PolyOne

Case Study

Specialty Engineered Materials

Trilliant™ HC GRV Compounds

CT scanner manufacturer makes switch to a sustainable and moldable material for radiation shielding

Situation

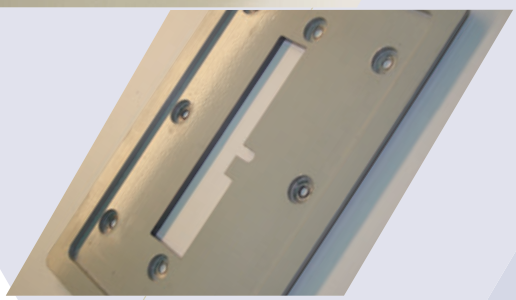
A leading multinational manufacturer of computer tomography (CT) scanners for healthcare decided to find a replacement for lead used in radiation-shielding components. Although European regulations allow an exemption for lead in medical devices, the OEM wanted to make the switch proactively. As a result, its engineers and designers began a search for a sustainable replacement that would shield radiation effectively while offering additional manufacturing benefits.

To ensure safety, CT scanners must be shielded effectively to minimize radiation exposure to the patient and caregiver. Central to the CT device is a collimator that traditionally uses lead-lined steel components to filter X-rays. At first, the OEM engineers tried replacing the lead/steel blades in the collimator with molybdenum, which is easier to machine but has a higher raw material cost. Tests of this solution found a one-eighth-inch-diameter "hot spot" of potential radiation leakage that needed to be addressed.

The designers then turned to supplier Radiation Protection Technologies (RPT), which molded a part using PolyOne's high-density compound, Trilliant™ HC GRV. This highly filled polymer incorporates PolyOne's exclusive Gravi-Tech™ compounds, and is specifically designed for the healthcare industry.

The PolyOne Difference

Tests have shown that the Trilliant HC GRV material blocks radiation at levels that meet or exceed those of both pure lead and pure tungsten. Furthermore, the impact-modified grade of Trilliant HC GRV worked so well for the patch that the designers began replacing other parts with the tungsten polymer material. The collimator blades, for example, were being machined from molybdenum at a cost of $150 each just for the raw material. Using Trilliant HC GRV reduced the material cost to $35. In addition, production time fell significantly. Once the tooling was built, it was only a matter of days before blades were ready to be assembled into the collimator.



Each CT scanner is 100 percent tested and inspected before it is shipped. In more than four years of production, the machines equipped with Trilliant HC GRV blades have continued to meet or exceed high standards for performance and quality. Throughout this period, RPT has continued to work with PolyOne to ensure repeatability in resin production. This lot-to-lot consistency is crucial to the success of these applications.

Gravi-tech™ and Trilliant™ GRV lead replacement and high specfic gravity compounds offer an excellent alternative to lead (Pb) and are classified as a PolyOne Sustainable Solution*

To learn more, go to www.polyone.com/sustain

*The PolyOne Sustainable Solution certification is awarded to those products or services that meet defined criteria for sustainability in areas such as renew-ability, recycle-ability, reusability, eco-friendly composition, or resource efficiency.

Delivering a Value-Added Solution

Trilliant™ HC GRV enables customers to reduce overall costs by 30 to 50 percent based on the specific solution. Trilliant HC GRV offers numerous solutions and creates greater value than alternative materials in this application as well as others that involve radiation shielding:

- **Positive environmental impact.** Trilliant HC GRV is an eco-conscious material that does not incur costly material handling, manufacturing, disposal and employee safety costs associated with lead.
- **Cost reduction.** System design, machining and regulatory costs are reduced compared to processing with lead.
- **Radiation-shielding performance.** Testing done by the CT manufacturer showed that Trilliant HC GRV parts meet or exceed the radiation-shielding levels provided by other materials.
- **Parts consolidation.** Trilliant HC GRV offers designers the opportunity to consolidate parts and thereby save time and money. For example, designers replaced a multi-part housing that had been assembled at a cost of $2,000. Working with PolyOne and molder RPT, the manufacturer switched to a single Trilliant HC part for a savings of more than 50 percent.
- **More robust finished parts.** Molded Trilliant HC GRV parts are less prone to damage than softer leaded equivalents, and there are fewer service and field replacements. They are also less brittle than pure tungsten.
- **Design freedom.** Trilliant HC GRV enables the CT device manufacturer to shield portions of the X-ray tube that were previously impractical to shield. With a molded part, engineers were able to design freely so that an opening for signal and power cables could be completely shielded to prevent radiation leaks.

Product choices often vary by region due to differences in regulatory and agency requirements, availability and other key factors. Please contact your nearest sales office for assistance in choosing the right solution for your locale.

CONTACT INFORMATION

Americas
U.S. – Avon Lake, Ohio
+1 440 930 1000
Argentina – Buenos Aires
+0054 11 4200 5917
Brasil – Campinas
+55 19 3206 0561
Mexico – Toluca
+52 722 2790200
GLS – McHenry, IL
+1 815 385-8500

Asia
China – Shenzhen
+86 (0) 755 2969 2888
China – Suzhou
+86 (0) 512 6823 24 38
India – Mumbai
+91 9820 194 220
Singapore
+65 (0) 6861 9325
GLS – Hong Kong
+852 2690 5332
GLS – Suzhou
+86 (0) 512 6265 2600
GLS – Taipei
+88 6 9396 99 740

Europe
Czech Republic – Praha
+420 224 142 214
Germany – Gaggenau
+49 (0) 7225 6802 0
Italy – Gallarate (Varese)
+39 03 31 797 448
Poland – Kutno
+48 24 357 47 00
Spain – Barbastro (Huesca)
+34 (0) 9 7431 0314
Sweden – Angered
+46 (0) 31 92 84 50
Turkey – Istanbul
+90 (0) 212 549 2256
United Kingdom – Widnes Cheshire
+44 (0) 05600 760 800
GLS – The Netherlands
+31 (0) 165 331 293

PolyOne

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Better Business Solutions.℠

www.polyone.com

PolyOne Americas
33587 Walker Road
Avon Lake, Ohio 44012
United States
+1 440 930 1000

PolyOne Asia
Guoshoujing Road No. 88
Z.J Hi-Tech Park, Pudong
Shanghai, 201203, China
+86 (0) 21 5080 1188

PolyOne Europe
Rue Melville Wilson 2
5330 Assesse, Belgium
+32 (0) 83 660 211