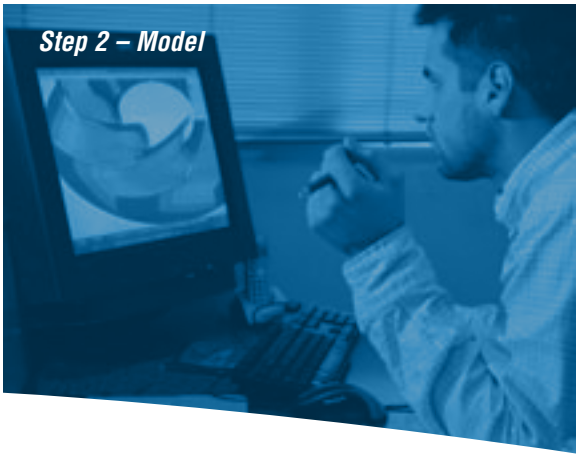
FLOWSERVE

Components Technology Group
Advanced Component Design and Supply

Experience In Motion



From Laser Modeling to Finished Casting – 3-Step Process

The Flowserve Components Technology Group (CTG) uses sophisticated laser scanning equipment to fully model existing pump components to a high degree of accuracy.

By integrating its powerful scanning technology with advanced modeling software, Flowserve engineers can design a correctly engineered part that can be quickly produced with rapid prototyping techniques. Through the application of this technology, CTG can upgrade and enhance the effectiveness of the part – whether it is an existing OEM part or an obsolete component. CTG's combination of technical expertise and global facilities makes it the ideal technical resource for users of critical pumping equipment and other rotating machinery.

Step 1: Laser Scanning

Powerful scanning captures the digital profile of a rotating machinery component.

Brand Independent Engineering
By leveraging its unique engineering capabilities, CTG can develop solid models for virtually any type and make of rotating machinery components. This includes the manufacturing of components for any pump OEM and all Flowserve pump brands.

Laser modeling allows Flowserve technology capabilities to be applied to any type of pump – regardless of OEM or age of part

Step 2: 3D Modeling

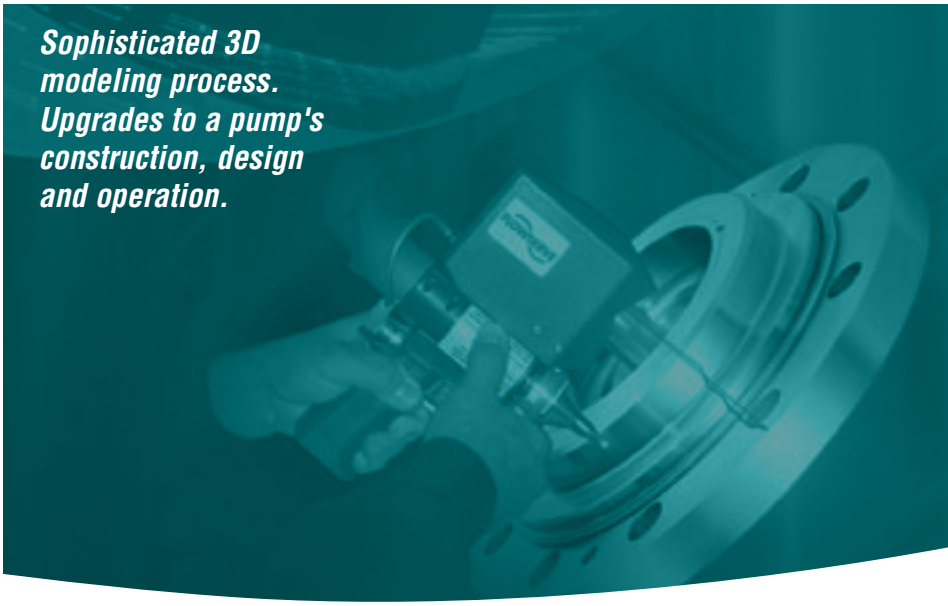
Input from the laser file enables the development of a 3D model.

New Mechanical Designs
During the design process, parts can be evaluated against the latest technological advancements to offer design feature upgrades. New design upgrades include:

- Adding reservoir to bottom of existing bearing housing for cooling efficiency including serpentine coil
- Developing a water cooling chamber for wet end components to control process fluid temperature
- Impeller ring design enhancements

Hydraulic Modifications
Hydraulic modifications made during the modeling process include pump redesigns to achieve less vibration, eliminate cavitation and make flow and head adjustments. Modifications include:

- Altering the number of vanes to optimize design
- Modifying eye diameter to achieve inlet performance



Step 3: Finished Casting

3D model is converted to a synthetic mold which can be used to produce a casting in a variety of metals.

Material Upgrades for Components
Material upgrades result in significant structural and operational improvements to the original part or component. By analyzing process fluid and component design, Flowserve materials engineers can help mitigate the effects of corrosion and erosion in newly engineered parts. Upgrades include:

- Improved materials of construction to increase life of the part
- Production of parts in light reactive alloys such as titanium and zirconium
- Supply of cavitation-resistant and other special materials

Inventory Management Program
As part of the Components Technology Group's additional offerings, the following inventory management services are provided:

- Creating a single database to include all pump parts inventory
- Consulting to rationalize quantities to proper materials and critical parts
- Consolidating and controlling vendor and transaction costs

Benefits

Through its rapid prototyping technology, the Components Technology Group leverages Flowserve's unparalleled industry expertise in the pumping industry to deliver added value in every component produced.

With these advanced capabilities, the Components Technology Group provides the following benefits:

- Improved operating efficiency
- Improved mechanical and hydraulic performance
- Increased mean time between failure (MTBF)
- Reduced operating and maintenance costs

Environmentally Friendly
The Components Technology Group endeavors to limit its footprint on the environment. In part, this is accomplished though the elimination of the wooden patterns in the production process. Instead, a new synthetic process uses renewable materials such as corn, soy and sugar cane to name a few. Neither sand-to-landfill processes nor catalysts and binder chemicals are used.

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