



SPEW

POSITIVE DISPLACEMENT PUMPS

HIGH VISCOSITY INTERNAL GEAR ROTOR PUMPS

**TECHNICAL KNOWLEDGE BASE
& PRODUCT CATALOG**

MANUFACTURED BY SPEW PUMPS

INTERNAL GEAR ROTOR PUMPS (HIGH-VISCOSITY)

TECHNICAL KNOWLEDGE BASE & PRODUCT CATALOG

1. INTRODUCTION

SPEW High-Viscosity Internal Gear Rotor Pumps are specialized positive-displacement pumps engineered for extremely thick liquids, semi-solid fluids, and temperature-sensitive materials. These pumps are ideal for applications where standard internal gear pumps may be insufficient due to viscosity, shear sensitivity, or required torque.

The enhanced rotor design, enlarged clearances, low-speed operating range, and reinforced mechanical components make this pump suitable for viscosities from **20,000 cSt up to 1,000,000+ cSt**.

Typical industries include:

- Bitumen, asphalt & polymer-modified bitumen (PMB)
- Greases & lubricating gels
- High-viscosity adhesives & resins
- Wax, paraffin, tallow & fats
- Paints, inks & coating compounds
- Chocolate, molasses & thick edible products
- Heavy fuel oils, bunker oils, sludge oils

2. KEY FEATURES (HIGH-VISCOUS DUTY DESIGN)

- Handles **ultra-high viscosities** up to 1,000,000+ cSt
- Low shear—for sensitive products
- Operates at **very low speeds (20–650 RPM)**
- Heavy-duty bearings & shafts
- Oversized rotor and idler geometry
- Steam/oil heating jacket available
- Optional rotor relief grooves for temperature-sensitive fluids
- Designed for **continuous operation under high torque**
- Ideal for pumping semi-solid materials

3. WORKING PRINCIPLE

ROTOR-ENHANCED INTERNAL GEAR MECHANISM.

This pump is based on the internal gear principle but optimized for handling **extreme viscosity loads**.

2.1 Rotor (Primary Gear Element)

- A reinforced, deeply cut gear profile
- Stronger torque transfer capability
- Designed to push highly resistant mediums

2.2 Idler Gear

- Larger backlash clearance
- Increased pocket capacity
- Lower shearing action

2.3 Crescent Barrier

- Maintains separation
- Prevents backflow
- Ensures smooth displacement at high load

2.4 High-Torque Design

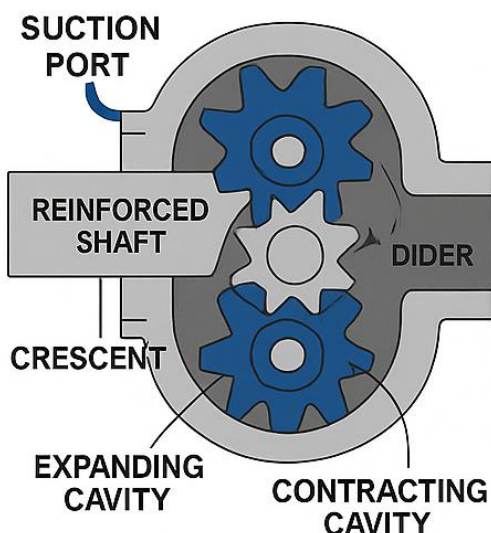
- Oversized shaft
- High-strength gear metallurgy
- Heavy-duty bearing supports

2.5 Operating Sequence

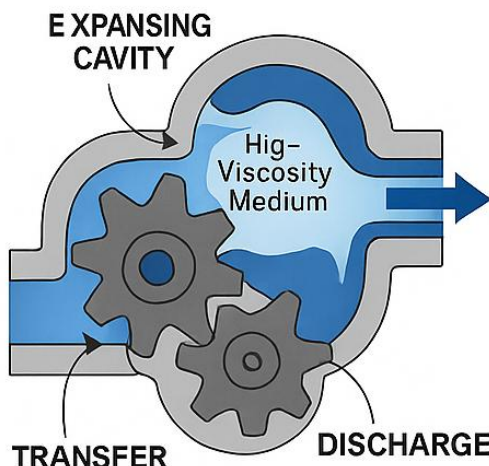
1. **Rotor begins rotation**, creating expanding cavities at suction.
2. Thick material is drawn in by vacuum + mechanical dragging effect.
3. Fluid travels around the casing in slow, powerful displacement pockets.
4. Shrinking cavities compress the fluid, delivering uniform discharge.

This low-speed, high-torque pumping method is **ideal for extremely thick, sticky materials**.

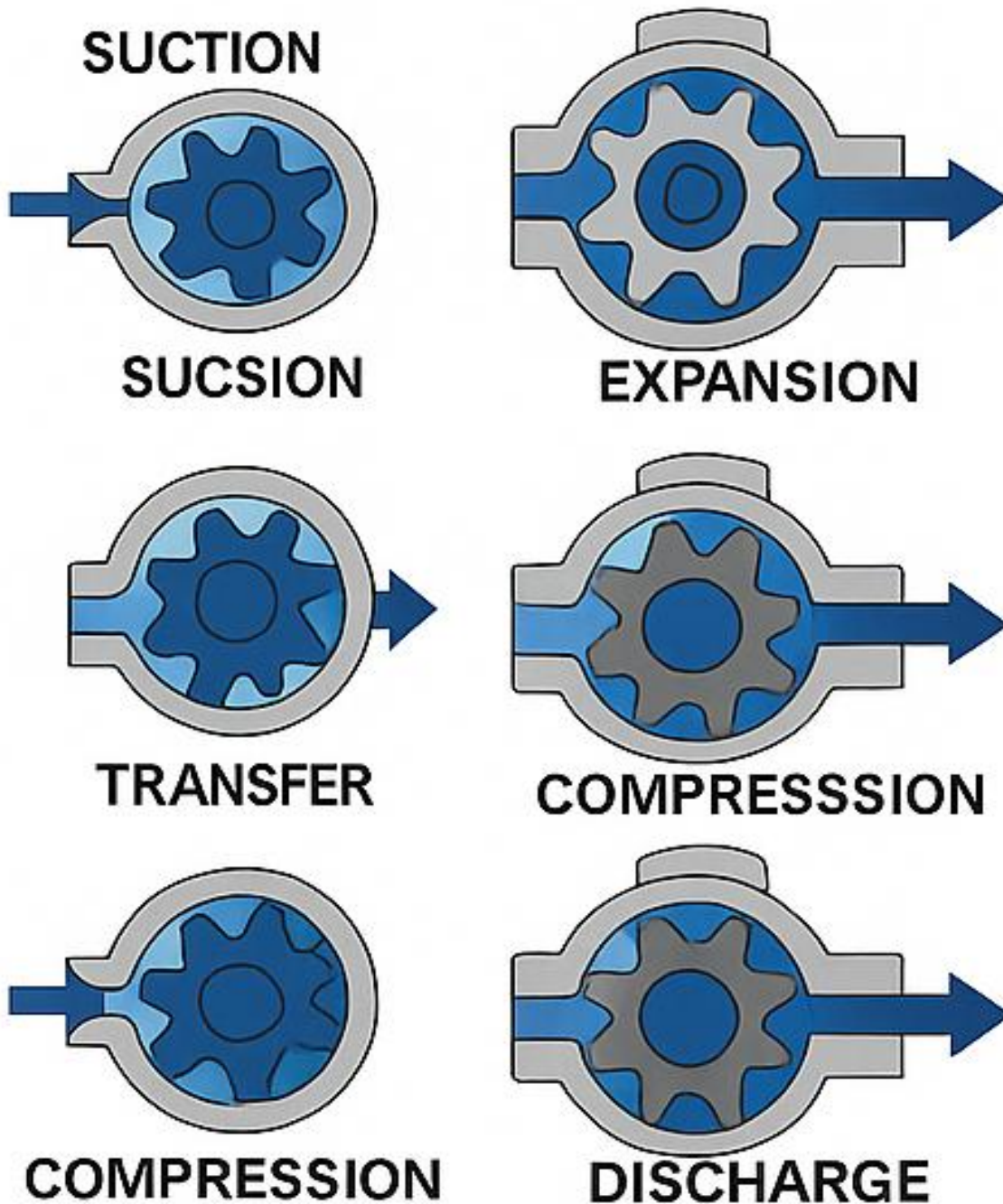
HIGH-VISCOSITY CROSS-SECTION



HIGH-VISCOSITY FLOW PATH



OPERATION SEQUENCE



4. MATERIALS OF CONSTRUCTION (MOC)

CASING & COVERS

- Cast Steel
- Ductile Iron
- Stainless Steel 316 / 316L
- Hardened Alloy Steel (abrasive duty)

BUSHINGS & BEARINGS

- High-load bronze
- Tungsten carbide
- PTFE composite
- Graphite carbon (high temp)

ROTOR & IDLER

- Case-hardened alloy steel
- Nitride-hardened steel
- SS316 (food / chemical duty)
- Special coatings for abrasive fillers

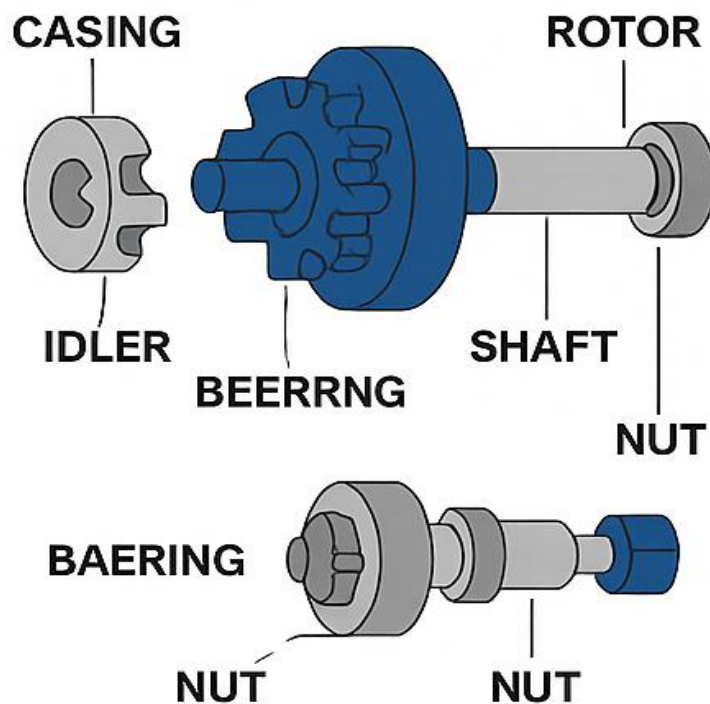
SEALS

- Mechanical Seal (standard)
- Double mechanical seal
- Cartridge seals
- High-temperature packing (bitumen/asphalt service)

NOTE:

Above MOC are standard but can be customized as per client requirement and operational statics

HIGH-VISCOSITY EXPLODED VIEW



5. OPERATING RANGE

Parameter	Range
Flow Rate	0.5 – 300 m ³ /hr
Pressure	Up to 20 bar
Temperature	0°C to 350°C (jacketed)
Viscosity	20,000 – 1,000,000+ cSt
Speed	20 – 120 RPM
Suction Lift	Up to 6 meters (fluid-dependent)

6. PERFORMANCE CHARACTERISTICS

6.1 Designed for Thick Liquids

Standard pumps fail when viscosity rises beyond 50,000 cSt.

High-viscosity rotor pumps maintain excellent performance even at **1 million cSt**.

6.2 Low-Speed, High-Torque Efficiency

- Larger gear pockets provide stronger “drag-in” effect
- Reduced slip

- Higher volumetric efficiency at low RPM

6.3 Shear-Sensitive Handling

- Chocolate
- Resins
- Greases
- Polymer melts

6.4 High-Temperature Function

With steam/hot-oil jackets, temperatures up to **350°C** can be achieved.

7. SELECTION GUIDELINES

To properly size a high-viscosity internal gear rotor pump:

1. Required flow rate (temperature-adjusted viscosity)
2. Differential pressure & back pressure
3. Viscosity vs. temperature curve of product
4. Required operating temperature
5. Heating jacket type (steam/oil/electric)
6. Type of sealing—select based on abrasiveness & temp
7. Required torque & motor sizing
8. Duty cycle—continuous/intermittent
9. Port size & orientation
10. Suction NPSH & line design

Important:

High-viscosity pumps must operate at **slow speeds** to avoid: Excessive wear, Seal failure & Overheating

8. INSTALLATION GUIDELINES

8.1 Suction Piping

- Oversize by 1–2 pipe sizes
- Keep short and straight
- Use smooth long-radius bends
- Jacketed suction recommended for waxy products

8.2 Discharge Piping

- Must include adjustable relief valve
- Use insulated lines for hot materials
- Install pressure gauges

8.3 Heating Jacket Requirements

- Bitumen
- Wax
- Polymer resins

Temperature must reach **flowable state** before starting the pump.

8.4 Alignment & Baseplate

- Precision alignment is critical
- Use heavy-duty baseplate
- Vibration isolators recommended

9. OPERATION & MAINTENANCE

Daily Monitoring

- Temperature
- Seal leakage
- Noise/vibration
- Motor amperage (indicates torque load)

Monthly Checks

- Strainer cleaning
- Coupling alignment
- Seal condition

Annual Overhaul

- Inspect gear teeth
- Measure clearances
- Replace worn bushings
- Inspect heating jacket for scaling

10. TROUBLESHOOTING

Pump Not Starting

- Product not heated
- Too high viscosity
- Motor undersized
- Blocked suction

High Temperature Rise

- Running dry
- Incorrect speed
- Blocked discharge
- Overloaded motor

Low Flow

- Insufficient temperature
- Excessive wear
- Air pockets in suction

Seal Leakage

- Excessive torque load
- Incorrect seal type
- Abrasive solids present

11. APPLICATIONS

Bitumen & Asphalt Industry

- Bitumen & modified bitumen
- PMB—Polymer Modified Bitumen
- Vacuum residue, pitches

Chemicals & Polymers

- Hot melt adhesives
- Polyols, resins
- Polymers, plastisols

Lubricants & Grease

- NLGI greases
- Thickened oils
- Additives

Food & Edible Oils

- Fats, tallow
- Molasses, glucose
- Cocoa butter, chocolate

12. ORDERING CODE

NOTE: Follow Specification sheets for selection of gear pumps with exact ordering code.

13. COMPARISON WITH STANDARD INTERNAL GEAR PUMP

Feature	Standard IGP	High-Viscosity Rotor Pump
Viscosity Capability	Up to ~100,000 cSt	Up to 1,000,000+ cSt
Speed	50–1750 RPM	20–120 RPM
Torque Load	Medium	Very High
Heating Needs	Moderate	Mandatory (for most fluids)
Shear Sensitivity	Low	Very Low
Applications	Oils, general chemicals	Bitumen, greases, waxes, polymers

14. SAFETY GUIDELINES

- Do not operate pump until product is fully heated
- Never run dry—severe damage will occur
- Ensure relief valve is functional
- Use proper PPE when handling hot materials
- Perform lock-out/tag-out before maintenance

15. SPEW MANUFACTURING EXCELLENCE

Every **SPEW** High-Viscosity Internal Gear Rotor Pump is engineered using:

- Precision CNC-machined components
- High-strength alloy steels
- Reinforced bearings
- Close-tolerance hydraulics
- 100% pressure and performance testing

SPEW pumps deliver **maximum reliability** under the harshest pumping conditions.

SPEW ensures unmatched reliability

For

industrial pumping applications.

Contact Us

Business Hours

📞 Weekdays: 8.30AM to 5.30PM
Weekends: Closed

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