not the flow rate, probably you can measure the power, possibly you can check the SG of the pumped fluid at the time the readings are taken. From which a very approximate performance curve can be plotted to compare with the factory performance test curve and indicate that the pump is operating as expected.



# Understanding Customer Specification Requirements

## 9. Site Performance Guarantee

You can expect to see a comment like this in the proposal:

*“Pump performance and vibration levels should be checked at site as part of commissioning, but since site piping, instrumentation and foundation design is not within RP control, the pump acceptance criteria will be the test results recorded and presented as part of performance test on our calibrated test bed.*

*The field test conditions shall represent actual in-service operation as closely as practicable. Pumps may be “bump started” (dry) for a few seconds to verify proper assembly and rotation direction. Pumps shall be primed prior to running.”*



# Understanding Customer Specification Requirements

## 10. Hazop / SIL Studies

We are occasionally asked to participate in these.

But we have little or no actual input in these studies.

I have known of an occasion where a pump engineer sat in on one of these meetings for 3 days and had precisely zero input!

In these days of Zoom/Teams Meetings an engineer can easily be made available at short notice to answer specific questions without the necessity to travel.



# Understanding Customer Specification Requirements

## 11. Paint

RP and all major API pump suppliers have developed a range of Paint Procedures for the full range of operating temperatures, using well known international paint brand names, available world-wide, and usually in a range of colours (except for high temperature coatings).

When you send us your paint specification, we will select our procedure that most closely matches your spec. and propose that one.

It is not practical to develop a special paint procedure for a small number of pumps.



# Understanding Customer Specification Requirements

## 12. Material Test Reports - Types 2.2, 3.1, 3.2

I am not going to go into this in this presentation.

I covered it in detail in Short Course No 43 “Performance Testing & Inspection of API610 Pumps” only a couple of months ago in October.”

If you missed it, you can download that presentation from our website.

<https://www.ruhrpumpen.com/en/media-center/972-all-courses>



# Understanding Customer Specification Requirements

## 13 – Suction Specific Speed

& the 11,000 limitation



# Suction Specific Speed ( $N_{SS}$ )

## Definition

You may think of it as a dimensionless number \* that describes the NPSH capability of an impeller

Defined as:-

$$NSS = N(\text{RPM}) \times Q(\text{BEP Full Dia})^{0.5} / \text{NPSH}(\text{BEP Full Dia})^{0.75}$$

$$\text{NSS}(\text{Metric}) = \text{NSS}(\text{US}) \times 1.16 \text{ (m}^3/\text{hr, m, rpm)}$$

Almost universally expressed in USGPM, Ft, RPM units

The higher the number the lower the  $\text{NPSH}_R$

Most specifications limit the allowable value to 11,000 (US units) or 12,760 (m<sup>3</sup>/hr, m, rpm)

WHY?

\* Except that it isn't actually dimensionless!



# Suction Specific Speed ( $N_{ss}$ )

## The 11,000 Limit

In the 1950's to 1980's the impeller design methods available to pump designers were more limited than they are today. Impeller designs from that era were notable for their achievement of good suction performance through the deployment of large impeller inlet diameters. It was not understood until later that the enlarging of the impeller inlet diameter caused impairment of the impeller performance at flow rates lower than the best efficiency point (BEP). This impairment exhibited itself as significantly increased vibration, Suction Recirculation, and in some extreme cases an unstable NPSHr characteristic.

- Warren Fraser – “Flow Recirculation in Centrifugal Pumps” (1981)

<https://oaktrust.library.tamu.edu/handle/1969.1/163728>

In 1981 Warren Fraser published a paper which brought the consequences of relying on large impeller inlet diameters into focus.

Pump users had already become increasingly concerned that while such designs minimized plant 1st cost, it was at the price of reliability and overall life cycle cost.



# Suction Specific Speed ( $N_{ss}$ )

## The 11,000 Limit

- Jerry Hallam – “Centrifugal Pumps: Which Suction Specific Speeds are Acceptable?”, Hydrocarbon Processing, April 1982

In 1982 Jerry Hallam published the results of a large scale reliability study of 480 pumps over a 5 year period at the Amoco Texas City refinery. He found that the reliability of a pump was meaningfully related to its suction specific speed ( $N_{ss}$ ). Specifically pumps with a  $N_{ss} > 11,000$  ( $S > 12760$ ) failed twice as often compared to lower suction specific speed pumps.

Hallam concluded: "This study indicates that caution should be exercised when purchasing hydrocarbon or small water pumps with a  $N_{ss}$  greater than 11,000 unless operation is closely controlled near BEP."



# Suction Specific Speed ( $N_{ss}$ )

## The 11,000 Limit

- Lobanoff & Ross, “Centrifugal Pumps: Design & Application 2<sup>nd</sup> Edition Fig 8-7”

Lobanoff & Ross carried out testing in 1985 which supported this limitation based on the then current state of impeller design.

They tested a range of impellers with differing suction specific speeds from  $N_{ss} = 7000$  to  $N_{ss} = 20,000$ . For each impeller the flow was varied until the pump vibration level exceeded the API 610 allowable level of 0.3 inches/sec (7.6 mm/s) peak.

The testing showed a strong correlation of  $N_{ss}$  & vibration.

The limit of 11,000 was widely adopted as a hard limit in the oil and gas industry and it is still rare to see a specification that does not invoke it.



# Suction Specific Speed ( $N_{ss}$ )

## The 11,000 Limit

Impeller design has improved by leaps and bounds since the 1980s and many authors have published papers to this effect.

Central to their claim was the premise that modern impeller design techniques allowed the attainment of better NPSH performance (and hence higher  $N_{ss}$  values) without relying solely on enlargement of the impeller eye.

- Bradshaw, Simon; Cowan, David; Liebner, Thomas (2013). “Influence Of Impeller Suction Specific Speed On Vibration Performance.”

<https://oaktrust.library.tamu.edu/handle/1969.1/162554>

In 2013 Bradshaw, Cowan & Liebner of ITT Goulds repeated the Lobanoff & Ross study from 1985 using modern impeller designs and pump construction standards. It is a very interesting read and I would recommend it to you all. I provide a link at the end of this presentation.

It would certainly suggest a limit of 13,000 rather than 11,000 and probably as high as 14,776.



# Coming Attractions 😊

## “Engineering Analyses”

Thurs 22<sup>nd</sup> January 2026 – 08.00 (UK GMT) (Eastern Hemisphere) & 17.00 (UK GMT) (Western Hemisphere)

*Aimed at Process and Mechanical Engineers, and Consultant Engineers who specify pumping equipment as well as Applications & Sales Engineers selecting and quoting them.*

*This course will give an overview of the various Engineering Analyses that are available – Structural Analysis, Seismic Analysis, Finite Element Analysis, Modal Analysis, Lateral Analysis, Torsional Analysis & Bearing Life Calculation.*

*It will explain the what, the why and the how as well as the customer benefits of these analyses and will show some sample reports.*



# Coming Attractions 😊



The logo consists of a white circle with a stylized 'A' shape inside, formed by two diagonal lines meeting at the top and a horizontal line across the middle. The word 'RUHRPUMPEN' is written in a bold, white, sans-serif font across the middle of the circle.

# RUHRPUMPEN

*Specialist for Pumping Technology*

**Q & A**

[ssmith@ruhrpumpen.com](mailto:ssmith@ruhrpumpen.com)

[www.ruhrpumpen.com](http://www.ruhrpumpen.com)

[marketing@ruhrpumpen.com](mailto:marketing@ruhrpumpen.com)

# RUHRPUMPEN AT A GLANCE

**VERTICAL  
INTEGRATION**

**SALES  
OFFICES IN  
+35 COUNTRIES**

**MANUFACTURING  
FACILITIES  
IN 10 COUNTRIES**

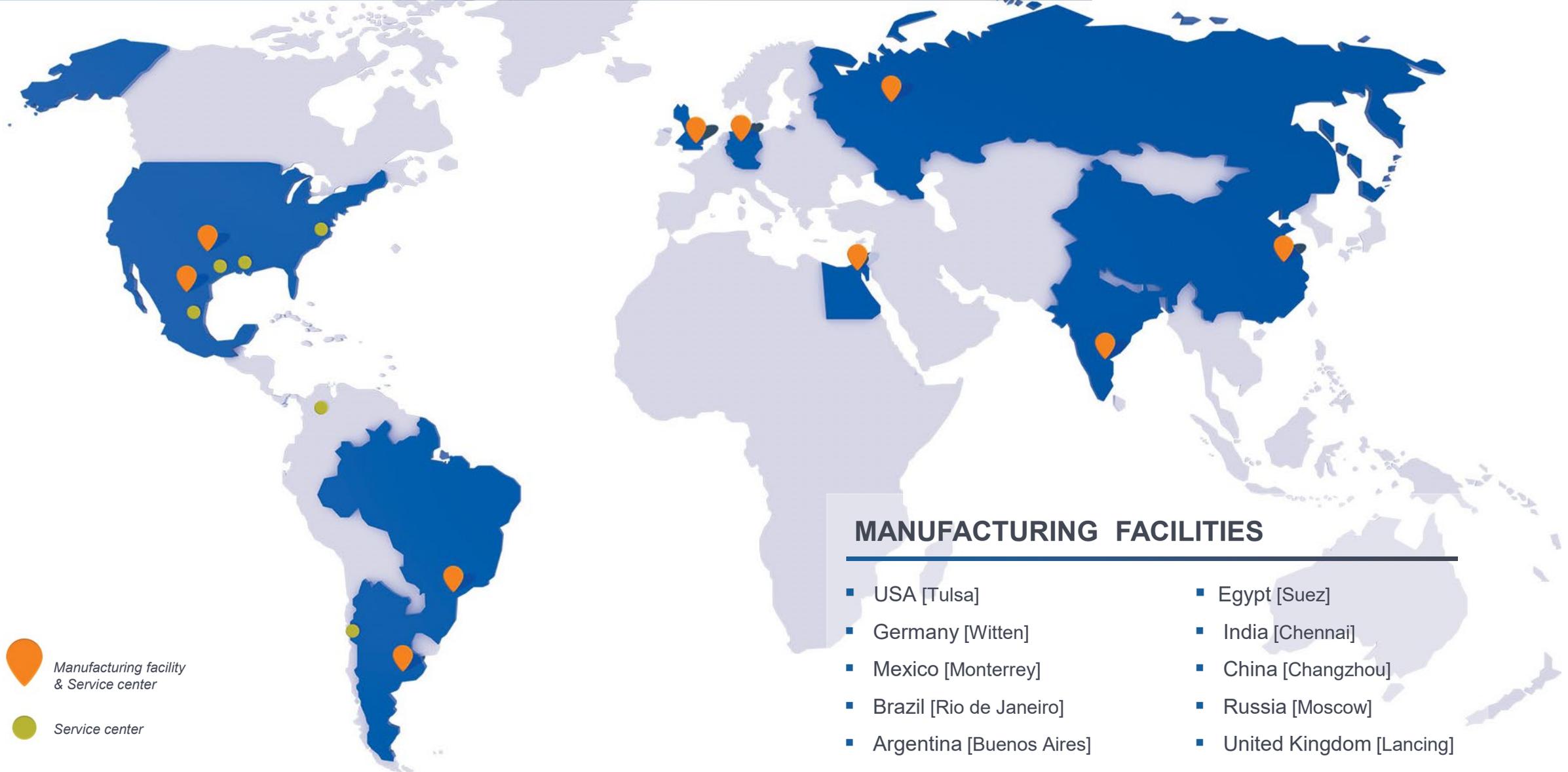
**+70 YEARS  
OF EXPERIENCE**

**+2,000  
EMPLOYEES**

**15 SERVICE  
CENTERS**

**+70,000 PUMPING SOLUTIONS INSTALLED WORLDWIDE**

# A GLOBAL COMPANY





# MANUFACTURING FACILITIES

*Monterrey, MX*



Area: 18,000 m<sup>2</sup>  
Testing: 7,500 HP

*Tulsa, USA*



Area: 29,000 m<sup>2</sup>  
Testing: 2,000 HP

*Witten, DE*



Area: 48,000 m<sup>2</sup>  
Testing: 8,850 HP

*Changzhou, CN*



Area: 15,000 m<sup>2</sup>  
Testing: 6,000 HP

*Lancing, UK*



Area: 1,703 m<sup>2</sup>  
Testing: 670 HP

*Rio de Janeiro, BR*



Area: 7,500 m<sup>2</sup>  
Testing: 6,000 HP

*Buenos Aires, AR*



Area: 7,500 m<sup>2</sup>  
Testing: 1,500 HP

*Suez, EG*



Area: 2,280 m<sup>2</sup>  
Testing: 2,680 HP

*Chennai, IN*



Area: 11,000m<sup>2</sup>  
Testing: 6,000 HP

# MARKETS WE SERVE

Our commitment to create innovations that offer reliable solutions to our customers allow us to provide a complete range of pump systems to support **core markets** as:





# OUR PUMP LINES

Ruhrpumpen offers a broad range of highly engineered and standard pumping products that meet and exceed the requirements of the most demanding quality specifications and industry standards.

Our pumps can handle head requirements as high as 13,000 ft (4,000 m) and capacities up to 300,000 gpm (68,000 m<sup>3</sup>/hr). Moreover, our pump designs cover temperatures from cryogenic temperatures of -310 °F (-196 °C) up to 752 °F (400 °C).

## Products include:

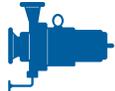
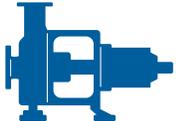
- Single Stage Overhung Pumps
- Between Bearings Pumps
- Horizontal Multi-Stage Pumps
- Vertical Multi-Stage Pumps
- Vertical Mixed Flow & Axial Flow Pumps
- Positive Displacement Pumps
- Full Range of Industrial Pumps
- Submersible Pumps
- Magnetic Drive Pumps
- Decoking Systems
- Packaged Systems
- Fire Systems





OUR PUMPS

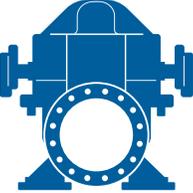
# OVERHUNG PUMPS

CATEGORY	RP MODEL	DESIGN STANDARD	
Sealless Magnetic Drive Pumps	<b>CRP-M / CRP-M-CC</b>	ISO 2858 & 15783 HI design (OH11)	
	<b>SCE-M</b>	API 685	
Foot Mounted OH1 and General End Suction Pumps	<b>IPP</b>	HI design (OH1)	
	<b>CPP / CPP-L</b>	HI design (OH1) ANSI B73.1	
	<b>CPO / CPO-L</b>	HI design (OH1) ANSI B73.1	
	<b>CRP</b>	HI design (OH1) ISO 2858 & 5199	
	<b>GSD</b>	HI design (OH0)	
	<b>SHD / ESK / SK / SKO SKV / ST / STV</b>	HI design (OH1)	
	<b>SWP</b>	HI design (OH3A)	
Centerline Mounted	<b>SCE</b>	API 610 (OH2)	
Vertical In-Line Pumps	<b>SPI</b>	API 610 (OH3)	
	<b>IVP / IVP-CC</b>	HI design (OH4 / OH5)	
	<b>IIL</b>	HI design (OH5) Dimensionally compliant with ANSI B73.2	
	<b>SPN</b>	API 610 (OH5)	





# BETWEEN BEARING PUMPS

CATEGORY		RP MODEL	DESIGN STANDARD	
1 and 2 stage	Axially split	<b>HSC / HSD / HSL HSR / ZW</b>	HI design (BB1)	
		<b>HSM</b>	HI design (BB3)	
		<b>ZM / ZMS ZLM / ZME</b>	API design (BB1)	
	Radially split	<b>HVN / J</b>	API design (BB2)	
		<b>RON / RON-D</b>	API design (BB2)	
Multi-stage	Axially split	<b>SM / SM-I</b>	API design (BB3)	
		<b>JTN</b>	API design (BB3)	
	Radially split <i>single casing</i>	<b>GP</b>	API design (BB4)	
	Radially split <i>double casing</i>	<b>A LINE</b>	API design (BB5)	





OUR PUMPS

# VERTICAL PUMPS

CATEGORY		RP MODEL	DESIGN STANDARD	
Single casing	Diffuser	<b>VTP</b>	HI & API 610 (VS1)	
		<b>VCT</b>	HI & API 610 (VS1)	
		<b>HQ</b>	HI & API 610 (VS1)	
		<b>VLT</b>	HI & API 610 (VS1)	
	Volute	<b>DSV / DX</b>	HI & API 610 (VS2)	
	Discharge through column – Axial flow	<b>VAF</b>	HI & API 610 (VS3)	
Separate discharge line	<b>VSP / VSP-Chem</b>	HI & API 610 (VS4)		
Double casing	Diffuser	<b>VLT / VMT</b>	HI & API 610 (VS6)	
	Volute	<b>DSV / DX</b>	HI & API 610 (VS7)	
Submersible pumps		<b>SMF</b>	HI design (OH8A)	
		<b>VLT-Sub / VTP-Sub</b>	HI design (VS0)	





OUR PUMPS

# SPECIAL SERVICE PUMPS

CATEGORY	RP MODEL	DESIGN STANDARD	
Pitot tube pumps	<b>COMBITUBE</b>	HI design	
Reciprocating pumps	<b>RDP</b>	API 674 ISO 13710	
Vertical turbine generator	<b>VTG</b>	HI design (VS6)	
Barge	<b>LS BARGE</b>	HI design	
Floating dock pumps	<b>ZVZ</b>	HI design	
	<b>LVZ</b>	HI design	
Cryogenic pumps	<b>SVNV</b>	-	
	<b>VTG Cryogenic</b>	-	
	<b>VLT Cryogenic VLTV</b>	-	
<b>Pre-packaged fire pump systems</b>	Fire systems incorporate pumps, drivers, control systems and pipework in a single container. They can be skid mounted, with or without enclosure and supplied with electric motor or diesel engine.	<b>NFPA-20-850</b> UL and FM approved components	

