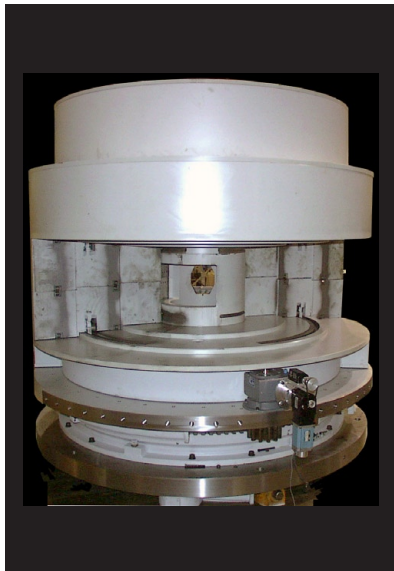
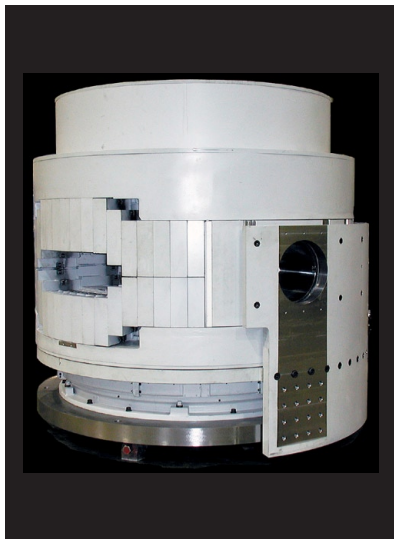
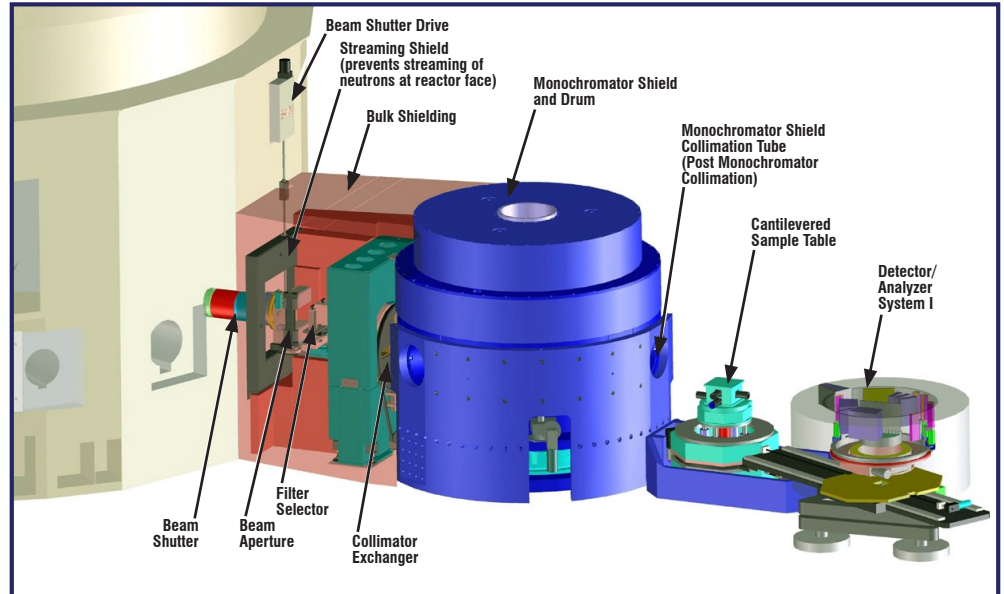
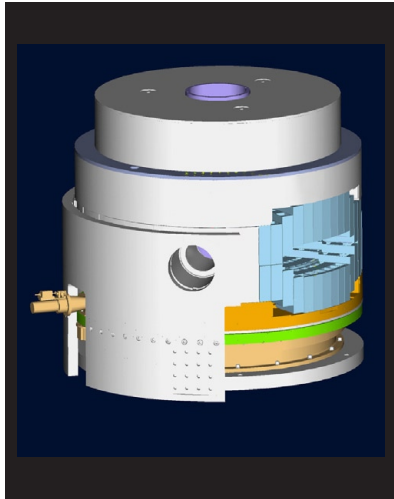


■ ENGINEERING ■ ARCHITECTURE ■ DESIGN-BUILD ■ GEOSPATIAL SOLUTIONS ■ SURVEYING



Merrick & Company redesigned components for a National Institute of Standards and Technology (NIST) monochromator, which was encountering problems during manufacture. A monochromator is a large and complex machine that separates the energy spectrum of reactor-generated neutrons into specific mono-energetic neutron beams. Merrick's assignment was to consolidate, eliminate, and simplify parts wherever possible in order to lower fabrication costs, lower assembly stackup tolerances, and streamline assembly operations.

Merrick began with a detailed tolerance study to identify components that were salvageable without compromising the functionality of the system. The study concluded that the existing design contained many components with close-tolerance features in weak rather than stiff directions (eg, rolled carbon steel plates with radial holes), so that the close tolerances were not maintained after a part was released from a machine tool.

Merrick's redesign incorporated close tolerance features into stiff areas of parts or weldments. For example, Merrick developed a simpler approach

for the aperture wedge translation mechanisms by machining the cam follower grooves that cause vertical wedge movement directly into two main weldments. This isolated the close-tolerance machining and reduced assembly stackup tolerances to only two parts.

Using Pro/ENGINEER[®] solid model design software, Merrick created two separate drawings for each large part and weldment of the complex monochromator. The first drawing shows the weldment in its fabricated state prior to the heat treating procedure and any machining operations. This aided the engineers and fabricators in understanding how much excess material was required to compensate for distortion due to forming, welding, and heat treating. The second drawing contained all of the datum features, machining details, and tolerances. This second drawing served the machining and inspection operations.

The Pro/ENGINEER[®] design package of two drawings separated the fabrication and machining details. This eliminated confusion during manufacture, since the fabrication and machining operations occurred at different times and were performed by different trades.