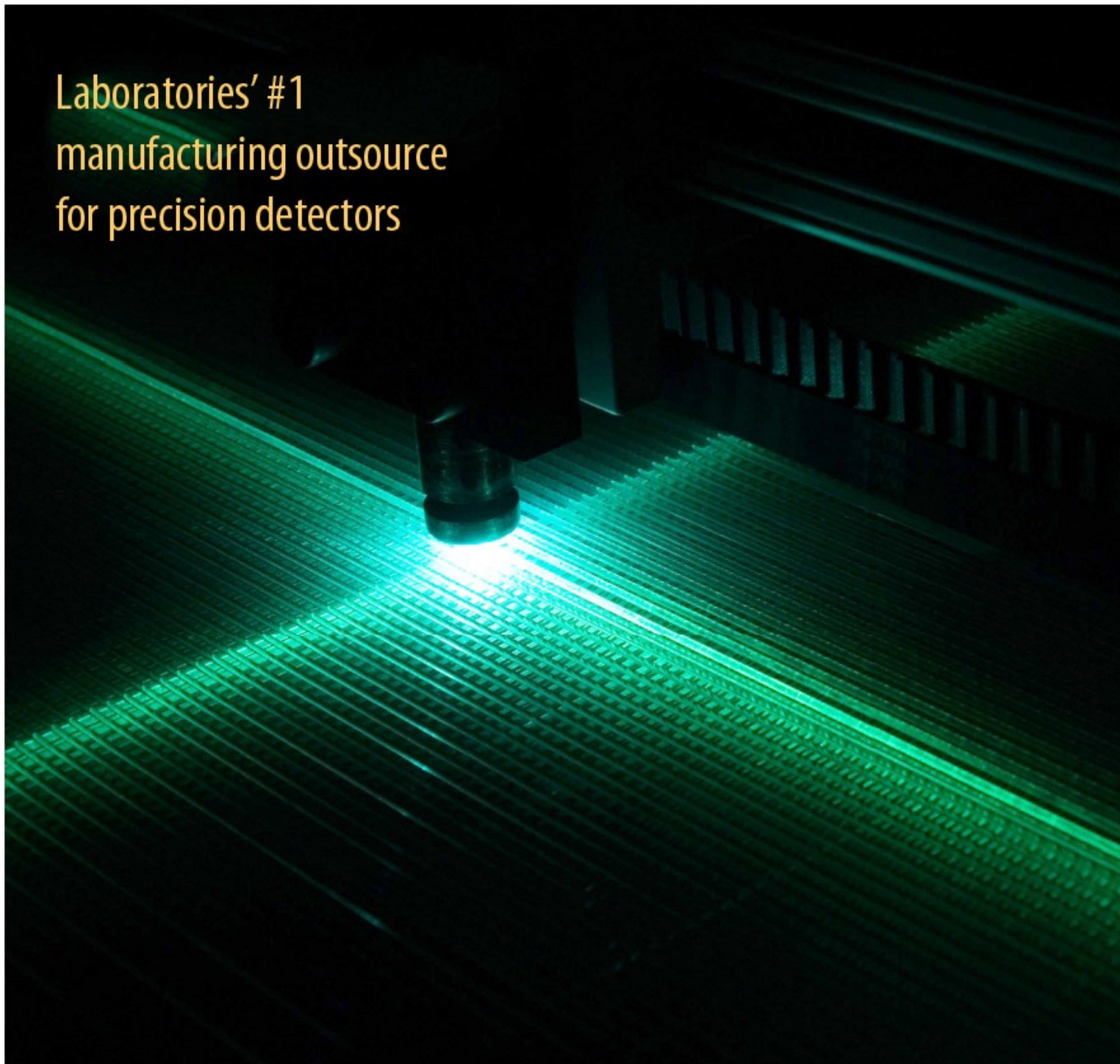




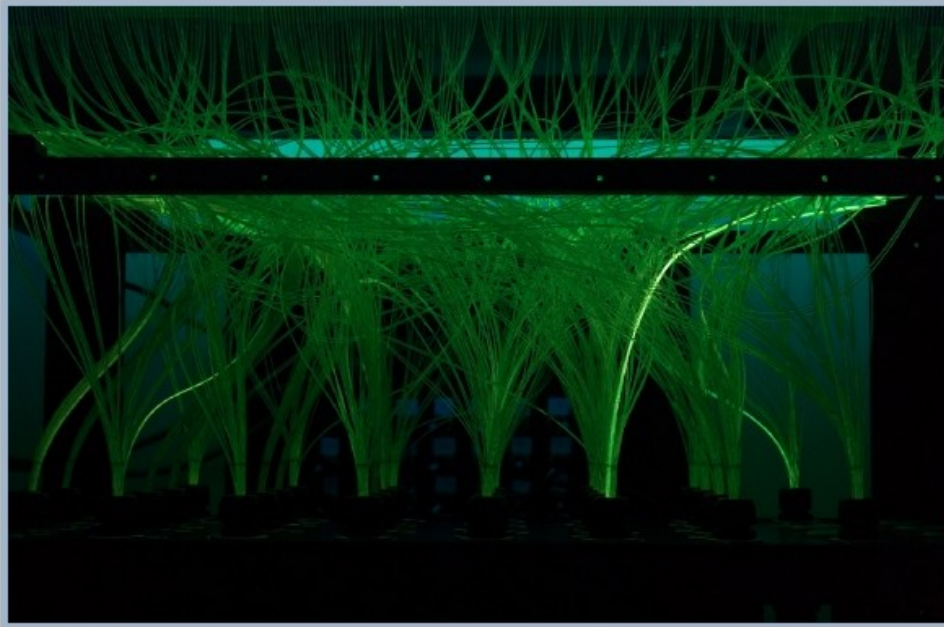
PartTec, LTD

PARTNERS IN TECHNOLOGY

Laboratories' #1
manufacturing outsource
for precision detectors



The Scintillator Neutron Detector



The scintillator neutron detector. Primary component of the Spallation Neutron Source's POWGEN3 Powder Diffractometer and its VULCAN Engineering Diffractometer.

The scintillator neutron detector is the primary component of the Spallation Neutron Source's POWGEN3 Powder Diffractometer and its VULCAN Engineering Diffractometer. PartTec efficiently manufactures these detectors for the Spallation Neutron Source using its unique design, manufacturing and quality improvement methods.

The SNS-designed detector is the premier detector of its type in the world. It is the best blend of affordability, resolution, energy sensitivity and area coverage for laboratories around the world. Years of design and prototyping were devoted to it.

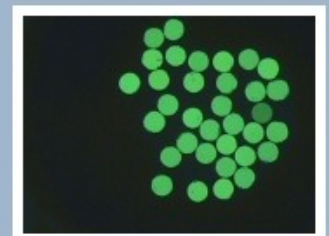
The Challenge

The scientists, engineers and technicians at SNS are devoted to detector innovation and installation, with the goal of providing users at SNS the highest quality research results. Translating those designs into manufactured detectors which meet the functional and cost requirements of the Laboratory was the challenge. SNS permitted PartTec to embed a manufacturing professional into its detector group during the final generation prototyping and testing phase. PartTec then provided guidance for the final design that allowed low-cost high quality manufacturing of the detectors

Design for Manufacturability

PartTec created the documentation, procedures, manufacturing tools and the test equipment for the manufacture of these high-precision detectors. PartTec's considerable experience with wavelength-shifting, crossed fiber detectors was increased through a 2004 SBIR grant from the Department of Energy and was the project which brought PartTec to the attention of the SNS. Leveraging its considerable knowledge of wavelength-shifting, crossed fiber detectors and its core competency, manufacturing, PartTec

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Specifications

Components of the Detector

- Fiber Loom Assembly
- Structural Frame
- $^6\text{LiF:ZnS/AG}$ Scintillator
- 460 Double-Clad 1 mm Diameter Wavelength-Shifting Fibers
 - 405 nm --> 520 nm
 - 2 layer orthogonal grid: 152 horizontal and 308 vertical mounted on the loom with 2.5 mm grid spacing
- Boron-Aluminum Electronics Shielding Plate(s)
- 0.2 mm Thick Reflective Back Plate
- Light Tight Covers for Frame and Loom Assembly
- 32 Green Enhanced 1" Diameter Photomultiplier Tube Assemblies
- Electronics to Power Photomultiplier Tubes and Process Event Signals

Detector Performance Properties

Detection Efficiency:	75% capture efficiency for thermal neutrons
Time Resolution:	5 μsec
Maximum Count Rate:	10^5 n/s
Position Resolution:	0.5 x 2.0 cm (adjustable)
Gamma Discrimination:	1.8×10^{-6}
Power Consumption:	16 W

Dimensions of the Fiber Loom

Width:	40.23 cm
Length:	78.48 cm
Height:	65.69 cm

Overall Dimensions of the Detector

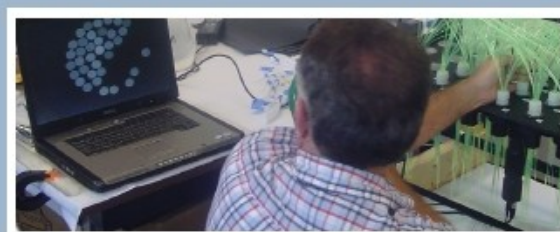
Detector Area:	0.3 m ²
Width:	40.23 cm
Length:	78.48 cm
Height:	65.69 cm

Scintillator Neutron Detector Customization

The Scintillator Neutron Detector can be customized to fit your specific laboratory applications. The specifications listed were developed for the Powgen3 engineering powder diffractometer facility at the Spallation Neutron Source in Oak Ridge, Tennessee. Contact PartTec, Ltd. To speak with a senior scientist about specific customization options for your application and laboratory needs.

Large Wavelength-Shifting Detector Arrays

Individual wavelength-shifting fiber detector modules may be arranged in vertical and/or horizontal arrays covering areas of 10's of square meters. The detector electronics modules can be multiplexed to produce a contiguous large area orthogonal grid of high sensitivity neutron detection with adjustable pixel resolution. Arrays are being built for instruments like the POWGEN Powder Diffractometer instrument at the Spallation Neutron Source.



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developed processes and tools specifically designed to enhance the manufacturability of the detectors.

Manufacturing

PartTec invented tools for the manufacture of the detector and improved tools originally developed at SNS. From the basic weaving jig to the fiber end positioning instrument, to the final test of the fibers' optics, all tools were created or redesigned by PartTec to allow the manufacture of multiple units simultaneously while improving and controlling quality.

Two of the manufacturing tools currently being used are unique in the industry: The fiber-end positioning camera and the Fiber ARRay Optical Testing (FARROT) instrument.

Delivery

PartTec's Quality Control policy requires that every component and every service provided in the manufacture of any of its products be documented in a manufacturing database. Upon delivery, every completed product or service is accompanied by a detailed Conformance Document, prepared from the database, which lists the parts that were used, the

vendors that supplied them and their lot numbers. It also lists all the tasks that were performed and which PartTec staff member performed them, all the quality testing procedures and their results and all re-work and repair tasks.

PartTec designed and manufactured shipping containers for the Fiber Detectors that are being delivered to SNS. The shipping containers are mounted to air shock absorbers on a pallet and transported by PartTec.

News



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Herschel Workman, CPA
Chief Executive Officer

4/27/2010

PartTec Awarded Patent for Radiography Defeat Material

PartTec, Ltd. has been awarded a patent for its Radiography Defeat Material. This patent (No. US 7,705,335 B2) covers the methods and material developed by PartTec to protect high security locking devices and other materials from radiographic imaging.

4/9/2010

PartTec Announces License Agreement with ORNL to Manufacture Advanced Neutron Detector System

PartTec, Ltd. signed an agreement to manufacture and market a scintillator neutron detector system jointly developed at the Department of Energy's (DOE) Oak Ridge National Laboratory (ORNL) and by PartTec with an SBIR grant from the Department of Energy.

6/27/2008

PartTec receives Phase I STTR Award from DOE

The U.S. Department of Energy has awarded a Phase I STTR grant to PartTec for research regarding a gas-filled neutron detector. This novel detector is a collaborative project with the Indiana University Cyclotron Facility. The award will fund the research project through March, 2009.