



Case Study - Intuitive Surgical - da Vinci™ Surgical Arm System

Precision Sand Castings

The Challenge

Exceeding the demands of pace-setting companies by identifying the most economical way to manufacture approximately 20 designs from prototypes through production and have a return on investment within 6 months.

Intuitive Surgical chose **General Foundry Service, of San Leandro**, and utilized General Foundry Service's "Precision" Sand Casting" process to produce the Arms, Carriages, Links, and Gimbals that are vital to the **da Vinci™ Surgical Arm System**.

Intuitive Surgical, Inc. of Sunnyvale, CA, leads the development and commercialization of products that are designed to provide flexibility of open surgery while operating through tiny ports. By integrating robotic technology with surgeon skill, the **da Vinci™ System** enables surgeons to perform better surgery in a manner never before experienced to enhance healing. **General Foundry Service** had the technical skills to produce the high quality product required.

The **da Vinci™ System**, designed by **Intuitive Surgical**, technically is not a robot because its Arms are operated in real time by the surgeon. The surgeon's fingers are placed in Velcro rings and connected to a master controller. When the surgeon's fingers move, the device's arms move. Another Arm is used to operate a three-dimensional camera. One of the advantages of the device is that it provides three-dimensional magnification that is up to 10 times greater than in conventional surgery. Patient benefits may include less anesthesia, reduced blood loss, less post-operative pain and discomfort and faster recovery.

Product Development

For the Arm, the development process was complex, in that four fabricated/welded/machined parts were ultimately eliminated and consolidated into one Precision "Green" Sand Casting. This consolidation assures the stability and strength required, with a more economical price tag than fabricating/welding/machining. Further, it was necessary to engineer "cast-in" passages for electrical wiring, bearings, and brakes, required to control the robotic components. Superior engineering, patternmaking, casting, and machining skills are providing Intuitive Surgical with excellent quality at less cost. The differential cost between the fabricated/welded/machined parts and "Precision" Sand Casting has allowed a minimal investment in tooling to be returned in a very short amount of time.



Intuitive Surgical is delighted with the product produced by **General Foundry Service**.

Awards

50 Fastest Growing Public Companies

Silicon Valley/San Jose Business Journal, May 23, 2003

Technology and Business Awards: 2001 Vertical Industry

Electronics START Magazine, September, 2001.

"The T&B Vertical Market Solutions award recognizes end-user companies for their vision in implementing technology to solve business challenges."

Grand Prize, Outstanding Application of Powder Metallurgy

International P/M Design Competition, Metal Powder Industries Federation, 2001

Best of What's New 2000

Medical Technology Division, Popular Science, December 2000

Design Distinction, Equipment Category

ID Magazine Annual Design Review, May 1999

Runner Up, Medical Category

Appliance Manufacturer Excellence in Design, May 1999

Gold Medal, Medical Design Excellence Award

Sponsored by Canon Communications and endorsed by the Industrial Designers Society of America, May 1999

The Computerworld Smithsonian Award

Inducted into the Smithsonian Institution's Permanent Research Collection of Information Technology, April 1999

Photos

Top: Cast Aluminum Arm with secondary Machining, Gold Alodine, and Powder Coating.

Middle: Close-up of aluminum casting manufactured at General Foundry Service.

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