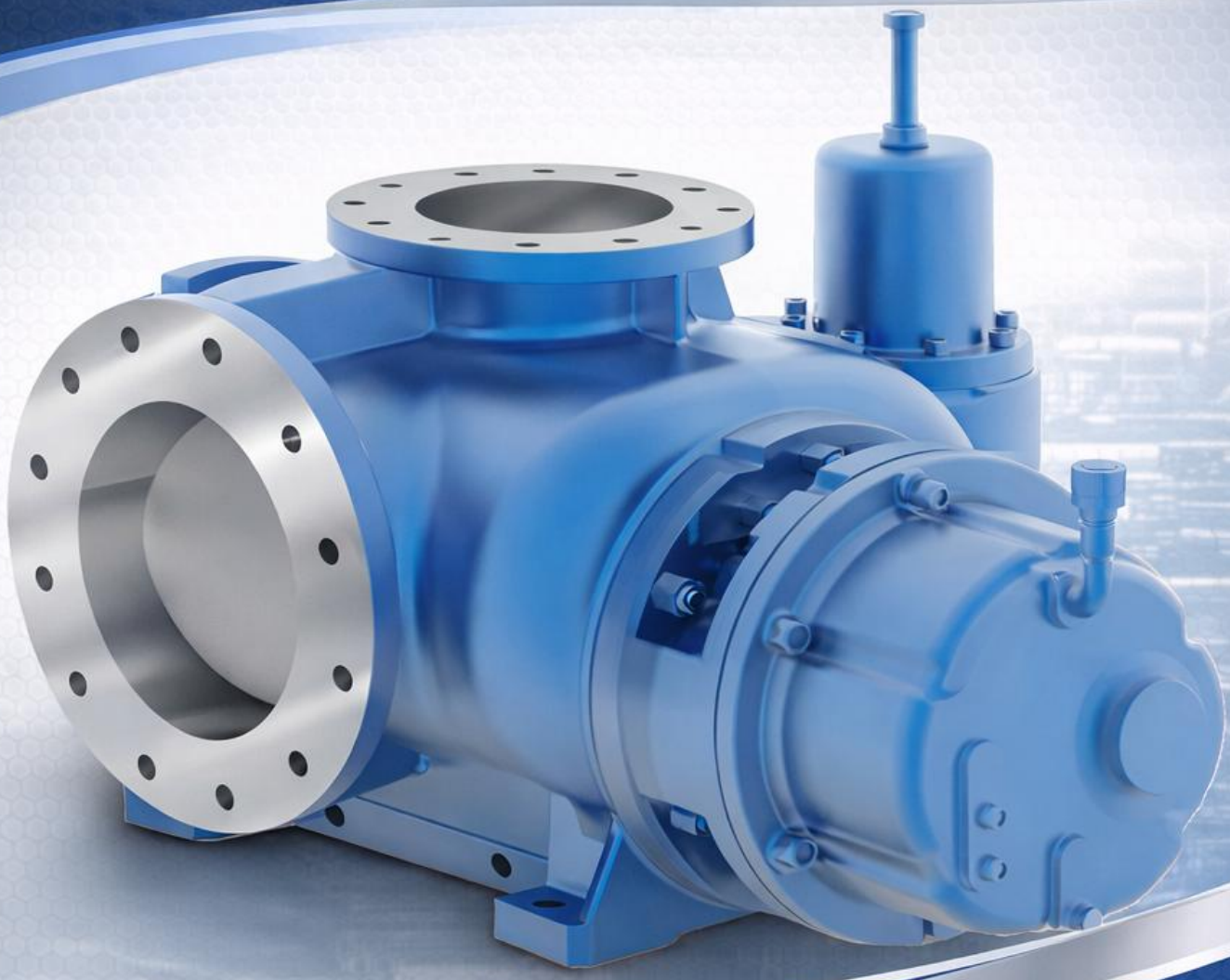
SPEW

POSITIVE DISPLACEMENT PUMPS

TWIN SCREW PUMP

MODEL: SST



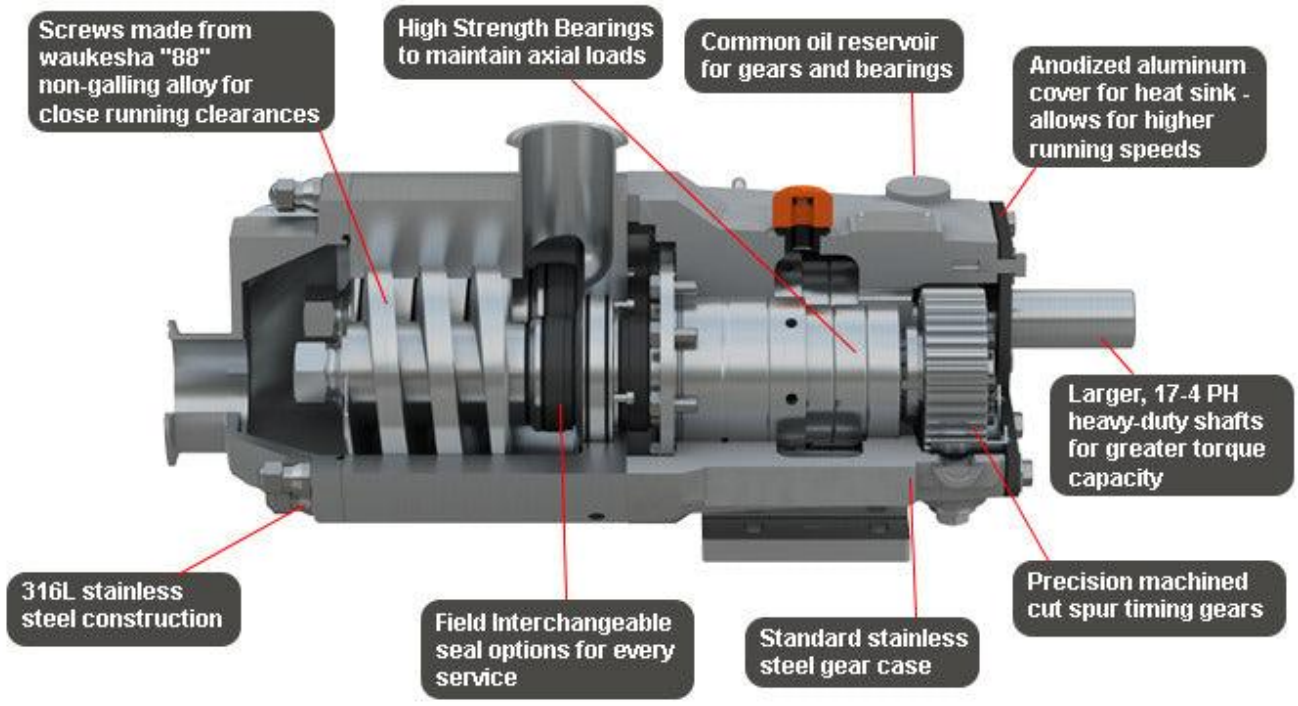
KNOWLEDGE BASE & TECHNICAL DOCUMENTS

Twin Screw Pump

Model: SST

SECTION: 01

1 – Product Definition & Engineering Design Intent



1.1 Product Definition

The **SPEW SST Series Twin Screw Pump** is a **positive displacement, non-contacting rotary pump** designed for **continuous-duty industrial service**, capable of handling **low to extremely high viscosity fluids**, including **gas-entrained and shear-sensitive products**.

The design intent is to provide:

- Absolute flow stability
- Mechanical reliability under variable conditions
- Gentle product handling
- High operational flexibility

1.2 Core Engineering Philosophy

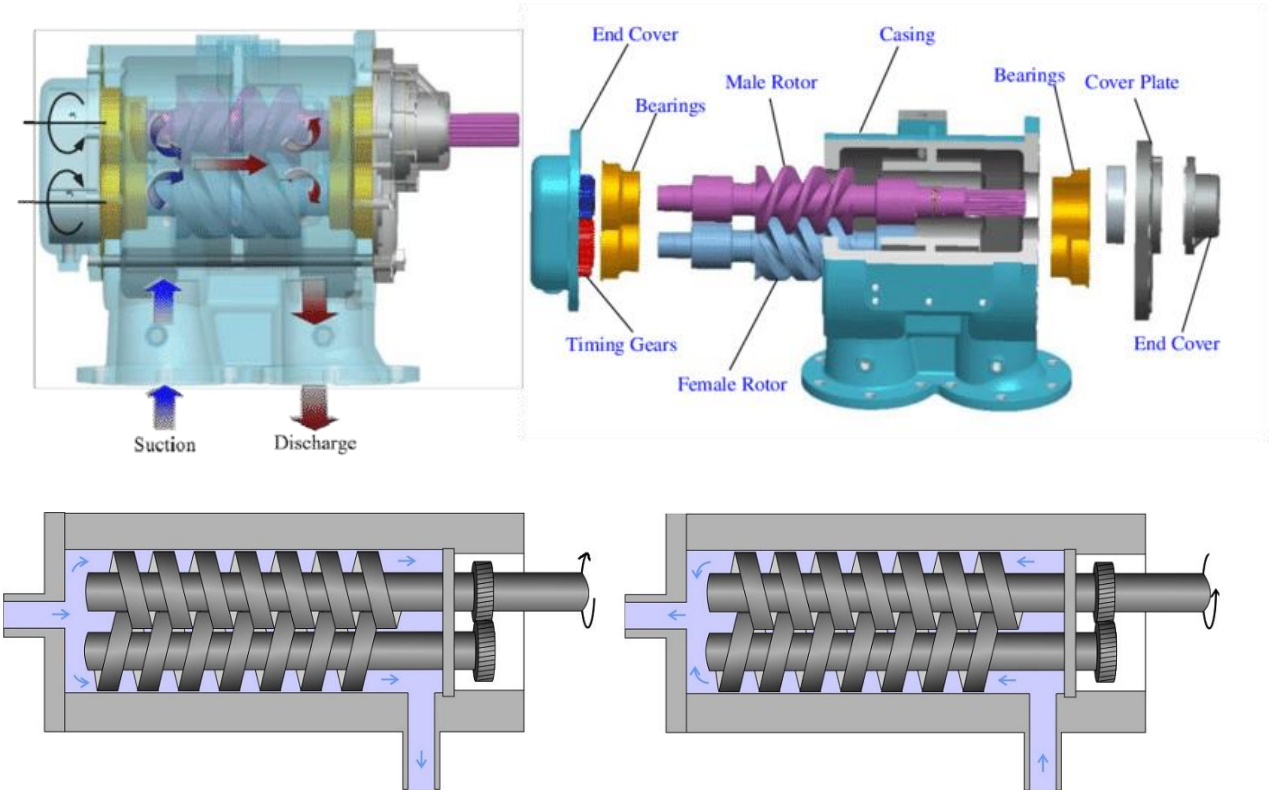
The SST Series is engineered around **three fundamental principles**:

1. **Axial cavity transport (not compression)**
2. **Non-contacting synchronized rotors**
3. **External mechanical timing control**

This philosophy eliminates:

- Pulsation
- Internal friction
- Cavitation-related instability

2 – Detailed Working Principle



2.1 Suction Phase

- Counter-rotating screws create **expanding cavities**
- Pressure drop occurs naturally at inlet
- Fluid is drawn smoothly without turbulence

2.2 Axial Transport Phase

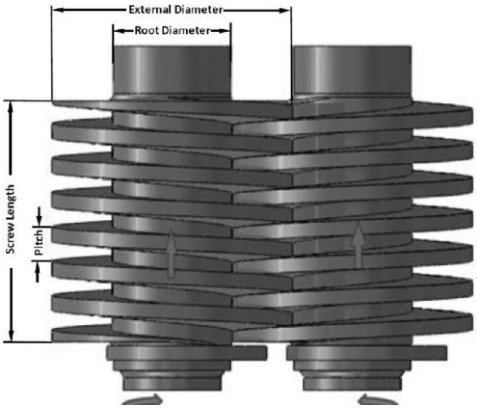
- Fluid is sealed within cavities
- Cavities move axially along screw length
- No internal recirculation or compression

2.3 Discharge Phase

- Cavity volume reduces at outlet
- Fluid exits at controlled pressure
- Flow remains constant irrespective of system pressure

Engineering Outcome:
✓ Pulsation-free flow
✓ No pressure shock
✓ Excellent metering capability

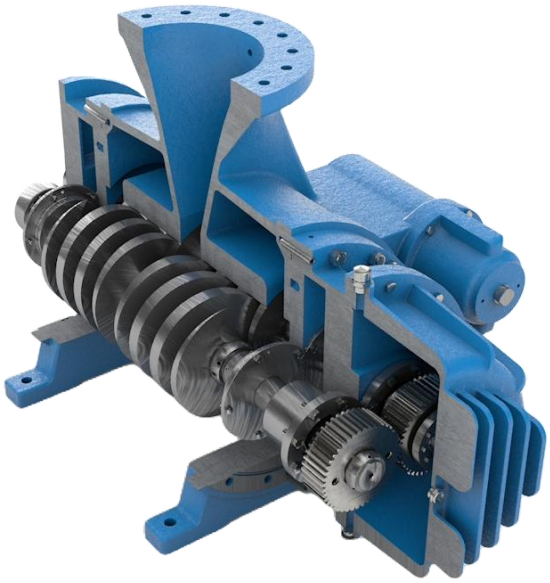
3 – Internal Rotor Geometry



3.1 Screw Profile Geometry

The SST Series uses **precision-machined helical screw rotors** with:

- Optimized lead and helix angle
- Constant cavity volume
- Controlled tip and flank clearances



This geometry ensures:

- Uniform axial displacement
- Minimal internal leakage
- Balanced hydraulic forces

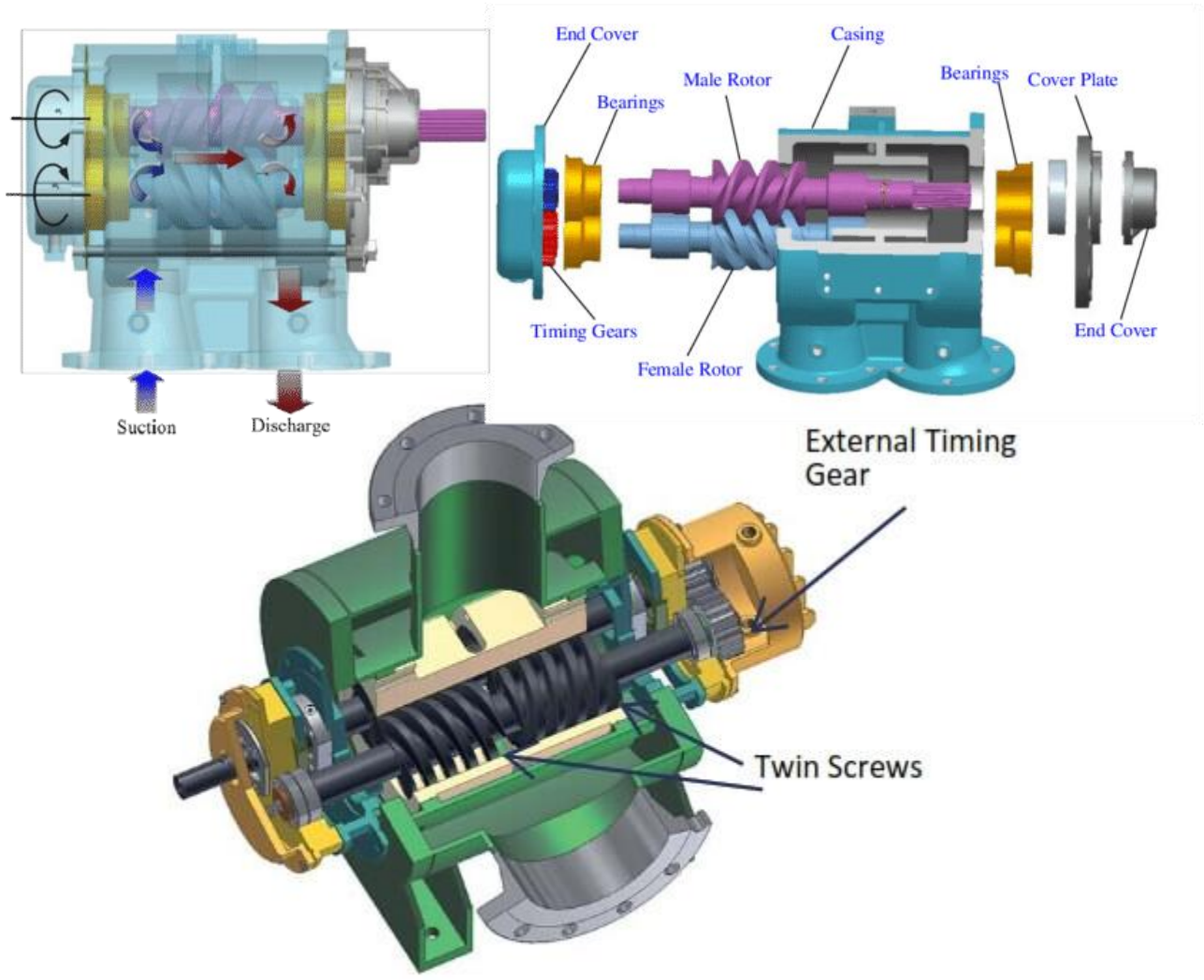
3.2 Non-Contacting Design Advantage

- Rotors do **not touch each other**
- Rotors do **not touch casing**
- Clearance maintained by timing gears

This allows:

- Handling of non-lubricating fluids
- Reduced wear
- Long operational life

4 – Timing Gear Synchronization System



4.1 Function of Timing Gears

- Synchronize angular position of both screws
- Maintain phase accuracy
- Prevent rotor collision

Result:

✓ Silent operation

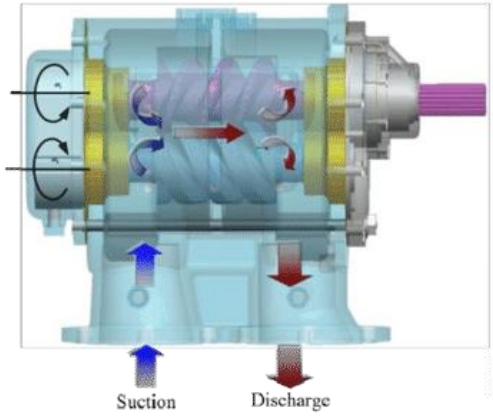
✓ High torque transmission

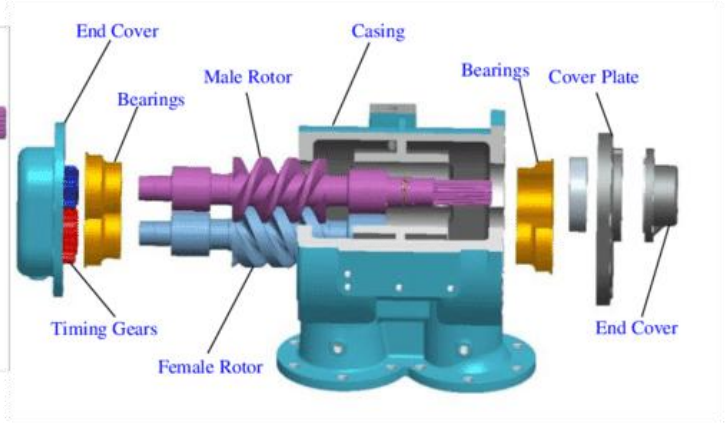
✓ Bi-directional rotation capability

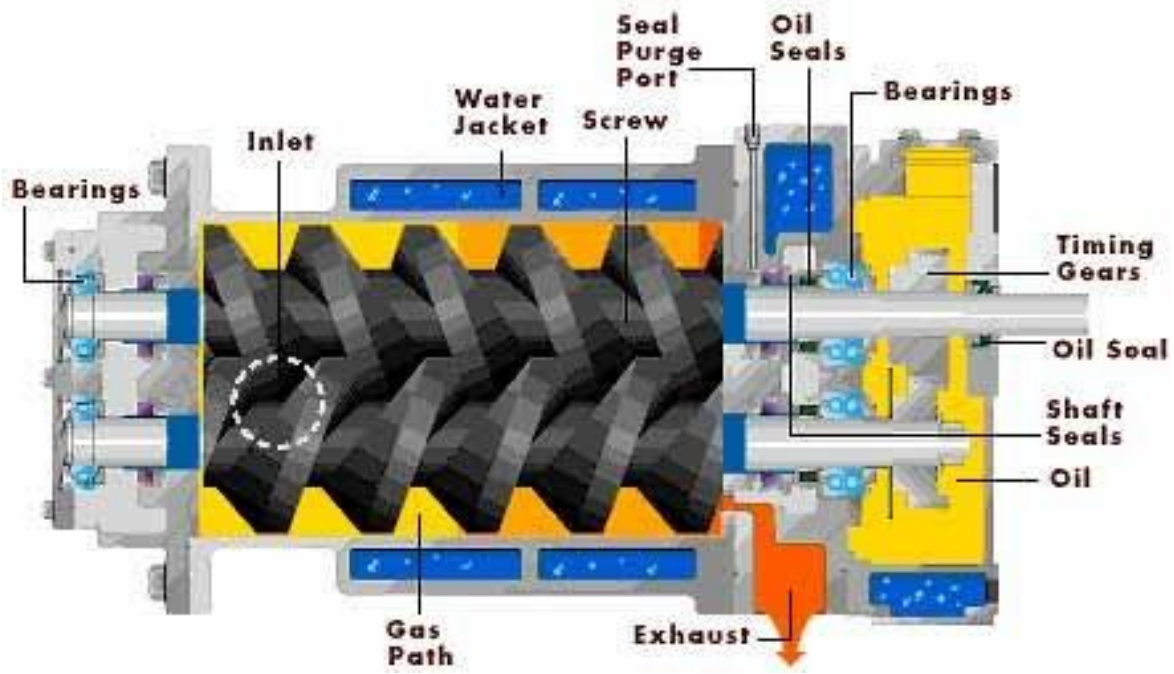
4.2 Gearbox Engineering

- Hardened alloy steel gears
- Precision ground teeth
- Oil-bath lubrication
- Thermally isolated from pump fluid

5 – Bearing & Shaft Engineering







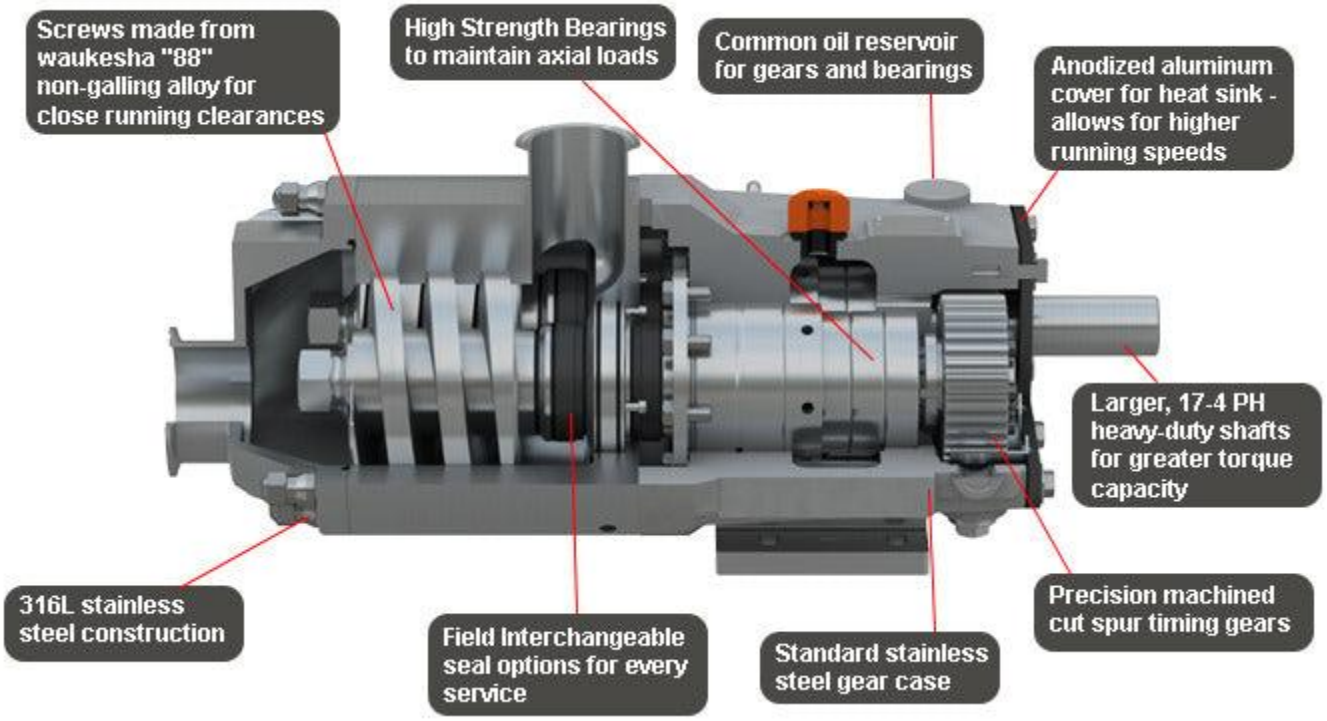
5.1 Bearing Configuration

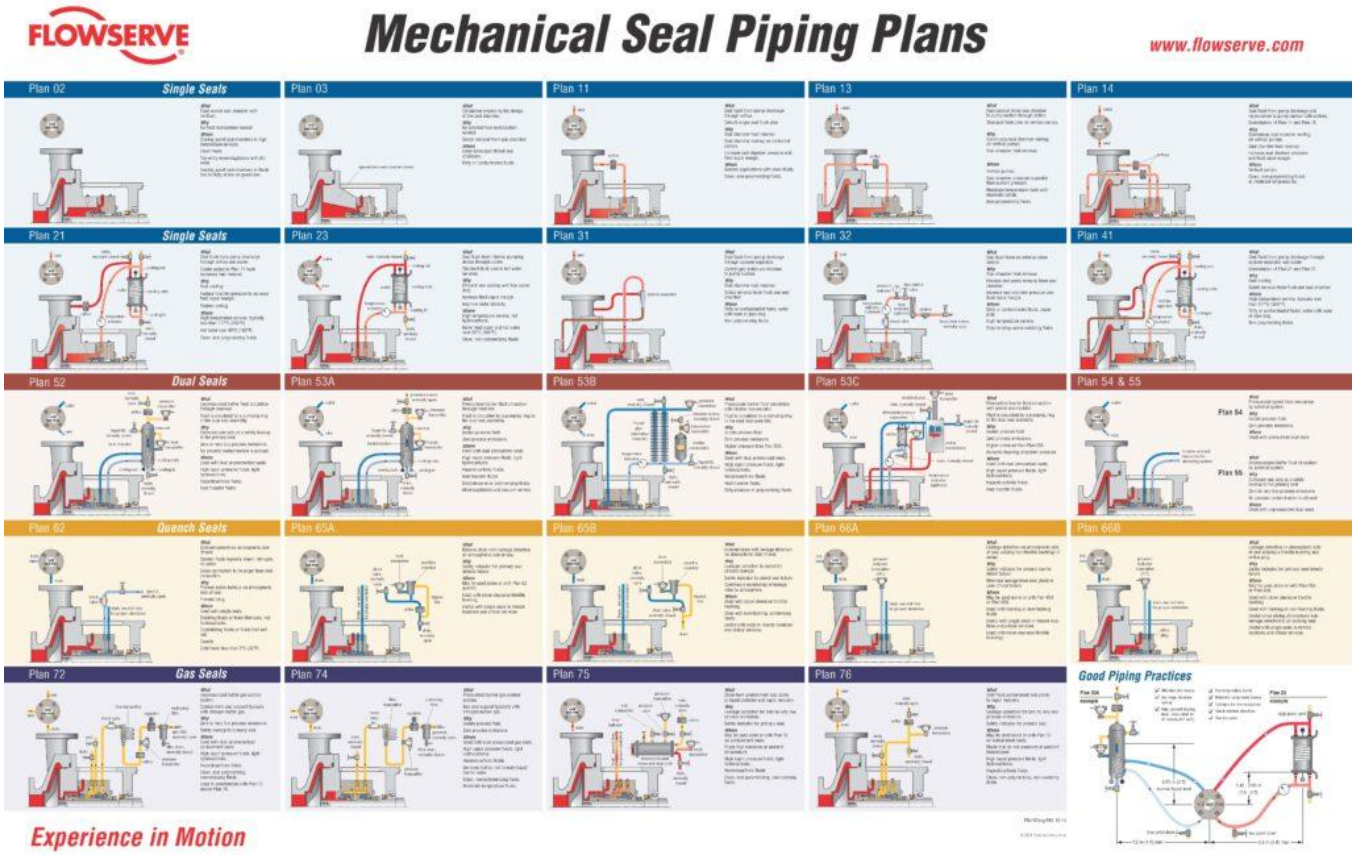
- Radial bearings support hydraulic loads
- Thrust bearings absorb axial forces
- Bearings isolated from pumped media

5.2 Load Management

- Symmetric screw geometry balances forces
- Minimal vibration
- Suitable for continuous 24/7 duty

6 – Seal Chamber & Mechanical Seal Systems





6.1 Seal Chamber Design

- Large-volume seal chamber
- Enhanced cooling and flushing
- Supports API flush plans

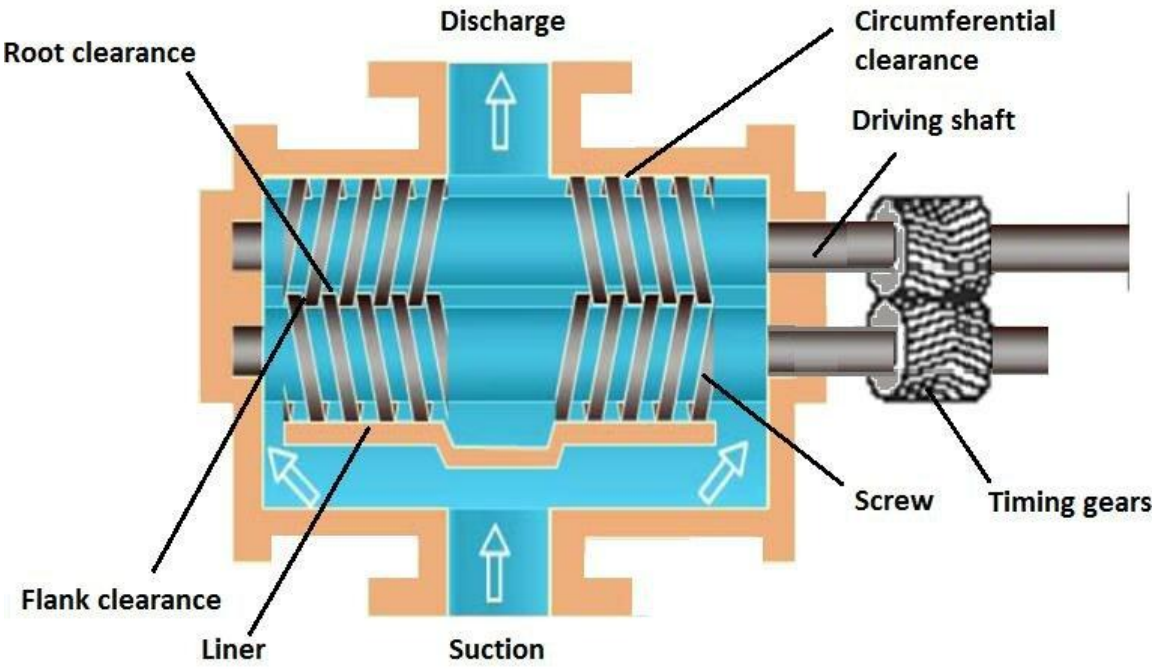
6.2 Seal Options

- Single mechanical seal
- Double mechanical seal
- Cartridge seal design
- Stuffing box (optional)

SECTION- 2

Exploded Assembly & Part Identification

7 – Exploded Assembly Overview



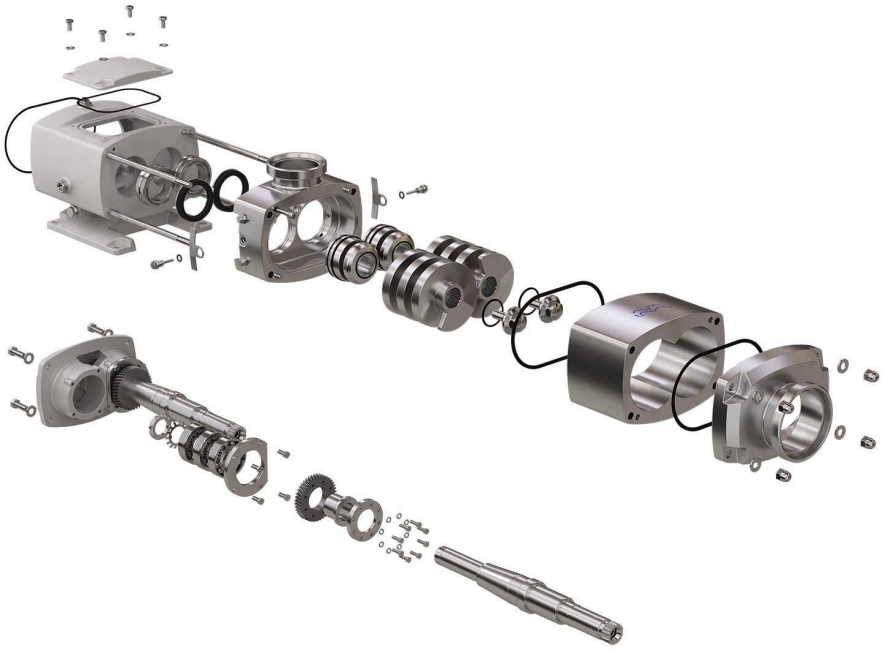
7.1 Purpose of Exploded Assembly

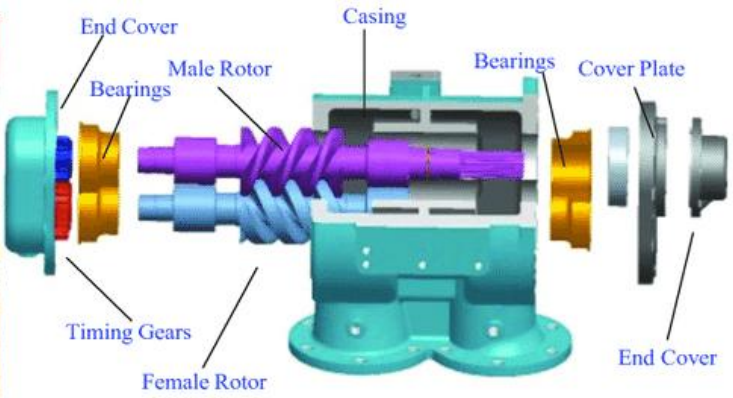
The exploded view illustrates **all major and auxiliary components** of the SPEW SST Series in their relative positions.
This section is critical for:

- Maintenance engineers
- Spare parts identification
- Assembly & disassembly procedures
- Training and troubleshooting

8 – Major Component Breakdown (Part-Wise)

8.1 Pump Casing





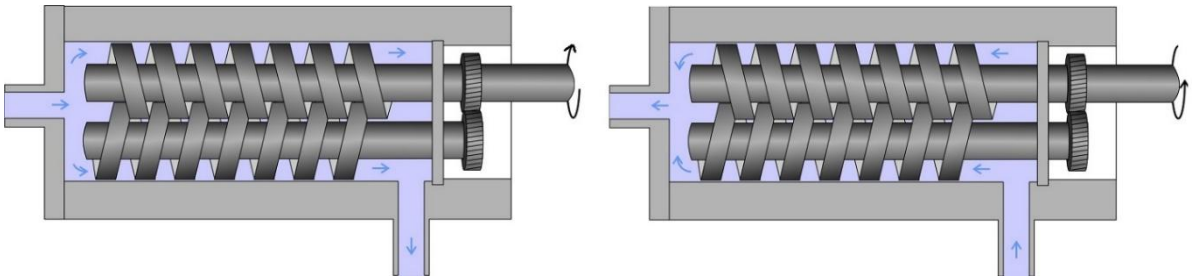
Function:

- Encloses rotors and forms pumping chambers
- Maintains pressure containment
- Provides nozzle interfaces

Engineering Design Notes:

- Heavy-duty, pressure-rated construction
- Smooth internal contours to reduce turbulence
- Supports:
  - Side-Side nozzles
  - Side-Top nozzles

8.2 Twin Screw Rotors (Drive & Driven)



Function:

- Create sealed axial cavities
- Transport fluid without compression

Key Characteristics:

- Precision-machined helical profiles
- Non-contacting operation
- Matched rotor sets (factory paired)

8.3 Shafts

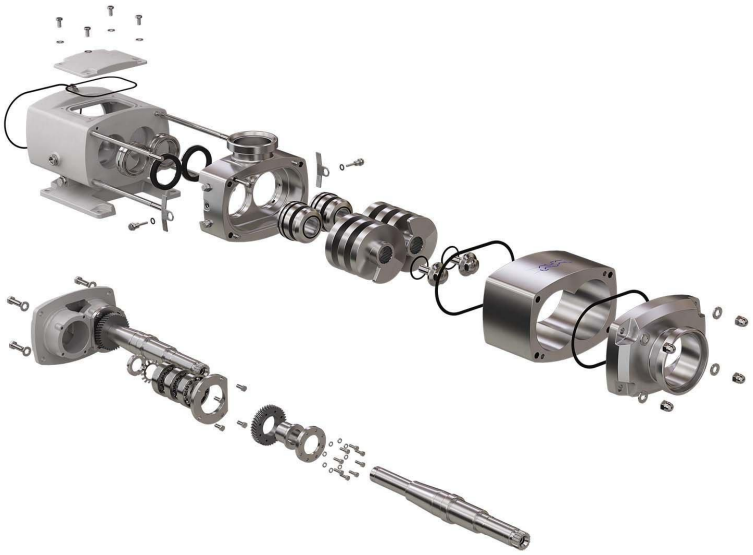
Function:

- Transmit torque from motor to rotors
- Maintain accurate rotor alignment

Engineering Details:

- High-strength alloy steel
- Designed for combined torsional & axial loads
- Precisely aligned with bearing system

8.4 Timing Gears



Function:

- Synchronize rotor rotation
- Maintain exact angular phase

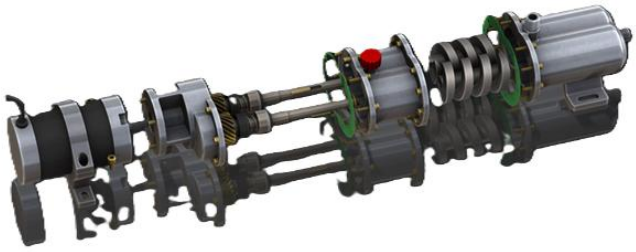
Design Highlights:

- Hardened, precision-ground gears
- External gear chamber
- Oil-lubricated for long service life

8.5 Bearing Assembly

Bearing Types:

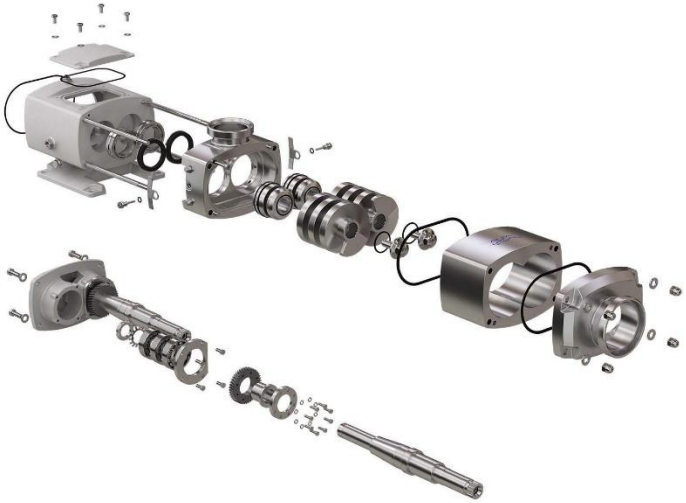
- Radial bearings – absorb hydraulic forces
- Thrust bearings – control axial movement



Engineering Advantage:

- Bearings isolated from pumped fluid
- Reduced contamination and wear
- Long maintenance intervals

8.6 Mechanical Seal System



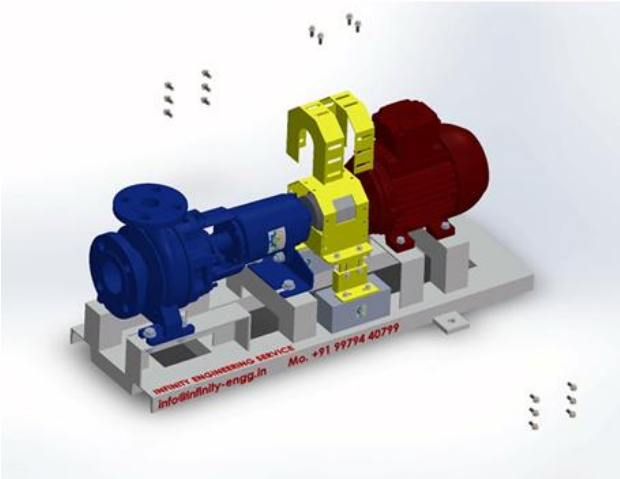
Seal Options Supported:

- Single mechanical seal
- Double mechanical seal
- Cartridge seal arrangement

Seal Chamber Features:

- Large cavity volume
- API flush plan compatibility
- Excellent heat dissipation

8.7 Coupling & Guard



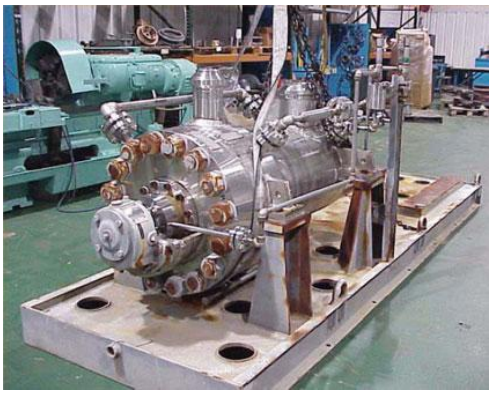
Function:

- Transmit power from motor to pump
- Compensate for minor misalignment

Safety:

- Full coupling guard as standard
- Designed for maintenance accessibility

8.8 Baseplate & Foundation Hardware



Baseplate Design:

- Fabricated steel construction
- Machined mounting pads
- Suitable for:
  - Grouted foundation
  - Skid-mounted packages

C 9 – Assembly Philosophy

9.1 Factory Assembly

- Rotors installed with calibrated clearances
- Timing gears phase-matched
- Bearings pre-loaded as per design

9.2 Field Assembly Considerations

- No internal timing adjustment required
- Cartridge seals simplify replacement
- Modular sub-assemblies reduce downtime

10 – Spare Parts Classification

Category	Parts
Wear Parts	Mechanical seals, gaskets
Critical Parts	Rotors, timing gears
Support Parts	Bearings, coupling
Structural	Casing, baseplate

Excellent.
Continuing exactly as planned.

SECTION-03

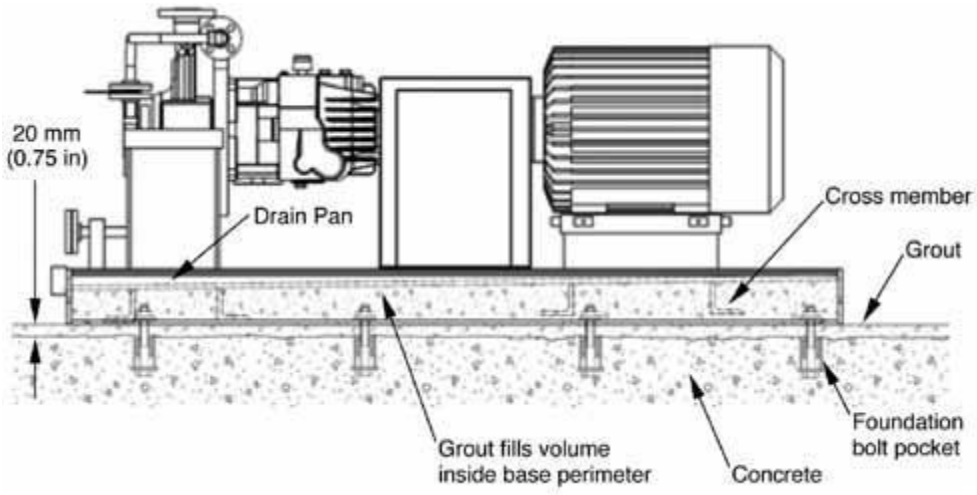
Installation, Alignment & Commissioning Engineering

11 – Installation Engineering Philosophy

The SPEW SST Series is designed for **robust, vibration-free installation** with minimum alignment sensitivity, provided correct installation practices are followed.

Primary Objectives:

- Maintain long-term shaft alignment
- Eliminate piping-induced stresses
- Ensure seal and bearing longevity
- Achieve stable hydraulic performance



12 – Foundation & Baseplate Installation

12.1 Foundation Requirements

- Reinforced concrete foundation recommended
- Foundation mass ≥ **3× pump-set weight**
- Flatness tolerance: **≤ 0.2 mm / meter**

12.2 Baseplate Placement

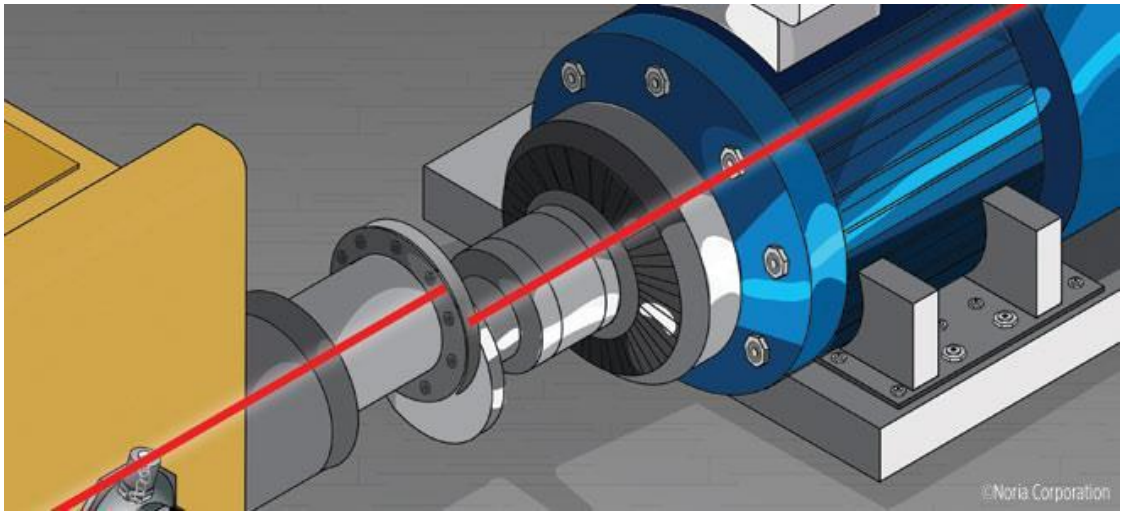
- Baseplate leveled using shims or jacking bolts
- Check level in both longitudinal and transverse directions
- Anchor bolts snug-tight (final tightening after grouting)

12.3 Grouting Procedure

- Use non-shrink epoxy or cementitious grout
- Pour grout continuously to avoid voids
- Allow full curing before final bolt tightening

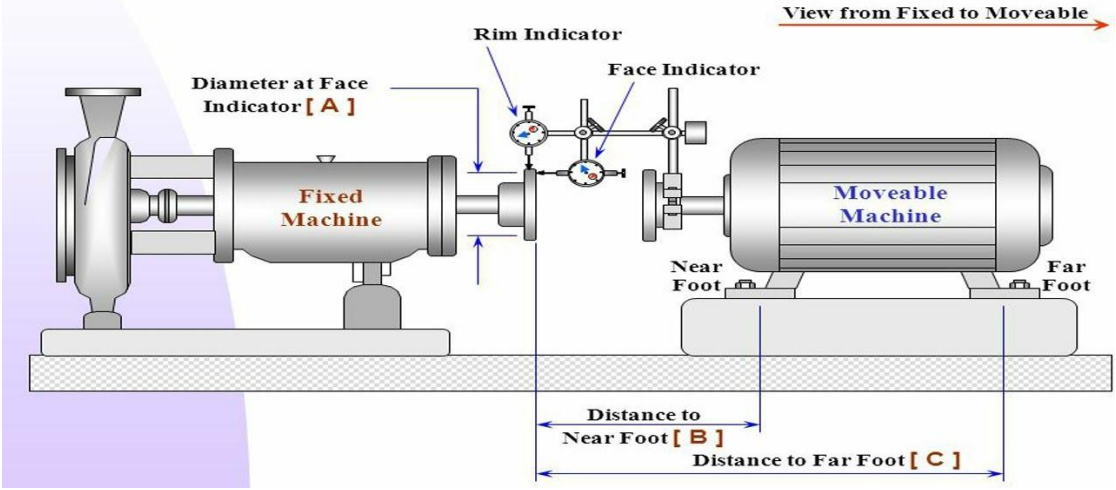
Engineering Benefit:
✓ Eliminates soft foot
✓ Improves vibration damping
✓ Maintains alignment over time

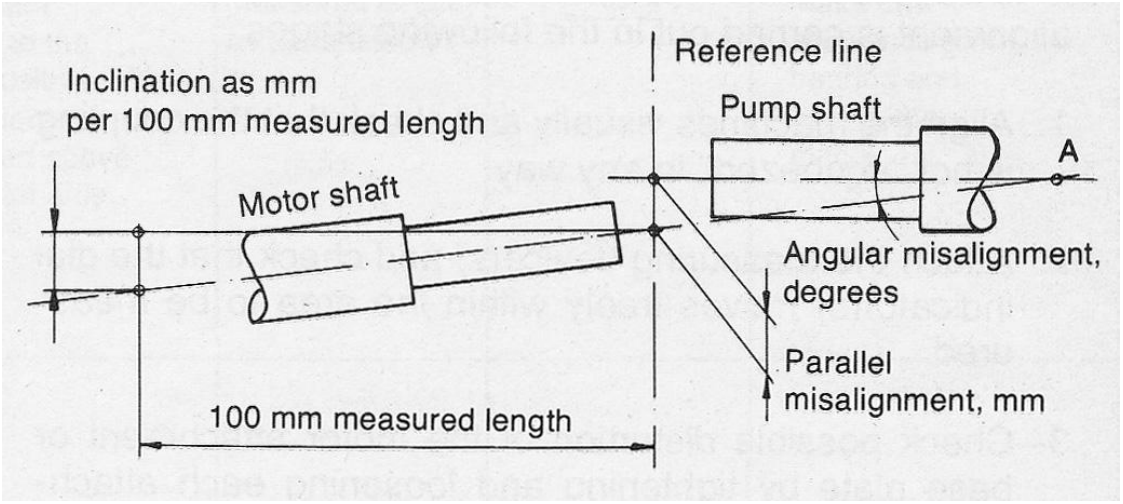
13 – Shaft Alignment Engineering



Rim & Face Shaft Alignment

- **Typical Set-up**





13.1 Alignment Importance

Even though SST pumps are positive displacement, **misalignment directly impacts**:

- Bearing life
- Seal life
- Timing gear reliability

13.2 Alignment Tolerances (Typical)

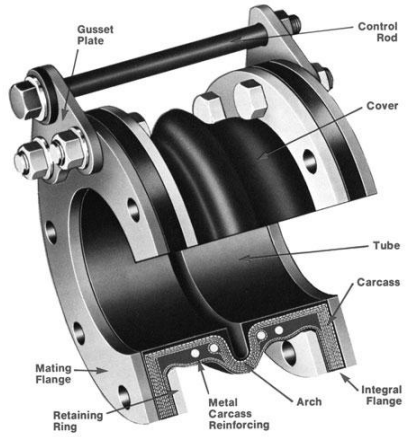
Parameter	Cold Alignment
Parallel Offset	≤ 0.05 mm
Angular Misalignment	≤ 0.05 mm / 100 mm

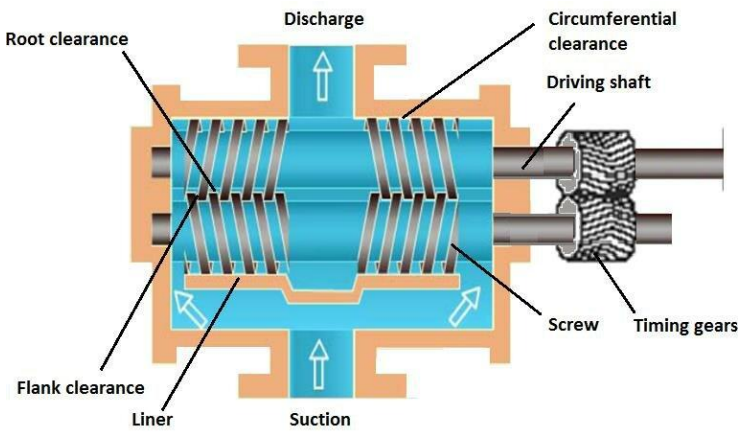
Laser alignment is **strongly recommended**.

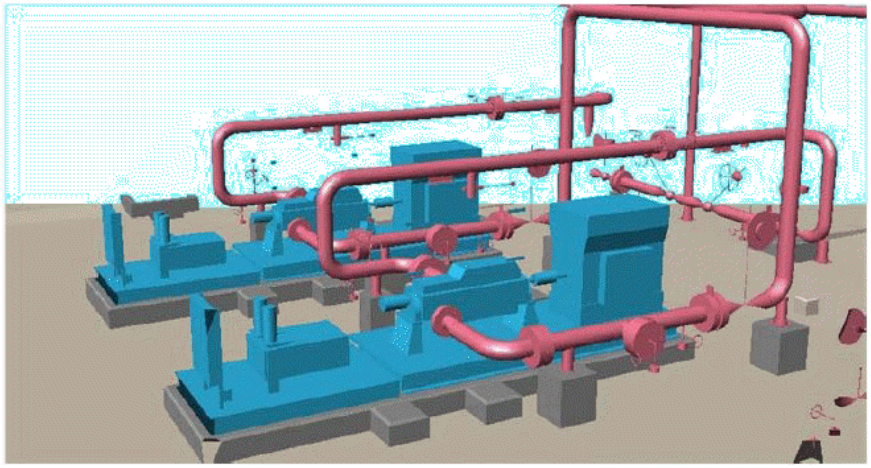
13.3 Post-Grout Alignment

- Re-check alignment after grout curing
- Re-check again after first thermal run

14 – Piping Design & Stress Management







14.1 Suction Piping Guidelines

- Short, straight suction line preferred
- Suction line diameter ≥ pump nozzle size
- Avoid:
  - High points trapping air
  - Sharp elbows close to suction

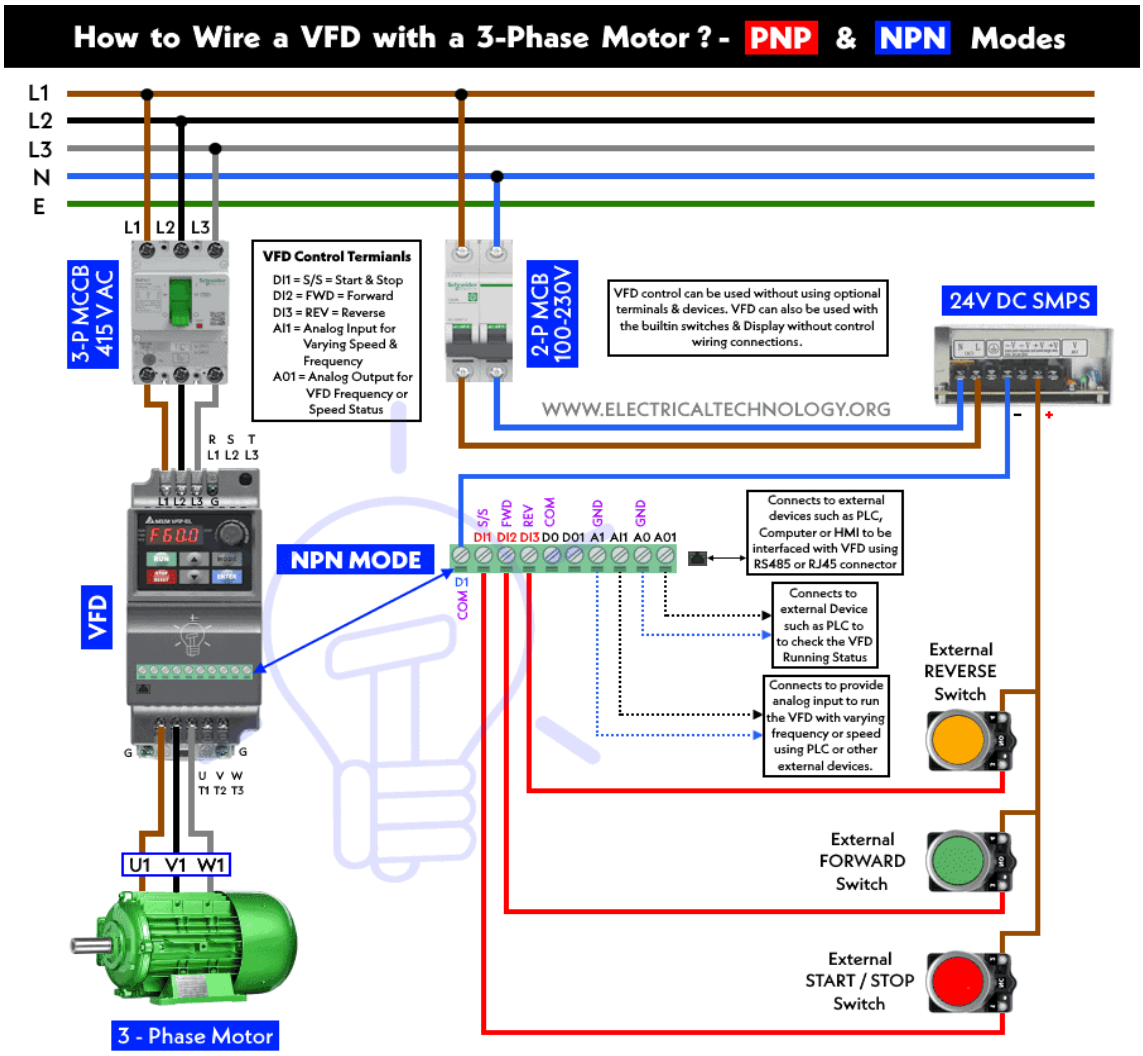
14.2 Discharge Piping

- Install isolation valve downstream
- Provide pressure relief device where required
- Support piping independently of pump

14.3 Nozzle Load Control

- Pump nozzles **must not carry pipe weight**
- Use pipe supports, spring hangers if required

CHAPTER 15 – Electrical & Drive System Integration



15.1 Motor Selection

- Suitable for constant torque duty
- Service factor ≥ 1.15 recommended

15.2 VFD Operation

- Flow directly proportional to speed
- Minimum speed limit set to avoid overheating
- Ramp-up and ramp-down to reduce mechanical shock

16 – Pre-Commissioning Checklist

16.1 Mechanical Checks

✓ Baseplate bolts tightened
✓ Alignment verified
✓ Coupling guard installed
✓ Seal flush lines connected

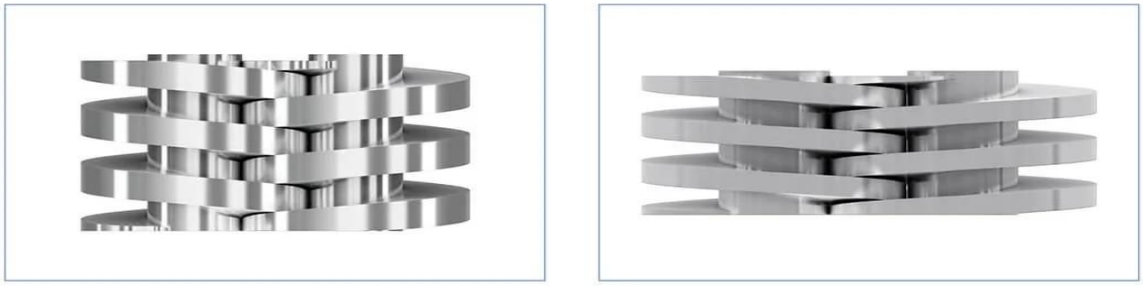
16.2 Lubrication Checks

✓ Timing gear oil filled to correct level
✓ Bearing lubrication verified

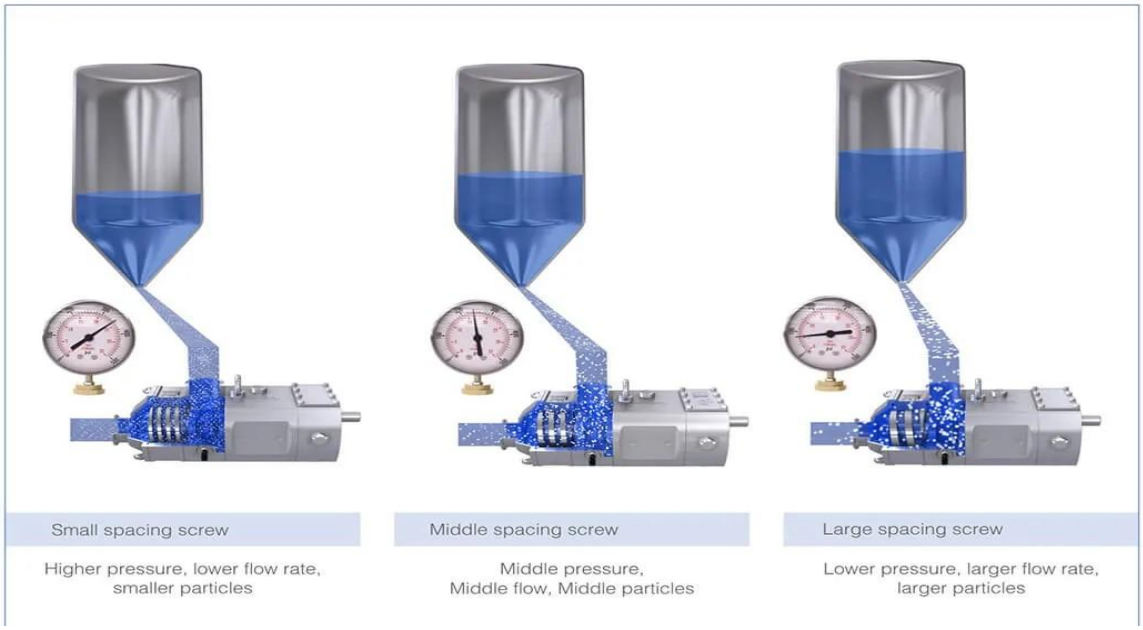
16.3 Process Checks

✓ Pump primed
✓ Suction valve open
✓ Discharge valve partially open

17 – Start-Up Procedure



Option 1: Large screw spacing, larger flow rate, can deliver larger particles, but the pressure will be lower compared with small spacing screw.
Option 2: Small screw spacing, lower flow rate but higher pressure, the particles that can be transported will also be smaller.



17.1 Initial Start

1. Jog motor to verify rotation direction
2. Start pump at low speed
3. Gradually increase to operating speed
4. Monitor pressure, noise, vibration

17.2 Normal Operation

- SST pumps tolerate pressure variation
- Never run against closed discharge valve
- Continuous duty operation permitted

PRE-COMMISSIONING CHECKLIST FOR PUMPS

Equipment tag number:

System Description:

P&ID Number:

Sr No.	Description	Remarks
1	Check for completion of equipment erection in all respect as per respective drawings / documents	
2	Check the stress-freeness of the main piping	
3	Bearings & hydraulic coupling lubricated with specified lubricant.	
4	Check that the couplings between are in perfect alignments.	
5	Check coupling bolts and guard installed.	
6	Rotor is free in its bearings	
7	Pump / Motor checked for correct direction of rotation. The direction must match arrow on the pump.	
8	Instrumentation & protection devices checked by simulation. Measuring & Monitoring instruments are okay.	
9	Oil Flushing of Oil Circuit is over successfully and new oil filled in hydraulic coupling and oil circuit.	
10	Reverse rotation detection switch on hydraulic coupling and protection is okay.	
11	Holding-down bolts fitted securely.	
12	Drain, Vents & gland leakage lines routed properly to common drains.	
13	Check Automatic Re-circulation Valves and Back Pressure valve in re-circulation line installed properly.	
14	Check oil coolers, oil pipes and cooling water pipe lines are installed properly as per PID & GA.	
15	Check mechanical seals	
16	Discharge Valves of Pumps kept closed	
17	Line Vents are kept opened	

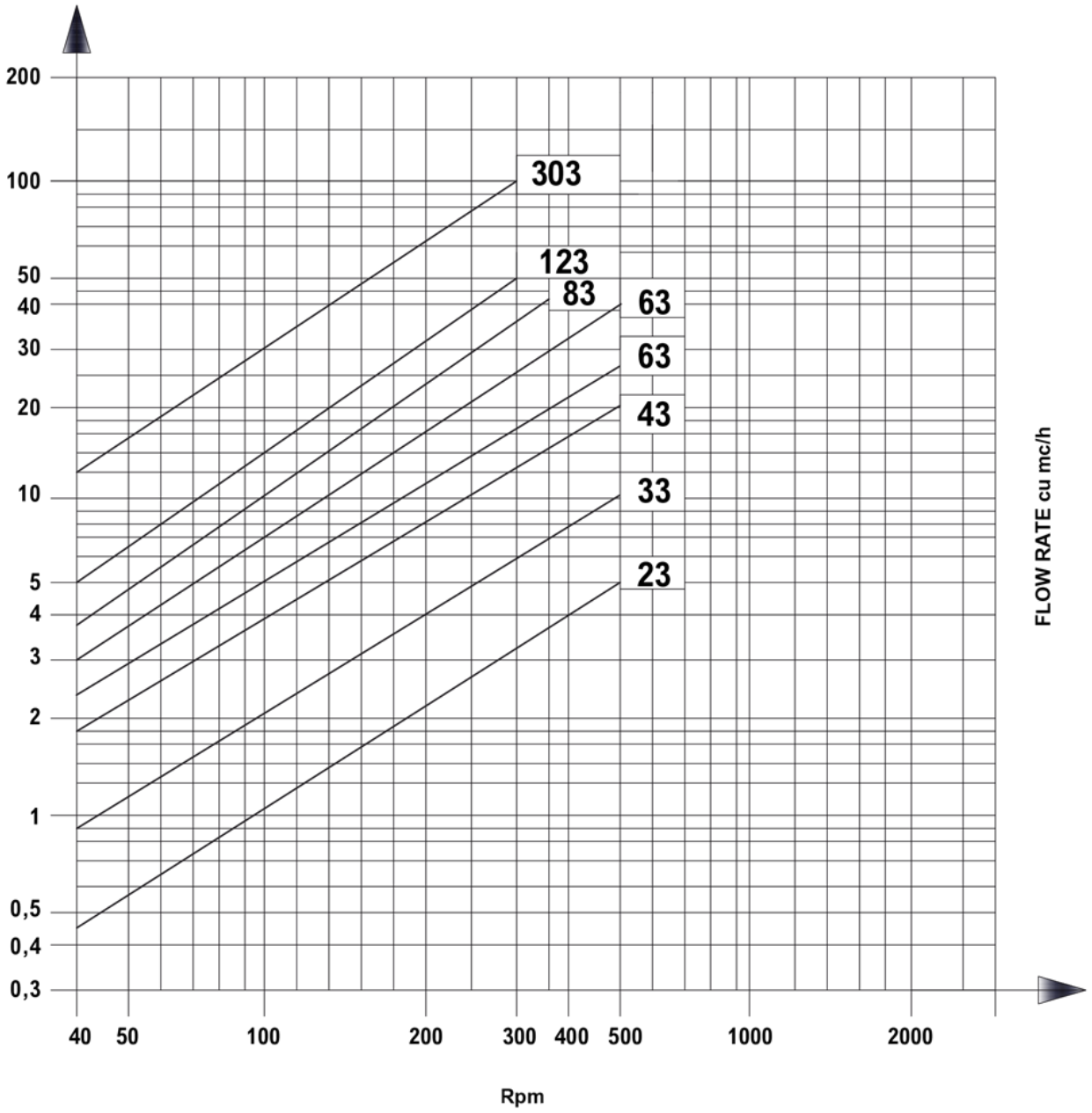
CHAPTER 18 – Shutdown Procedure

- Reduce speed gradually
- Close discharge valve
- Stop pump
- Flush pump if handling viscous or solidifying fluid

SECTION 4

Operation, Control & Performance Engineering

19 – Operating Characteristics of SST Twin Screw Pumps



19.1 Positive Displacement Flow Behaviour

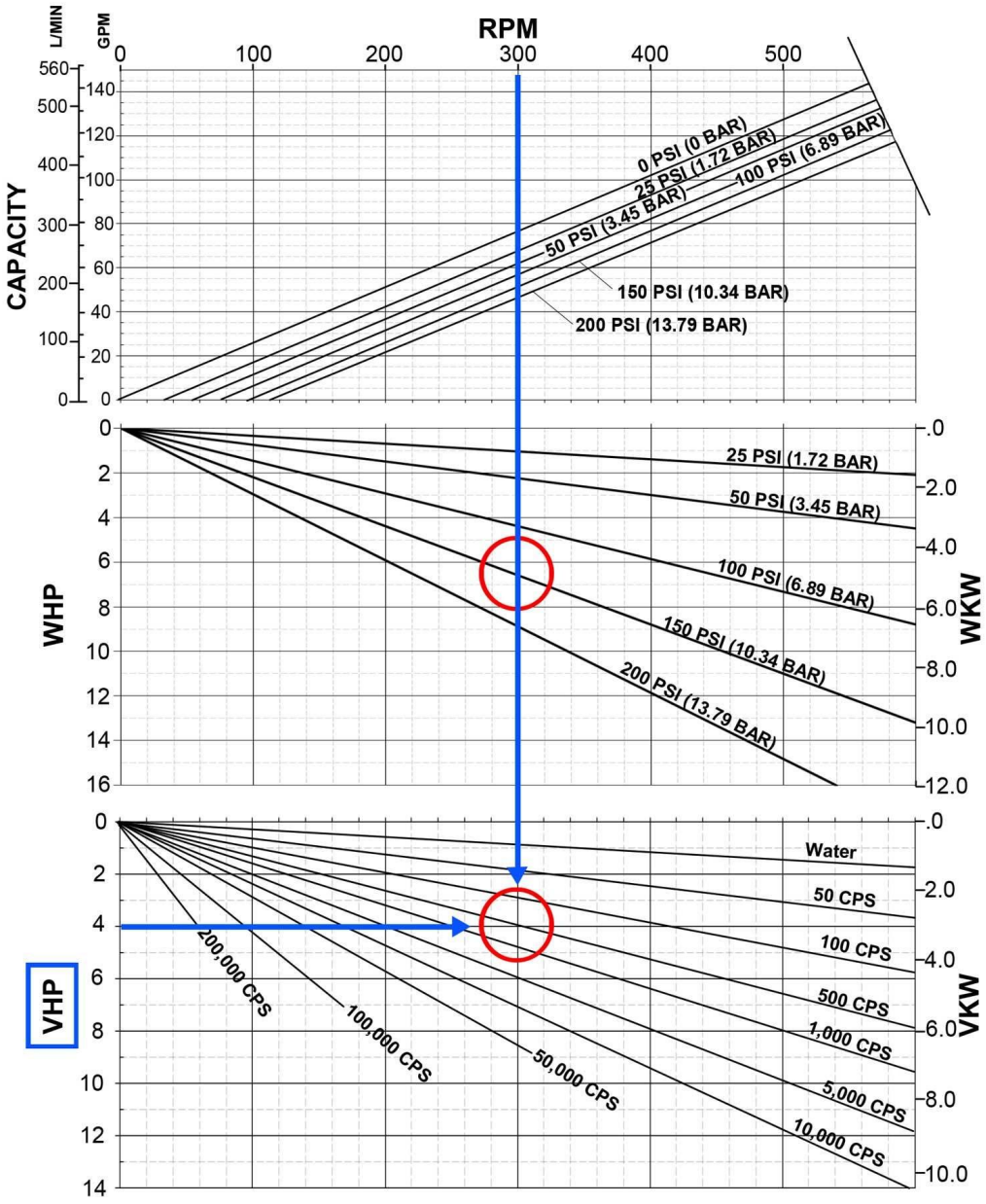
The SPEW SST Series delivers **fixed volumetric displacement per revolution**.

- Flow rate is **directly proportional to speed**
- Flow remains **independent of discharge pressure**
- No internal slip at operating clearances

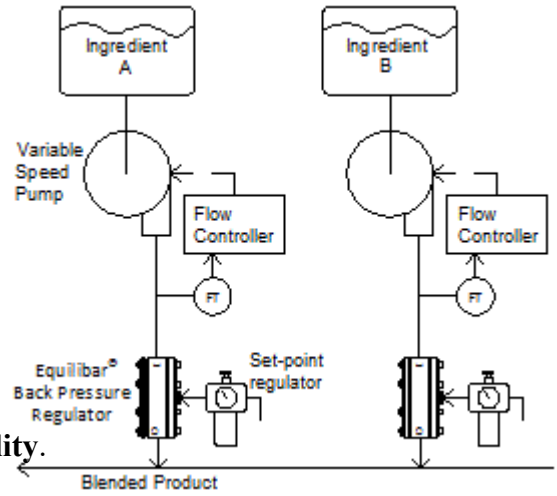
Engineering Implication:
✓ Accurate flow control
✓ Ideal for metering & circulation
✓ Stable operation under varying system resistance

20 – Flow vs Speed Relationship

Ampco ZP1-130 & ZP1-134 Viscous Horsepower



20.1 Linear Flow Control



[Q = V_d \times N]

Where:

- **Q** = Flow rate
- **V_a** = Displacement per revolution
- **N** = Pump speed (RPM)

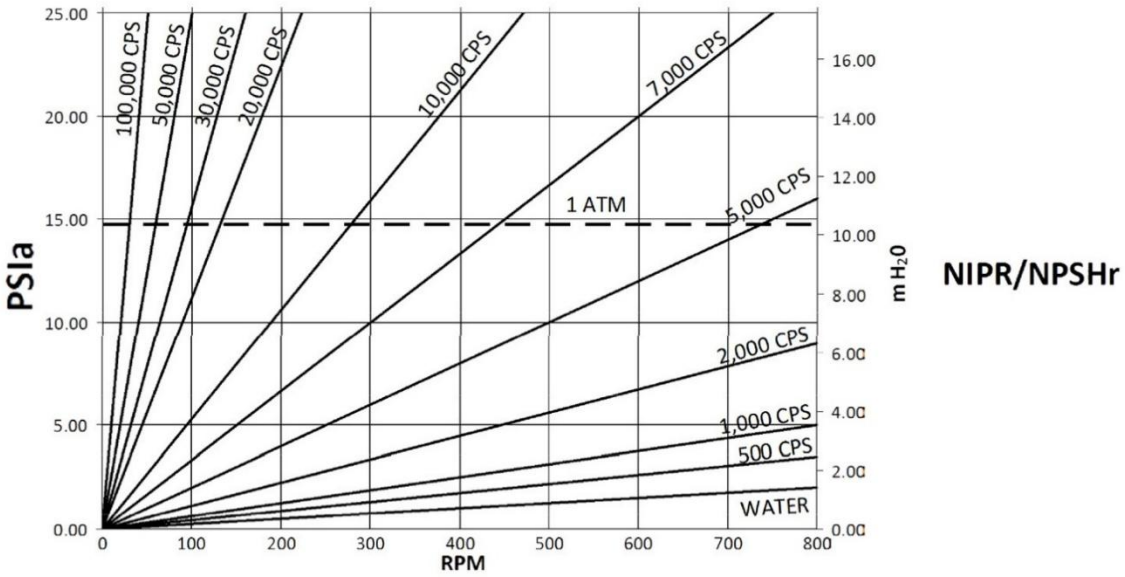
Reducing speed reduces flow **without affecting pressure capability**.

20.2 Turndown Capability

- Typical speed turndown: **10:1**
- Maintains efficiency at low speeds
- No cavitation risk at reduced RPM

21 – Differential Pressure Capability

Ampco ZP1-6 Net Positive Suction Head Required



21.1 Pressure Generation

Pressure is generated by **system resistance**, not by pump geometry.

- Pump produces required pressure up to design limit
- Must always install **pressure relief protection**

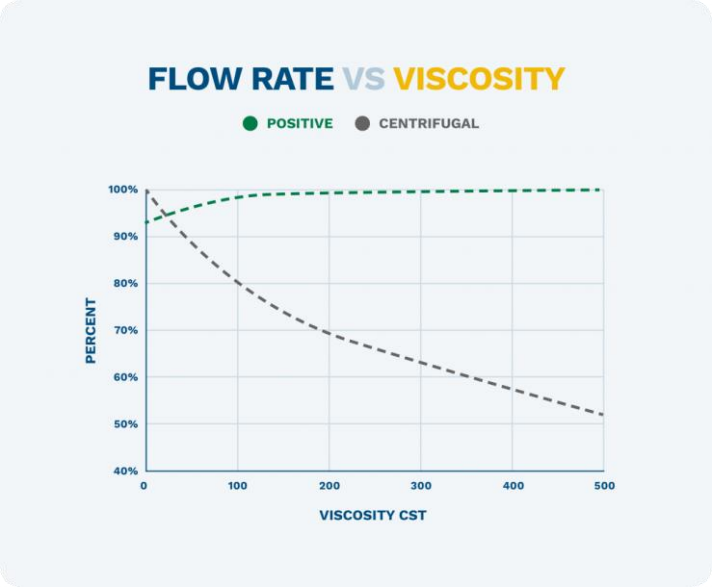
Important Safety Rule:

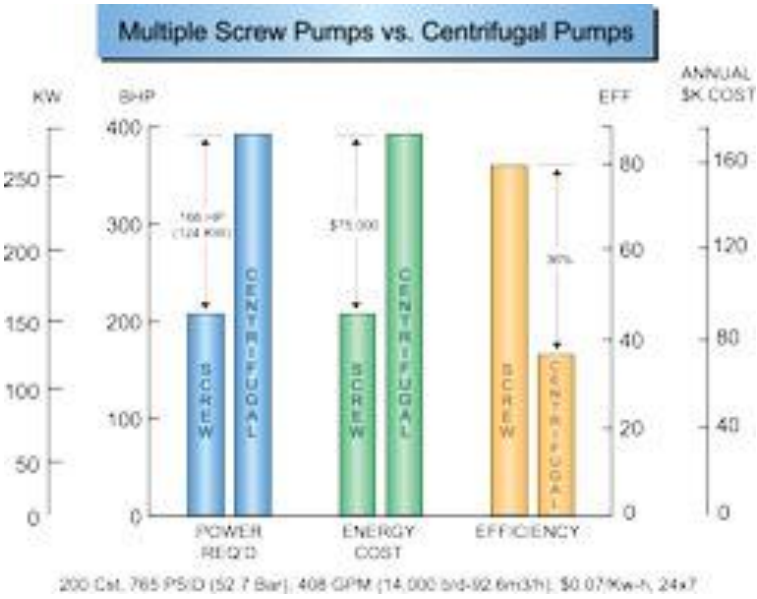
❗ Never operate against a closed discharge valve

21.2 Pressure Limiting Devices

- Inline pressure relief valve
- Integrated bypass loop (optional)
- External safety valve recommended

CHAPTER 22 – Viscosity Impact on Performance





22.1 Low Viscosity Fluids

- Slight internal leakage
- Stable flow maintained
- Suitable for fuels, solvents, light oils

22.2 High Viscosity Fluids

- Leakage reduces
- Volumetric efficiency improves
- Torque requirement increases

Engineering Advantage:
SST pumps **improve efficiency with increasing viscosity**, unlike centrifugal pumps.

23 – Temperature & Thermal Performance

23.1 Temperature Handling

- Designed for hot oil, bitumen, polymers
- Thermal expansion accommodated by:
  - Controlled rotor clearances
  - External timing gears
  - Bearing isolation

23.2 Heating Options

- Casing jacketing (optional)
- Steam or thermal oil tracing
- Seal heating (if required)

24 – Gas Handling & Multiphase Capability

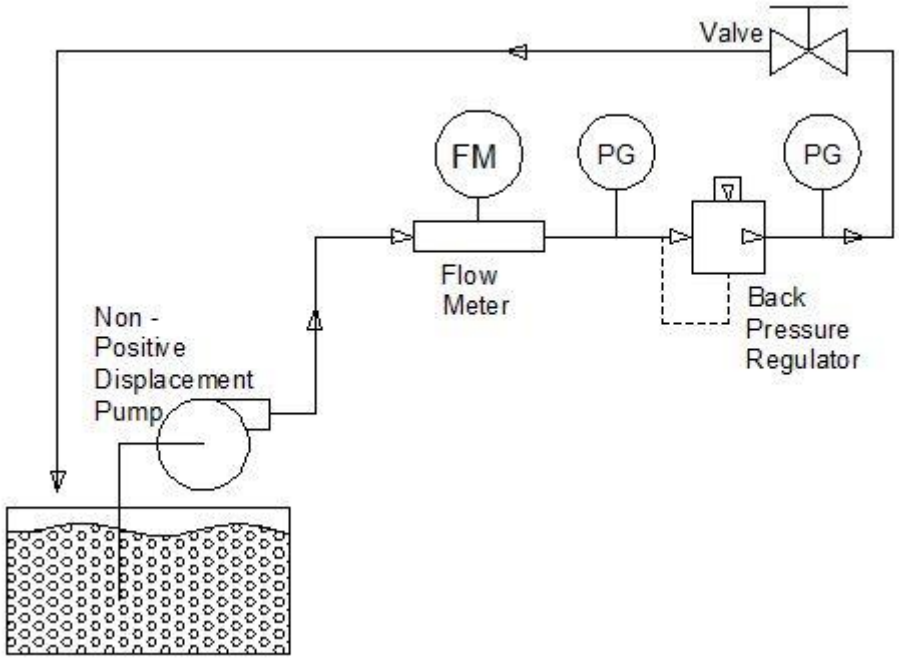
24.1 Gas Entrained Fluids

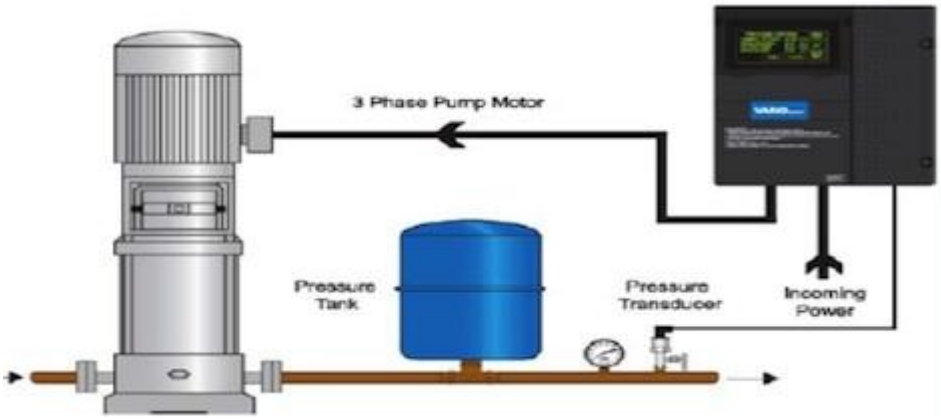
- SST pumps tolerate high gas volume fractions
- No vapor lock
- Maintains flow stability

24.2 Self-Priming Behavior

- Strong suction vacuum
- Capable of dry suction lift (within limits)
- Ideal for tank unloading and stripping duties

25 – Automation & Control Integration





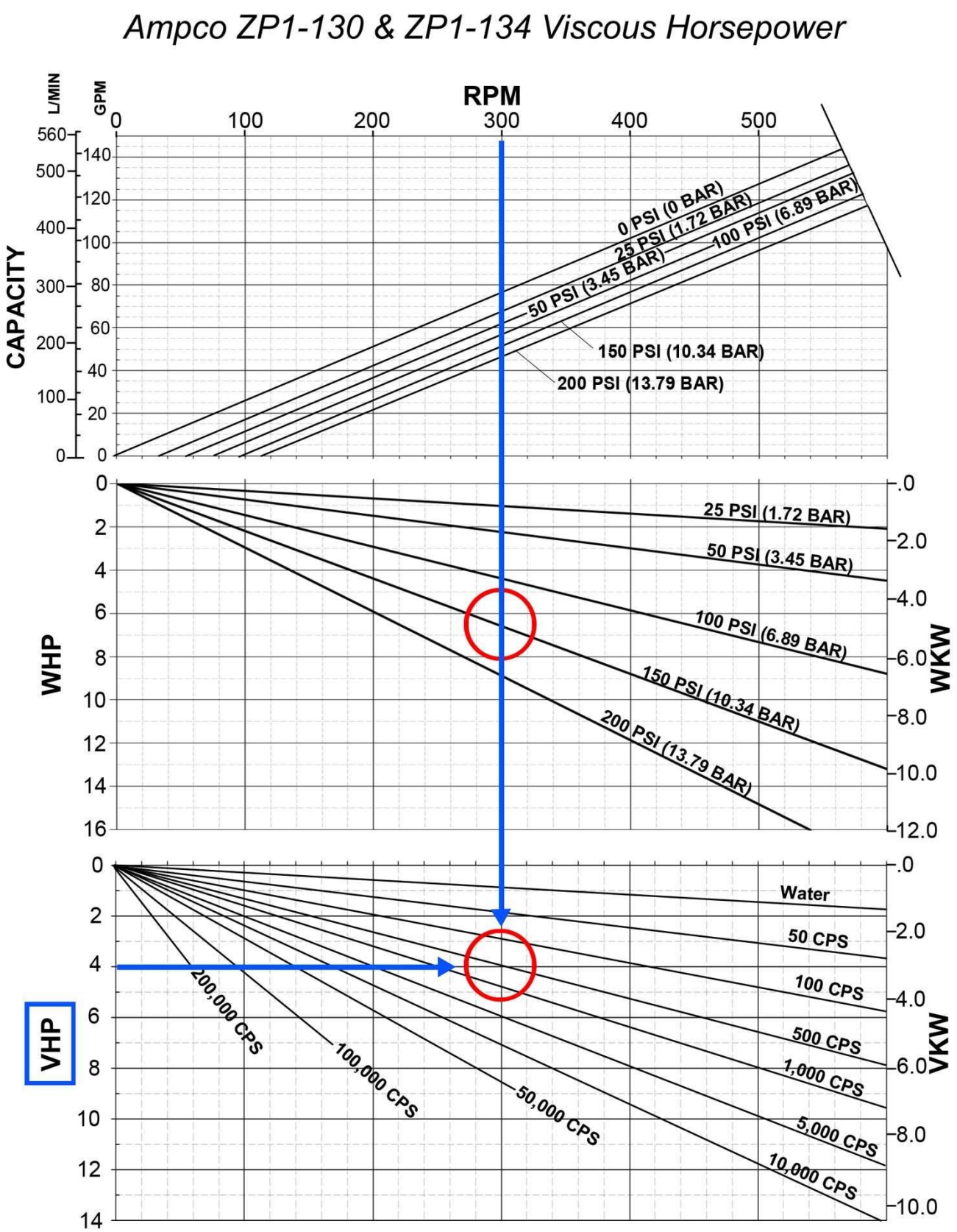
25.1 Instrumentation Compatibility

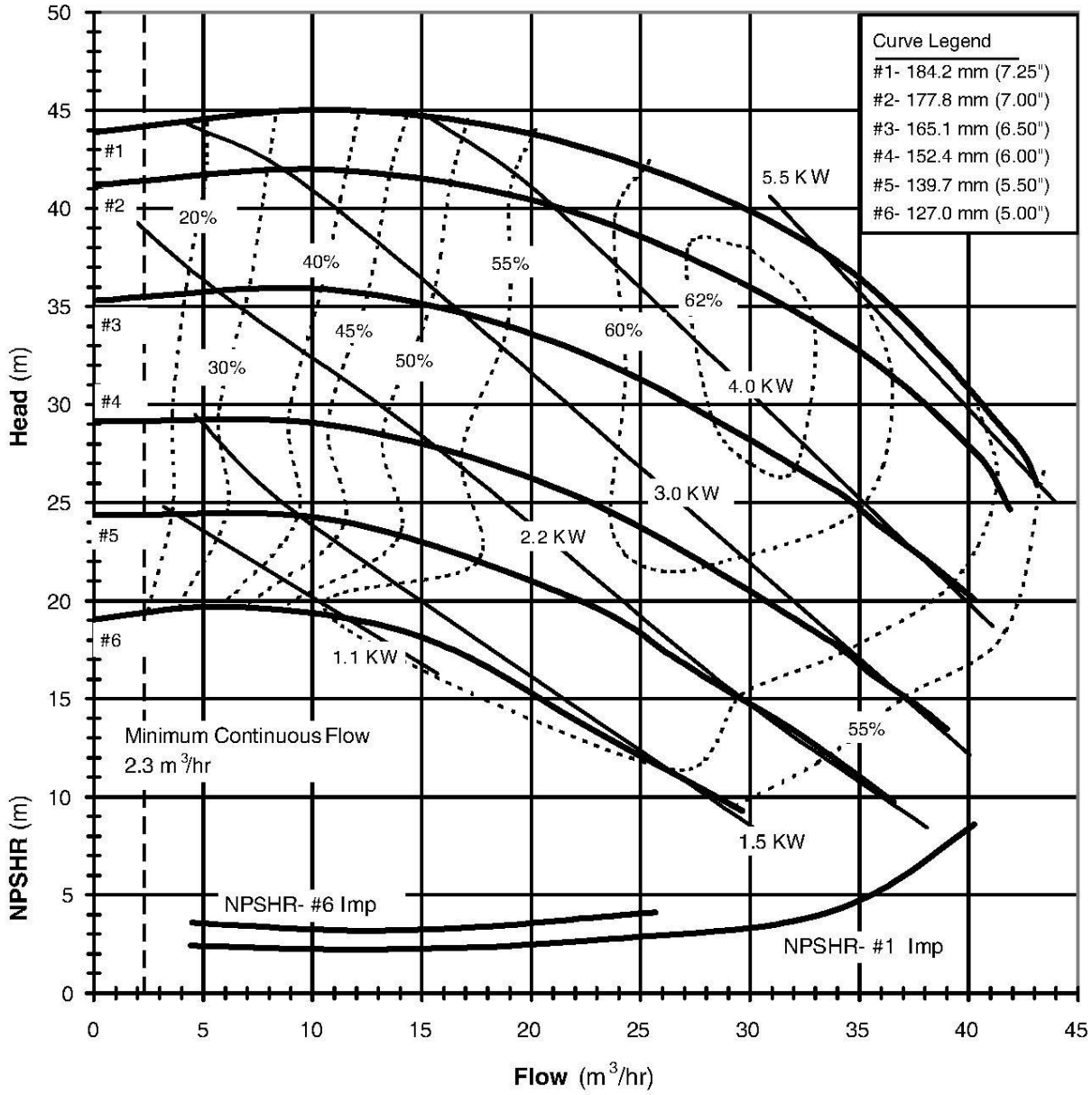
- Pressure transmitters (suction & discharge)
- Temperature sensors
- Flowmeters
- Seal leakage detectors

25.2 Typical Control Strategies

Control Mode	Description
Speed Control	Flow regulation via VFD
Pressure Control	Pump speed adjusted to pressure feedback
Flow Control	Closed-loop flow regulation

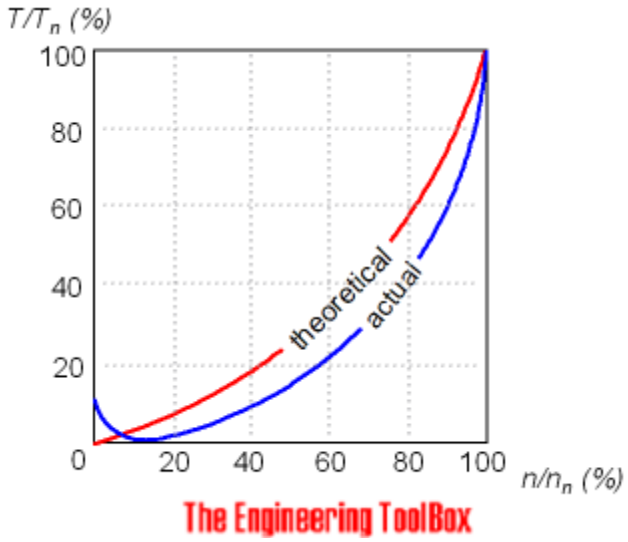
26 – Efficiency & Power Consumption





26.1 Power Characteristics

- Power proportional to:
  - Differential pressure
  - Fluid viscosity
  - Pump speed



26.2 Motor Sizing Philosophy

- Motor sized for **maximum viscosity + pressure**
- VFD prevents overload during variable operation

27 – Operational Limits & Protection

27.1 Operating Limits

- Maximum allowable pressure: model-specific
- Maximum speed: manufacturer defined
- Minimum speed: bearing & seal dependent

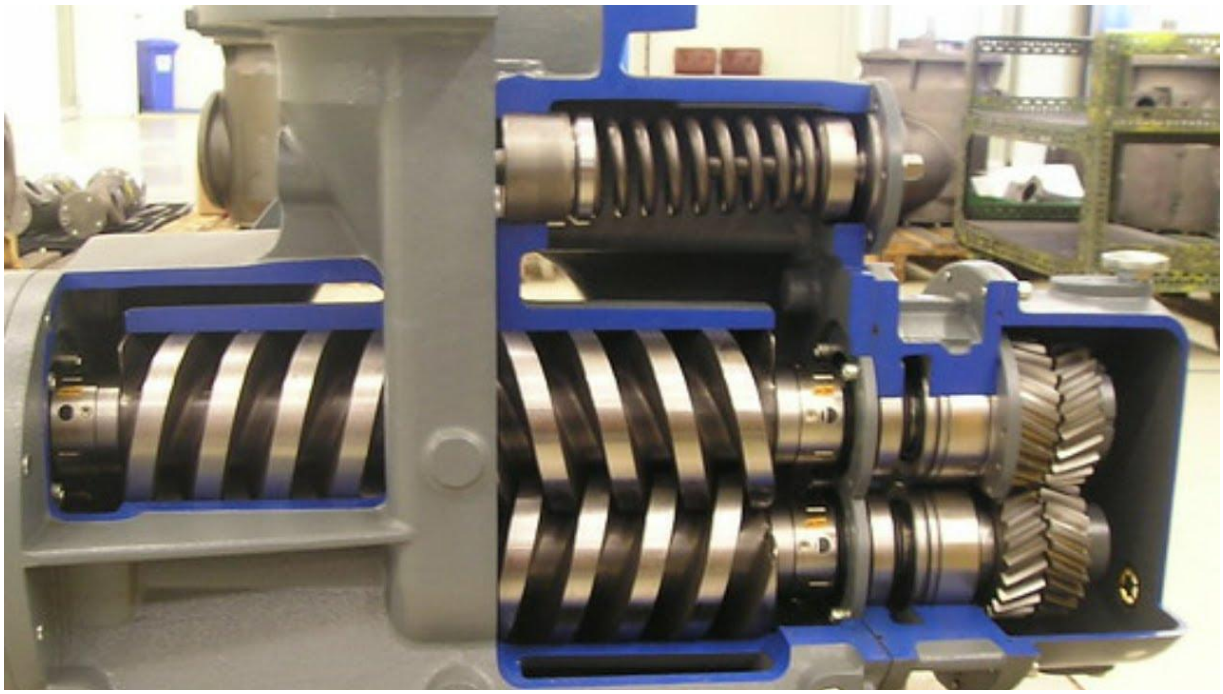
27.2 Protection Systems

- Pressure relief valve (mandatory)
- Overcurrent motor protection
- Temperature monitoring
- Dry-run protection (optional)

SECTION 5

Maintenance, Inspection & Troubleshooting Engineering

28 – Maintenance Philosophy



The SPEW SST Series is designed for **low-maintenance, continuous-duty operation** due to its **non-contacting internal design**.
Maintenance is primarily **preventive rather than corrective**.

Core Objectives:

- Maximize equipment life
- Prevent unplanned shutdowns
- Maintain hydraulic efficiency
- Protect seals, bearings, and gears

29 – Preventive Maintenance Schedule

29.1 Daily / Shift Checks

✓ Abnormal noise or vibration
✓ Leakage at seal or connections
✓ Discharge pressure stability
✓ Motor current within limits

29.2 Weekly Checks

✓ Timing gear oil level
✓ Seal flush flow (if applicable)
✓ Coupling guard condition

29.3 Monthly Checks

✓ Vibration trend comparison
✓ Bearing temperature monitoring
✓ Alignment visual inspection

29.4 Annual / Shutdown Maintenance

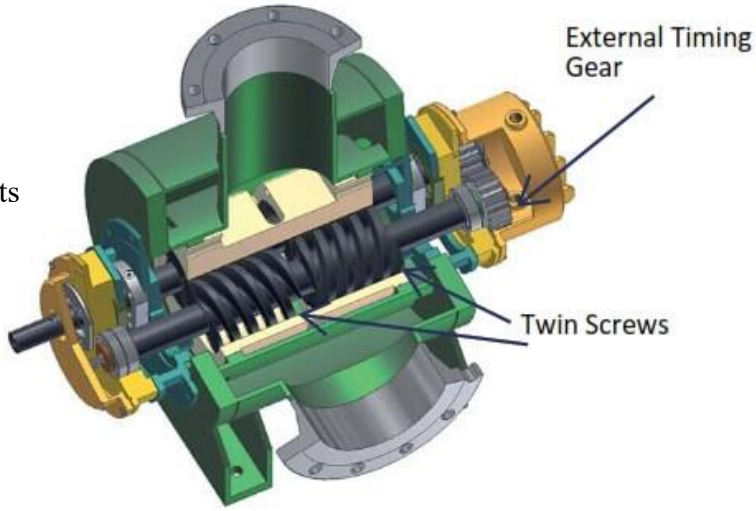
✓ Oil replacement in timing gear housing
✓ Mechanical seal inspection
✓ Bearing condition assessment
✓ Rotor clearance verification (if required)

30 – Lubrication Management

30.1 Timing Gear Lubrication

- Oil-bath lubricated gearbox
- Use OEM-recommended oil grade
- Maintain oil level within sight glass limits

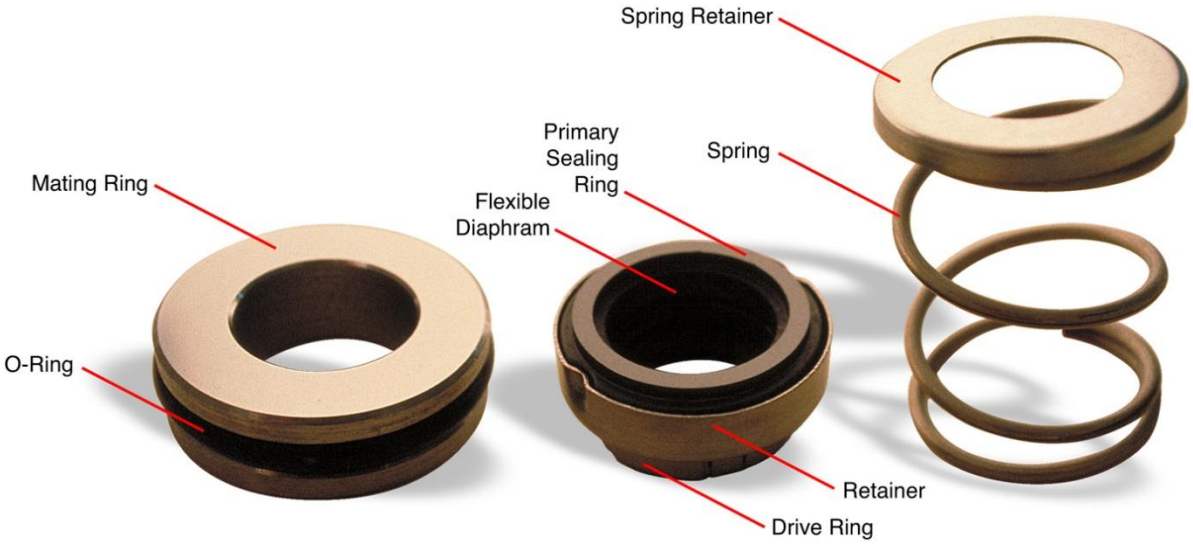
Never mix oil grades.



30.2 Bearing Lubrication

- Bearings isolated from process fluid
- Grease or oil lubrication depending on design
- Over-lubrication to be avoided

31 – Wear Mechanisms & Life Expectancy



31.1 Typical Wear Points

- Mechanical seal faces
- Bearings (after long service hours)
- Timing gear teeth (if lubrication neglected)

Important:
Rotors experience **minimal wear** due to non-contact operation.

32 – Seal Maintenance & Replacement

32.1 Seal Inspection Indicators

- Visible leakage
- Increased seal chamber temperature
- Contaminated barrier fluid (double seal)

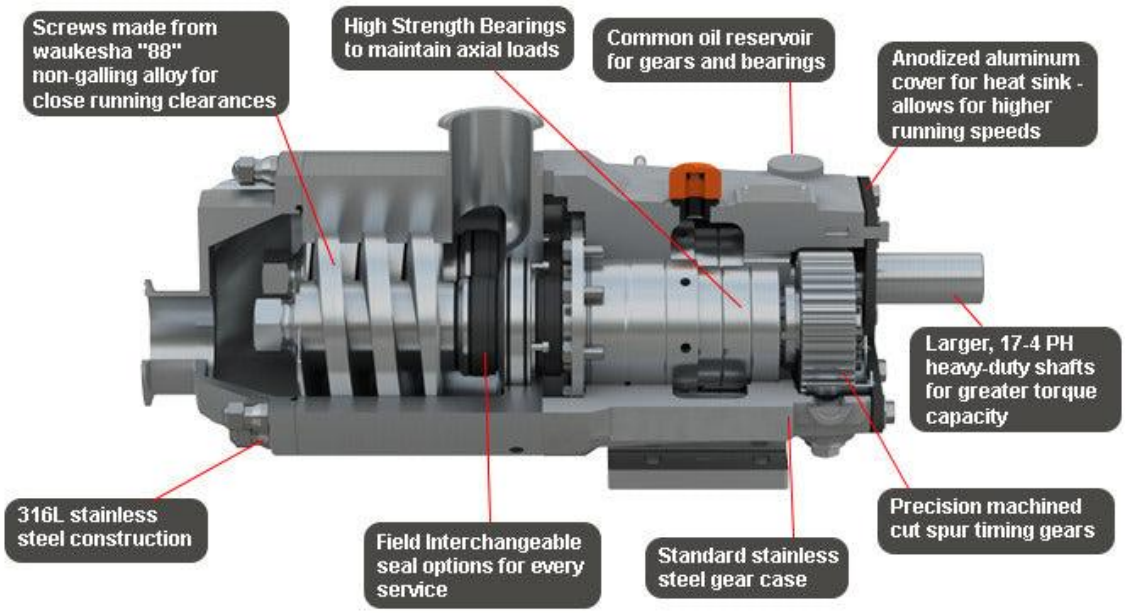
32.2 Seal Replacement Philosophy

- Cartridge seals allow quick replacement
- No rotor retiming required
- Follow torque values for gland bolts

VS

Component Seals	Cartridge Seals
1 Assembled onsite.	1 Pre-installed single-piece.
2 Numerous human errors occur during installation.	2 Precision and effectiveness of installation.
3 Challenging to determine the cause of seal failure.	3 Can accurately identify the root cause of seal failure.
4 High replacement rate, necessitating a substantial inventory.	4 Low replacement rate, solely replacing worn components.
5 Diverse general classifications and non-standardized.	5 Modularity.

33 – Bearing Inspection & Replacement

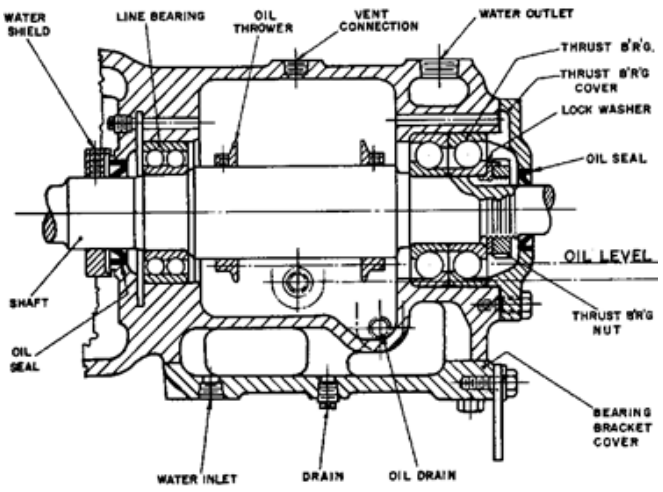


33.1 Bearing Condition Monitoring

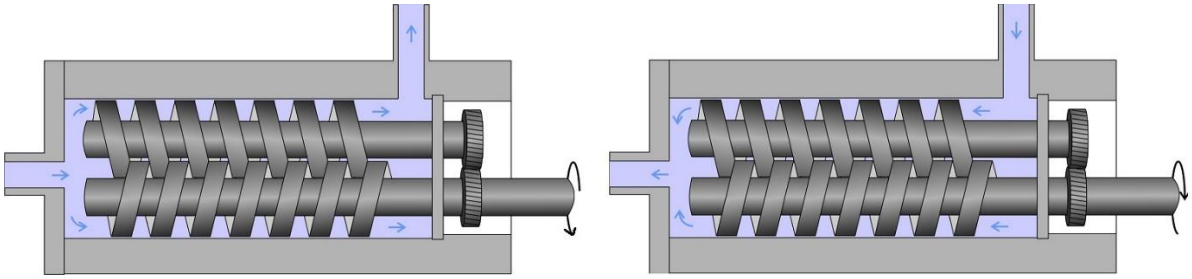
- Vibration trend analysis
- Temperature rise
- Audible noise changes

33.2 Bearing Replacement Guidelines

- Replace as matched sets
- Use correct preload settings
- Verify shaft runout before assembly



34 – Common Operating Issues & Root Causes



Symptom	Probable Cause	Corrective Action
Low flow	Speed too low	Increase RPM
Low flow	Air ingress	Check suction piping
Noise	Cavitation	Improve NPSH
Overload	High viscosity	Reduce speed
Seal leakage	Dry running	Improve priming

Troubleshooting the positive displacement rotary-pump.

No liquid discharge.

- The pump is not primed. Prime it from the outlet side by keeping the outlet air vent open until liquid comes out the vent.
- The rotating unit is turning in the wrong direction.
- Valves are closed or there is an obstruction in the inlet or outlet line. Check that the flange gaskets have their center cut out.
- The end of the inlet pipe is not submerged. You can either increase the length of the inlet pipe into the liquid level or raise the level in the tank.
- The foot valve is stuck.
- A strainer or filter is clogged.
- The net inlet pressure is too low.
- A bypass valve is open.
- There is an air leak some where in the inlet line. Air can come in through gaskets or valves above the fluid line.
- The stuffing box is under negative pressure. Packing is allowing air to get into the system. You should convert the packing to a mechanical seal
- The pump is worn. The critical clearances have increased.
- Something is broken. Check the shaft, coupling, internal parts, etc.
- There is no power to the pump.

The pump is putting out a low capacity.

- The pump's internal clearances have increased. It is time to change some parts.
- The net inlet pressure is too low; the pump is cavitating.
- A strainer or filter is partially clogged.
- The speed is too low. Check the voltage.
- The tank vent is partially frozen shut.
- A bypass line is partially open.
- A relief valve is stuck partially open.
- The inlet piping is damaged. Something ran over it
- A corrosion resistant liner has collapsed in the inlet piping.
- Air is leaking through the packing. You should go to a mechanical seal.

The pump looses its prime after it has been running for a while.

- The liquid supply is exhausted. Check the tank level; sometimes the float is stuck, giving an incorrect level reading.
- The liquid velocity has increased dramatically.

35 – Emergency & Abnormal Conditions

35.1 Dry Running

- Limited tolerance only
- Immediately stop pump
- Inspect seals before restart

35.2 Overpressure

- Caused by blocked discharge
- Relief valve must activate
- Investigate before restarting

36 – Spare Parts Strategy

36.1 Recommended Critical Spares

- Mechanical seal (complete cartridge)
- Bearing set
- Gaskets & O-rings

36.2 Capital Spares

- Rotor set
- Timing gear set
- Shaft assembly

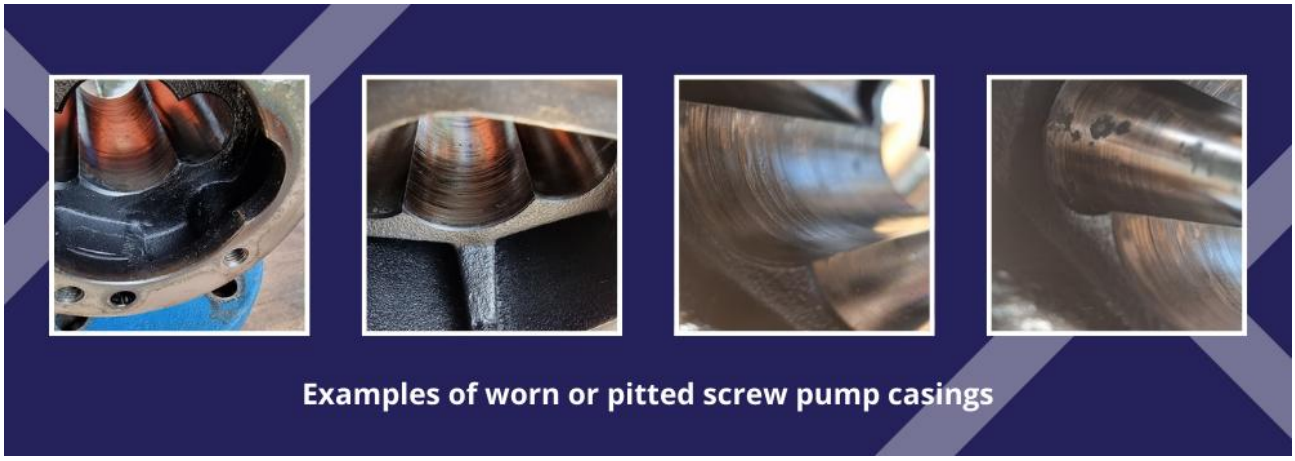
37 – Lifecycle Cost Optimization

- Low wear = reduced spare consumption
- Minimal downtime due to modular design
- Long MTBF under proper operation

SECTION 6

Failure Analysis, Safety, Compliance & Best Practices

38 – Failure Analysis (FMEA-Oriented)



The SPEW SST Series is engineered to **minimize catastrophic failure**, but understanding potential failure modes is essential for safe and reliable operation.

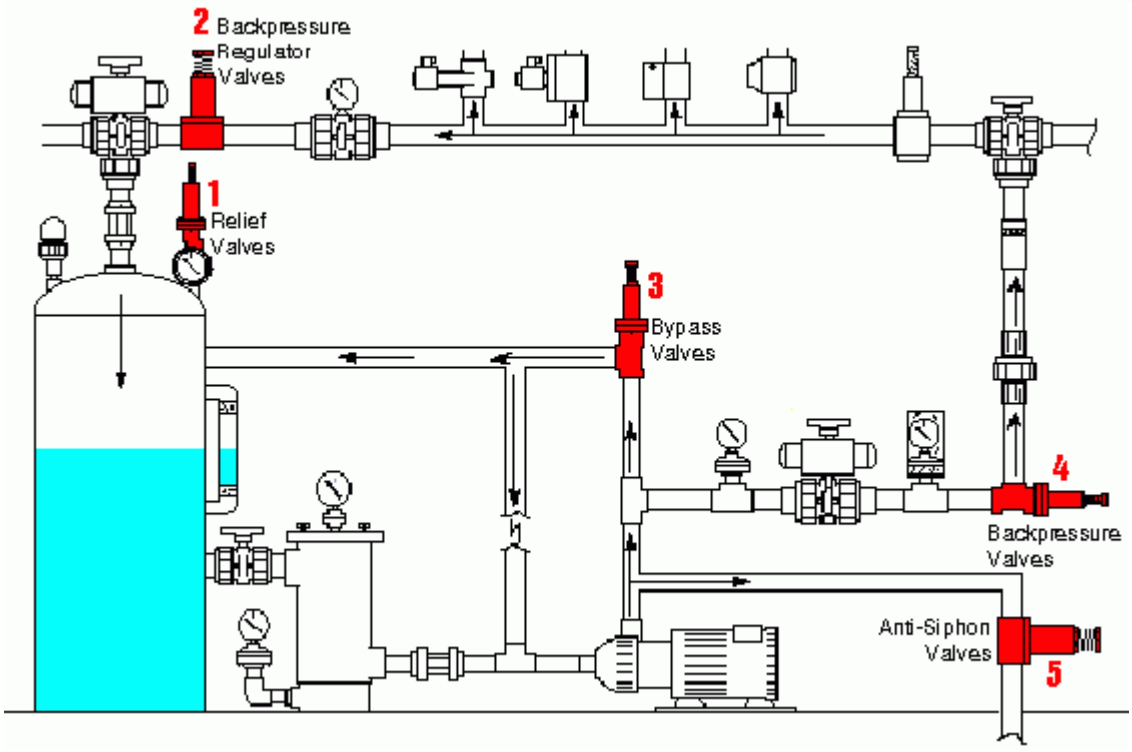
38.1 Major Failure Modes & Effects

Failure Mode	Root Cause	Effect	SST Design Mitigation
Rotor contact	Gear failure	Severe damage	External timing gears
Seal failure	Dry running	Leakage	Large seal chamber
Bearing damage	Misalignment	Vibration	Rigid baseplate
Overpressure	Blocked discharge	Casing stress	Relief valve mandatory
Cavitation	Poor suction	Noise, erosion	Low NPSHr design

38.2 Progressive vs Sudden Failures

- **Progressive:** seal wear, bearing fatigue (detectable early)
- **Sudden:** overpressure, lubrication loss (requires protection systems)

39 – Safety Engineering & Risk Control



39.1 Mandatory Safety Provisions

✓ Pressure relief valve on discharge
✓ Full coupling guard
✓ Proper earthing of motor and baseplate
✓ Lock-out / tag-out (LOTO) during maintenance

39.2 Operational Safety Rules

- ❌ Never run pump against closed discharge
- ❌ Never dry-run without protection
- ✓ Always prime pump before start
- ✓ Monitor pressure and temperature continuously

40 – Best Operating Practices (DOs & DON'Ts)

40.1 DOs

✓ Use VFD for controlled startup
✓ Maintain clean suction conditions
✓ Follow oil change intervals
✓ Use correct seal flush plans

40.2 DON'Ts

❌ Throttle suction line
❌ Exceed rated speed or pressure
❌ Mix lubrication oil grades
❌ Ignore vibration or noise trends

41 – Compliance, Standards & Engineering Acceptance

41.1 Engineering Compliance

The SPEW SST Series is suitable for projects requiring:

- Industrial pump best practices
- EPC and consultant approval
- Oil & gas, chemical, and process industry norms

41.2 Quality & Testing

- Dimensional inspection
- Rotor clearance verification
- Hydrostatic pressure testing
- Performance testing (if specified)

Lk. Dio

MAY 11 2000 **ENGINEERING DATA TRANSMITTAL**

Page 1 of 1

1. EDT 624913

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
DISTRIBUTION	INTERIM STABILIZATION	N/A
5. Proj./Prog./Dept./Div.:	6. Design Authority/Design Agent/Cog. Engr.:	7. Purchase Order No.:
INTERIM STABILIZATION	W. F. ZUROFF	N/A
8. Originator Remarks:		9. Equip./Component No.:
ATTACHED IS AN ACCEPTANCE TEST PLAN (ATP) FOR THE NEW PUMPING INSTRUMENTATION AND CONTROL (PIC) SKIDS BEING FABRICATED BY SITE FABRICATION SERVICES.		N/A
		10. System/Bldg./Facility: 241-G
11. Receiver Remarks: NONE	11A. Design Baseline Document? ☒ Yes ☐ No	12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 04/24/2000

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Desig-nator	(G) Reason for Trans-mittal	(H) Origi-nator Dispo-sition	(I) Receiv-er Dispo-sition
1	RPP-6193	N/A	0	ACCEPTANCE TEST PROCEDURE	SQ	1	1	1
				FOR NEW PUMPING				
				INSTRUMENTATION AND				
				CONTROL SKID "R"				

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Rea-son	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Rea-son	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority W.F. ZUROFF		5/11/00							
1	1	Design Agent B.R. JOHNS	BRJohns	5/2/00	S2-24						
1	1	Cog. Eng. B.R. JOHNS	BRJohns	5/2/00	S2-24						
1	1	Cog. Mgr. M.R. KOCH	M.R. Koch	5/4/00	S7-24						
1	1	QA T.J. Volkman	T.J. VERDERBER	5/10/00							
1	1	Safety F.A. ZAK		5/4/00							
		Env. N/A									

18. BRJohns
B.R. JOHNS — 5/2/00
Signature of EDT Originator — Date

19. M.R. Koch
M.R. KOCH — 5/4/2000
Authorized Representative for Receiving Organization — Date

20. W.F. ZUROFF — 5/11/00
Design Authority/ Cognizant Manager — Date

21. DOE APPROVAL (if required)
Ctrl No. N/A
☐ Approved
☐ Approved w/comments
☐ Disapproved w/comments

BD-7400-172-2 (10/97)

BD-7400-172-1

42 – Documentation & Handover Package

42.1 Standard Documents Supplied

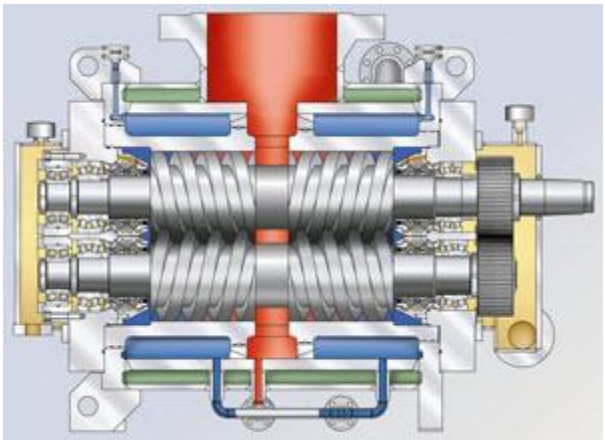
- Technical datasheet
- GA drawings
- Performance curves
- Installation & O&M manual
- Spare parts list

42.2 Optional Documents

- 3D models
- Exploded drawings
- FAT / SAT procedures
- Compliance statements

---

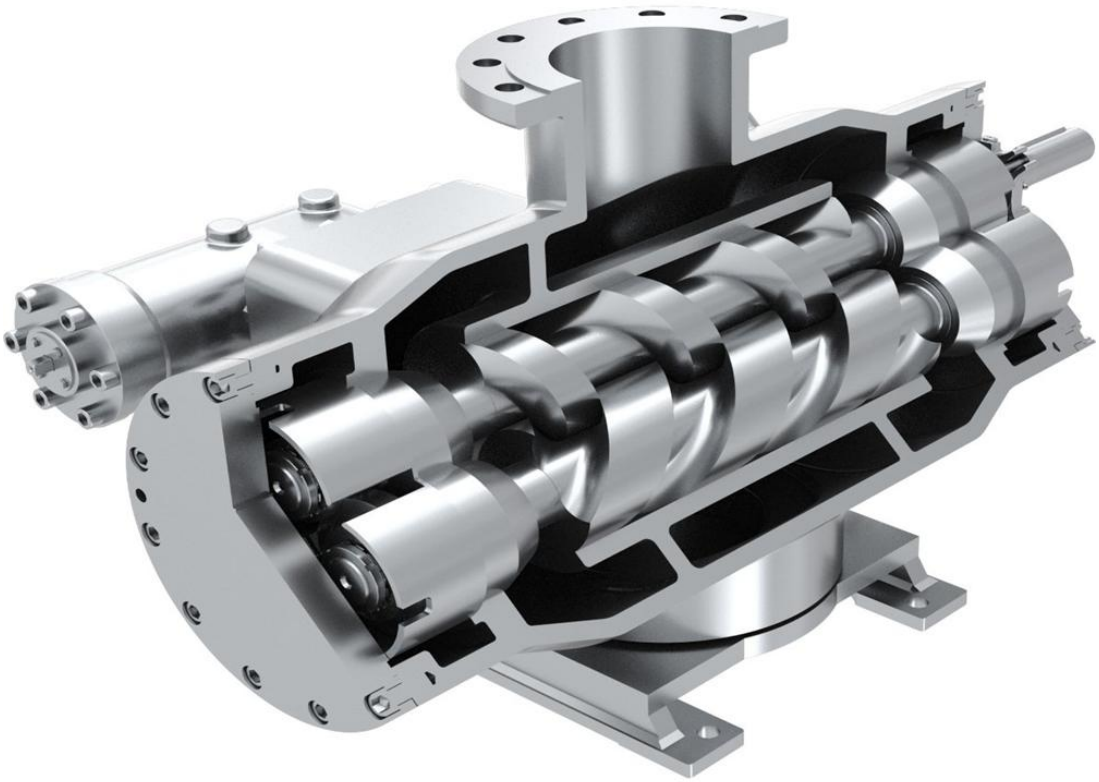
43 – Engineering Best-Use Scenarios



Ideal Use Cases

- Variable flow process lines
- High-viscosity product handling
- Gas-entrained fluids
- Metering & circulation duties

SPEW
POSITIVE DISPLACEMENT PUMPS



Contact Us

Business Hours
Weekdays: 8.30AM to 5.30PM
Weekends: Closed

enquiry@spewpumps.com

PT 14515, Persiaran Batu Gajah Perdan 8, Taman Perindustrian Batu Gajah Perdan, 31550, Perak, Malaysia