Crankshaft Design
Radial Piston
Hydraulic Motors
& Gearboxes
History

SAI was founded in 1964 when the Pecorari family could not find a reliable low speed, high torque motor for their farm equipment. Frustrated with the poor performance of the available motors at the time, they decided to make their own and proceeded to make the first SAI crankshaft style radial piston motor. They soon realized that the motor they produced was far superior to anything on the market, and went into the business of hydraulic motors. The enthusiasm, passion, and experience of the Pecorari brothers for mechanical and hydraulic engineering led them to create the SAI Company.

In 1976, recognizing the importance of innovation through design, the company formed a department dedicated to research and development to encourage forward thinking solutions and to help guarantee on-going improvement. This was the founding of the SAI R&D group, a group dedicated to maintaining the highest standards and developing new, innovative products to meet our customers’ most demanding application requirements.

SAI has developed over the years to achieve the success that it can now boast on both national and international markets. SAI has Branches in several countries, including: the United States, Canada, Italy, England, South Africa, Brazil, and many others.
SAI continues to be a leading company in the production of hydraulic motors and related products. Thanks to a continuous awareness of market trends and development, SAI is able to offer products made to the highest technological standards, incorporating the latest technologies as well as the latest in energy efficiency. The SAI motto “Power Though Efficiency” perfectly sums up the company policy. SAI is a company which is devoted to continuous investment in engineering research and development which has resulted in a diverse range of high quality and high performance products.

SAI’s specialist staff design, manufacture, and sell a wide range of items that are capable of fulfilling the most demanding of market needs. SAI’s engineering and commercial team have spent countless hours developing and testing innovative ideas to further improve the performance of our products. The SAI technical team has specifically focused on the following areas of technological development.

1. High Starting Torque
2. High Volumetric Efficiency
3. High Contamination Resistance
4. Thermal Shock Resistance
5. Cavitation Resistance

History
High Starting Torque

The SAI motor has virtually the same starting torque and dynamic torque. This is due to the presence of the crankshaft roller bearing. With this, startup friction is greatly reduced. Competitor motors have metal-to-metal sliding friction on startup.

Hydrostatic balance - no oil film and metal-to-metal friction in static condition

High Volumetric Efficiency

In all SAI motor parts under pressure, the sealing is provided by teflon/elastomer seals. The seal is able to compensate for the normal wearing of parts, as well as the natural expansion of the parts under stress. This enables SAI motors to maintain excellent volumetric efficiency, even after several thousand working hours. This is especially useful in applications requiring precise speed control at very low speeds or good braking capability.
Contamination Resistance

The SAI design can withstand very large contamination particles in the system, up to 40 µm. All dynamic parts, such as cylinders, pistons, distributors, and valves, are hardened to further enhance their performance and contamination resistance. Large clearances and seals between dynamic parts also adds to the contamination resistance.

Thermal Shock Resistance

The large clearances also allow SAI motors to have excellent thermal shock resistance. The large clearances will accept thermal expansion, and will not cause the dynamic parts to come in contact with each other and prolong the life of the motor.
Cavitation Resistance

The innovative SAI design allows the motor to run in partial or full cavitation. The roller bearing under the piston does not require lubrication, and the piston retaining rings ensure that the pistons remain in firm contact with the central roller bearing. These innovative features allow the SAI motor to operate in full cavitation. The traditional hydraulic motor design with hydrostatic balancing under the pistons require lubrication at all times. If there is no lubrication present, it will experience significant frictional damage.

SAI Assembly

Roller Bearing allows motor to run without lubrication

Traditional Assembly

If no lubrication is present, as in cavitation, metal-to-metal contact will occur.

Two Styles of Motors

SAI offers two different types of radial piston hydraulic motors. The center bearing type act upon a bearing around the center of the crankshaft. This type includes the FS, GM, GS, L, and S series motors. The second type is a Slipper Piston, where the pistons act upon a cam ring around the crankshaft. This type includes the B and T series motors. Please see our product guide for more information on the different lines of motors.
Plan-Star offers a complete line of planetary gearboxes. This line has been developed by skilled engineers with years of experience in planetary gear design. Plan-Star gearboxes represent the latest technology and a dedication to reliability. They are made to exact specifications, allowing them to handle greater torques and extending their life. They also share interface dimensions with older designs, allowing for easy replacement. There are several design advantages to a Plan-Star gearbox, including:

- Six steps or families
- 3-4-5 Technology
- Peak torques of up to 158,000 ft-lb
- Gear ratios up to 1500:1
- Reinforced housings available for greater bearing capacity
- Available with male keyed, male/female splined, shrink disc, or spindle output
- Modular Design allows for numerous input/output combinations
- Integrated Brake available
- In-line or right angle units available
- Wheel Drive units are alternatives to Poclain or Rexroth drives
- Components manufactured in USA/Italy
- All assembly is done in Linwood, PA