Types of Pumps in the Spray Foam & Polyurea coating industry 1-2-25

Hydraulic Reciprocating Pumps: These pumps use independent hydraulic reciprocating with a mechanical trip rod for quick directional change, ensuring precise ratio control. This setup is known as an independent hydraulic reciprocating drive system, which provides better ratio control and minimizes pressure loss during direction changes. These pumps are ideal for high-pressure applications and are commonly used in spray foam and polyurea coatings. Total of 4 pumps to maintain, A & B pumps, Hydraulic pump and Pump Lube Peristaltic pump.

- **Common Drive Hydraulic Pumps:** They are not known for fast pump changeover, with several electrical components switches, and solenoids which can lead to pressure loss during direction changes. Common drive systems are typically used for applications requiring a fixed 1:1 ratio but can be challenging to maintain precise control with 2 different components. (Note: these chemicals are different in viscosity and different in coefficient of friction and flow and temperatures) and use a central directional common drive control pump. These systems use a four-pump setup, on the pump line with two fluid pumps (one for ISO and one for resin) also the ISO pump lubricating side and the directional control pump. Some are incorporating a Peristaltic Lube pump. That is 4 pumps and with the Transfer pumps equals 6 pumps, and finally the main Hydraulic piston pressure compensating pump making a grand total of 7 pumps to maintain.
- **Pneumatic (Air-Driven) Pumps:** Pneumatic pumps use an air motor to drive the chemical pumps. They are simpler but not cost-effective due to the need for large air compressors and air dryer systems, which increase maintenance costs and operational expenses. Pneumatic pumps are suitable for lower pressure applications and are often used in large plants with existing air and filter systems. Could be a 4 pump system.
- **Electric Pumps type A:** These pumps use an electric motor to drive the chemical pumps with gears and a connecting rod like a locomotive. This system is one motor operating a common drive on each end of the motor. Typically, common drive pumps with shorter strokes and faster changeover times can lead to issues with maintaining the correct ratio, especially with varying viscosities coefficients of friction, Flow and temperatures of the A and B components. Electric pumps are not suitable for a wide range of applications and can result in off-ratio pumping, leading to inefficiencies and increased material usage. Total of 5 pumps to maintain.
- **Electric Pumps type B:** They are electric Stepper motors or Frequency drive motors that are Connected to small gear pumps driven by these electric motors. These systems have no syphoning capabilities so also rely on Drum Transfer pumps. Other problems include

They can Not Pressure compensate like Hydraulics can starting and stopping under pressure. Therefore, they have to be electrically controlled On and off so that the Gear pumps will not blow there seals with spray pressures when stopped. These Gear pumps also have problems trying to move the higher Viscosity Polyurea chemicals not recommended for thicker 2 component Coatings. Now a 4-pump system.

Advantages of Hydraulic Reciprocating Independent Drive Pumps

- **Simplicity**: The CDS Proportioner is designed for simplicity, with fewer components and straightforward operation. This reduces the chances of mechanical failure and makes maintenance easier.
- **No Transfer Pumps**: These systems do not require transfer pumps, which simplifies the setup and reduces the overall cost.
- **Single Preheater**: Only one preheater is needed for both sides, which saves energy and reduces the complexity of the system.
- **Mechanical Operation**: The pumps operate mechanically without the need for directional change components, which enhances reliability and reduces maintenance.
- **Low Power Consumption**: These pumps require the least amount of wattage to operate, typically under 40 amps, making them energy efficient.
- **Easy Troubleshooting**: The simplicity of the system allows for easy troubleshooting and independent testing of components.
- **Simply Get parts locally across the US**.
- **No PLC System Needed**: The system can operate without a Programmable Logic Controller (PLC), which further simplifies the operation and reduces costs.
- **Full Heat Control**: The system provides full heat control from the drums to the gun, ensuring consistent material temperature and quality.
- **Simple Small space footprint in the rig, pumps can be mounted to the walls**
- **Battery Operation**: These pumps can operate on batteries, making them versatile and suitable for remote or off-grid applications.
- **Environmental Benefits**: The system does not use CO2 or ozone-depleting substances, making it environmentally friendly.
- **Cost Savings**: By reducing the complexity and energy requirements, these pumps can save thousands of dollars in expenses and fuel.

Independent Reciprocating Drive Systems

- Improved Ratio Control: Independent drive systems offer better ratio control allowing for precise adjustments even with off-ratio spraying. This is particularly

beneficial when dealing with varying viscosities coefficients of friction and flow temperatures of the A and B components.

- Isolated Pressure Control: Each component is driven independently, so a restriction or blockage in one component does not affect the pressure of the other. This Isolation simplifies troubleshooting and ensures consistent spray patterns.
- Enhanced Troubleshooting: Independent drive systems make it easier to identify and address issues, as each component can be tested separately. This reduces downtime and improves overall efficiency.
- Temperature Management: Properly heating and insulating both components from the drum to the spray gun is essential for maintaining the correct viscosity and ensuring optimal spray performance.

Additional Considerations

- Viscosity Differences: the statement correctly highlights the importance of managing the viscosity Coefficient of Flow differences and temperature curve between the A (ISO) and B (resin) components. This is crucial in trying to match the flowability of the A & B to achieve a true 1:1 Ratio or ratio needed.
- Training and Expertise: Operating independent drive systems requires a higher level of technical knowledge and expertise. Proper training is essential to ensure that operators can effectively manage the system and achieve the desired results.
- Environmental Impact: Independent drive systems can contribute to more efficient and environmentally friendly operation by reducing the need for large generators and minimizing CO_2 emissions.

Applications

Hydraulic reciprocating independent drive pumps are ideal for high-pressure applications, including:

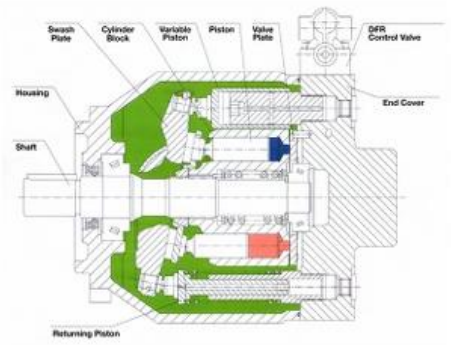
- **Protective Coatings**: Industrial equipment, bridges, ships, and tanks.
- **Insulation**: Spray foam insulation for buildings, ships, Freezers and homes.
- **Automotive Parts**: Coatings for automotive parts to protect against corrosion and wear.
- **Construction Materials**: Coatings for concrete and steel to enhance durability.
- **Durability**: Hydraulic Reciprocating pumps are known for their durability and reliability, making them suitable for demanding applications.
- **Hydraulic Reciprocating Pump Unit**: Has its own mechanical directional change incorporated in the pump.

- **Proportioning Pumps**: Two pumps connected with a common drive directional controlled hydraulic unit, equates to a 4-pump system usually need transfer 2 pumps. With the pump lube pump & main hydraulic pump become a 7-pump system to maintain.
- **Spray Gun**: Where the polyol and isocyanate are mixed just before exiting the tip of the spray gun.

Hydraulic Reciprocating pump

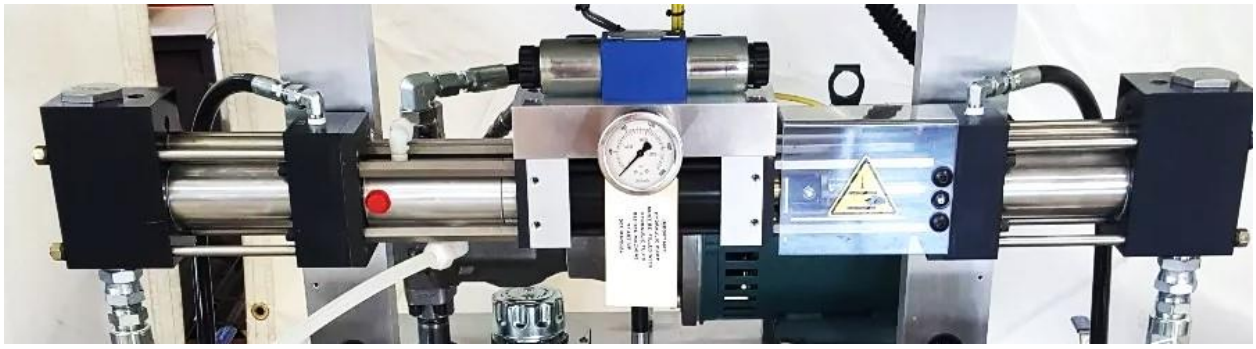
See-through hydraulic reciprocating pump

Cut-away Hydraulic Variable piston Pump



Cutaway view of hydraulic reciprocating pump

Hydraulic Variable Piston pump



Pump line consisting of A ISO, Pump lube, Center Directional, B Resin pumps. Plus, main hydraulic pump to a Total 7 pumps to maintain + Plus all of the directional pump control circuit.

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