

Specification for Success

SCOTT HATFIELD is self-deprecating and quick to give others credit for a job well done. But ask him about his involvement with the shot peening program at Medtronic Spinal and his contributions to its success become evident. His leadership in the development of a new SAE medical implant specification and a validated shot peening program has earned him the 2013 Shot Peener of the Year award.

The Medtronic project began in 2005 when Scott's boss, Mark Pelo, asked Scott to develop a FDA-compliant shot peening process for a new spinal screw. Medtronic was outsourcing most of their shot peening at that time, but they recognized that it would be easier to control the work if it was done on their shop floor. Mark also wanted to duplicate the shot peening operation at their facility in Humacao, Puerto Rico.

Scott had limited knowledge of shot peening having worked in aerospace and automotive machine shops before starting at Medtronic in 2001. While working at a machine shop, he saw the request for "shot peening" on a print and began researching it. When Mark approached him, Scott already knew enough to question if the tumblast machine on the plant floor was the right equipment for the task. In addition to probable limitations in equipment, Scott recognized that engineers and machine operators needed in-depth shot peening training, that he needed to create training documentation, and that the process would need testing. "I wanted a program that I was willing to put my name on," Scott said.

Building the Foundation with Equipment and Education

Scott, Mark, and several other Medtronic engineers went to the 2006 Electronics Inc. (EI) Shot Peening Workshop and Trade Show. Initially, Scott wanted to talk with other workshop attendees to see if he was correct in thinking that a tumblast machine couldn't support a validated shot peening process. Fortunately, at the same time he learned he

was right, he and Mark met an OEM at the trade show that was willing and capable of developing a customized robotic shot peening system that could meet the FDA's demands for a controllable and repeatable shot peening process. Another benefit of the workshop was that the Medtronic engineering staff was exposed to every aspect of a controlled shot peening process. Eventually, Medtronic's shot peening technicians and inspectors from the Indiana and Puerto Rico facilities would receive training and earn their Shot Peening Certifications. Scott has achieved EI's Level Three Shot Peening Certification, the highest certification available, and is now a Specialized Instructor for the EI Shot Peening Workshop.

Creating Discipline Through Documentation

At the beginning of the project, Scott started working on a guidance document for the shot peening machine technicians. He began reading shot peening specs for reference. Scott became a regular attendee at the Shot Peening Workshops where he had conversations with Jack Champaigne, President of EI and Chairman of the Society of Automotive Engineers Surface Enhancement Committee (SAE SEC), about how parts of aerospace and automotive specs weren't applicable to medical implant manufacturing. "There were bits and pieces of useful information in aerospace and automotive specs but I wanted a 'one-stop' document," said Scott. "Jack invited me to join the committee and I accepted with the idea that membership could help me improve our internal document and lead to a new SAE standard for our industry." Jack encouraged Scott to write the specification and Scott started on what would become "SAE J3020 for Medical Device Shot Peening." His intent was to write a standard that adequately defined best practice methodology for medical device shot peening.

In 2013, only two years after he started on the specification, Scott presented the final draft of J3020 to the committee and submitted a request for a ballot. "He worked diligently on this



Scott Hatfield

Manufacturing Engineer, Medtronic Technology Engineering Group

Job Responsibilities include:

- Shot Peening and Abrasive Finishing Subject Matter Expert
- Implementation of New Technologies Pertaining to Process Improvements
- New Product DRM Analysis (Design for Reliability and Manufacturability)
- New Product Process Design and Development
- New Product Initial Cost Estimating

spec and it went through SAE in only two years, which is very unusual,” said Jack. Scott credits the successful development of the spec to the committee. “The time frame wouldn’t have been possible without the dedication of the group and Jack’s willingness to allot time in every meeting to work on refining the specification,” said Scott. Jack doesn’t completely agree with Scott’s assessment. “It’s great having Scott on our committee. He brings a discipline to our meetings that helps us work on many document topics from media to intensity and coverage,” Jack said.

Medtronic has also shown unselfish support for the new document since J3020 will be applicable to all medical implant manufacturing. “I am proud to say that Medtronic is committed to advancing shot peening practices as demonstrated by their continued support of my involvement in SAE,” said Scott.

Validation Through Testing

After the shot peening machines were completed (one for the Indiana Medtronic facility and one for the Puerto Rico plant), Scott initiated life cycle testing on shot-peened spinal screws to validate and optimize their shot peening practices. “Validation increased our confidence that the shot peening process and the resulting increase in fatigue resistance was dependable and repeatable and would improve product reliability,” said Scott. The testing program has had a “trickle up” effect from the shop floor—design engineers now call Scott and ask him about incorporating shot peening in a part. The design engineers can take advantage of Medtronic’s large database of shot peening test results.

Shot Peening: The Highlight of a Medtronic Tour

Shot peening has not only been given a place on Medtronic’s shop floor, it’s now a highlight of their plant tours. The company is proud of their cost savings from bringing shot peening in-house. “Even with the purchase of two robotic shot peening machines and the time and other resources we’ve invested in a validated shot peening program, our in-house program is still less expensive than outsourcing,” said Scott.

Cost savings aren’t the only reasons Medtronic is proud of their shot peening program. “Through Scott’s commitment and leadership, Medtronic has a world-class shot peening program that is validated in the medical community,” said Mark Pelo. “Clearly, Medtronic and the shot peening industry have benefited from Scott’s commitment to shot peening technology,” he added.

Scott is still very involved in the day-to-day concerns of shot peening and anything to do with shot peening validation. He plans to continue his involvement with SAE SEC even after the specification is published. ●

Shot Peener of the Year Award

Since 1992, *The Shot Peener* magazine has given “The Shot Peener of the Year” award to individuals in our industry that have made significant contributions to the advancement of shot peening. We’ve listed the year of the award, the recipient and their place of employment at the time they received the award.

2013	Scott Hatfield	Medtronic Spinal
2012	Hali Diep	Boeing Research and Technology
2011	James Kernan	U.S. Army Aviation and Missile Research, Development and Engineering Center
2010	Herb Tobben	Clemco Industries
2009	Michelle Bandini	Peen Service
2008	Holger Polanetzki	MTU Aero Engines
2007	Ken l’Anson	Progressive Technologies
2006	Kumar Balan Dr. John Cammett	Wheelabrator Group, Ontario Materials Engineering Division, Naval Aviation Depot
2005	Marsha Tufft Helmut Wohlfahrt	GE Aircraft Engines Technical University of Braunschweig
2004	Walter Beach Dr. Katsuji Tosha	Peening Technologies Meiji University
2003	Paul Prevey Dr. Niku-Lari	Lambda Research IITT International
2002	David Francis Shaker Meguid	Metal Improvement Company University of Toronto
2001	Dr. David Kirk Dale Lombardo Bill Miller	Coventry University, U.K. GE Aircraft Engines The Boeing Company
2000	Jonathan Clarke Lothar Wagner	Delta Air Lines Technical University of Brandenburg
1999	Andre Levers	British Aerospace Airbus
1998	Wolfgang Linnemann	Kugelstrahlzentrum Aachen
1997	Dr. R. Kopp	Institute Metal Forming of RWTH
1996	Dr. M.C. Sharma	Maulana Azad College of Technology
1995	Dr. Kisuke Iida	Meiji University
1994	Charlie Barrett	Metal Improvement Company
1993	Pete Bailey Bob Thompson Jim Whalen	GE Aircraft Engines GE Aircraft Engines GE Aircraft Engines
1992	Charlie Mason	Menasco Aerospace Ltd.