

Cloud Manufacturing in Healthcare: A Gamma Knife Center Experience

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What is a Gamma Knife?



Gamma Knife Components

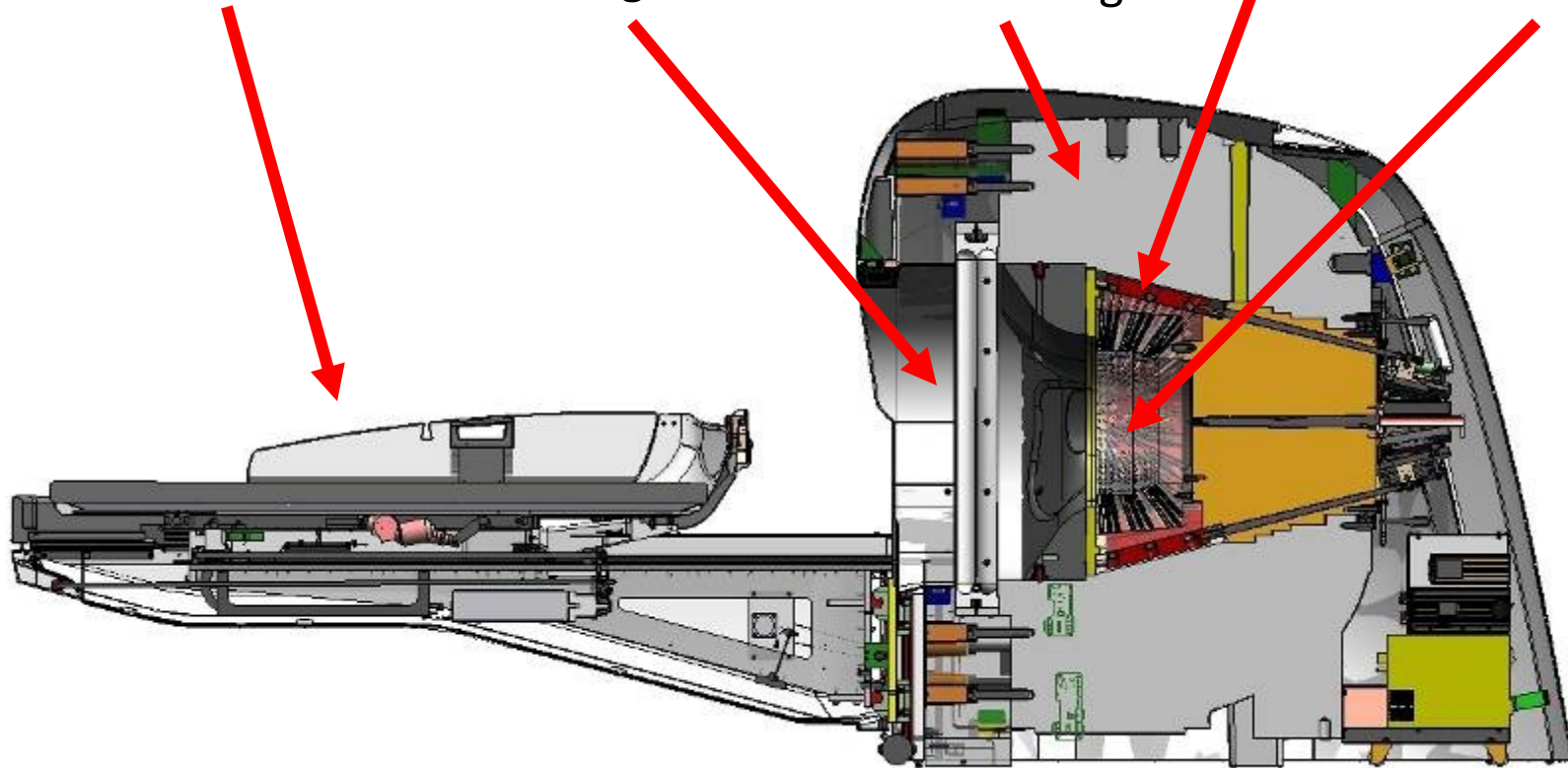
Patient Positioning System

Shielding doors

Shielding

^{60}Co sources

Collimator Body



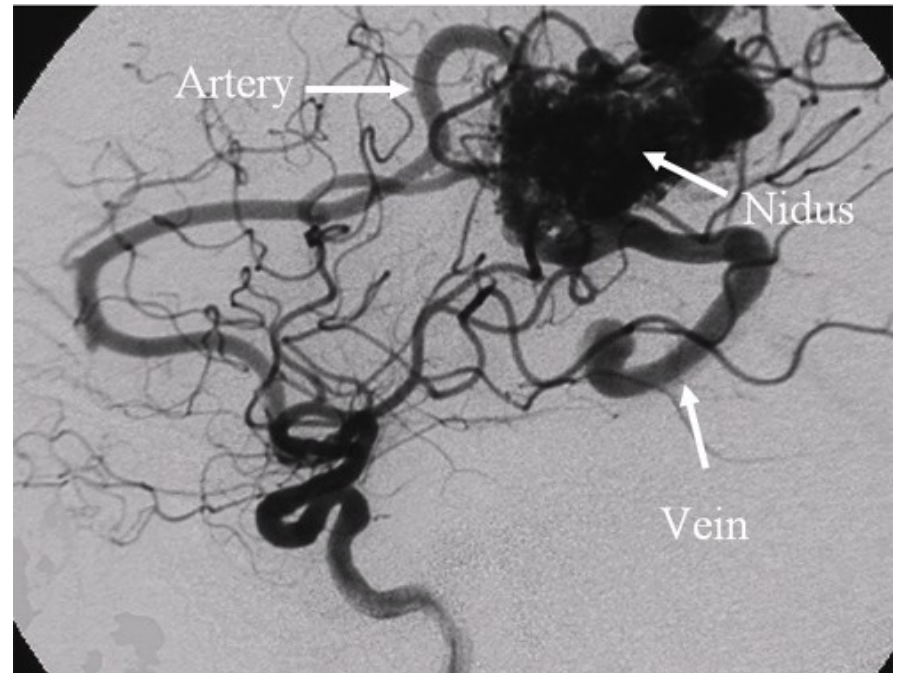
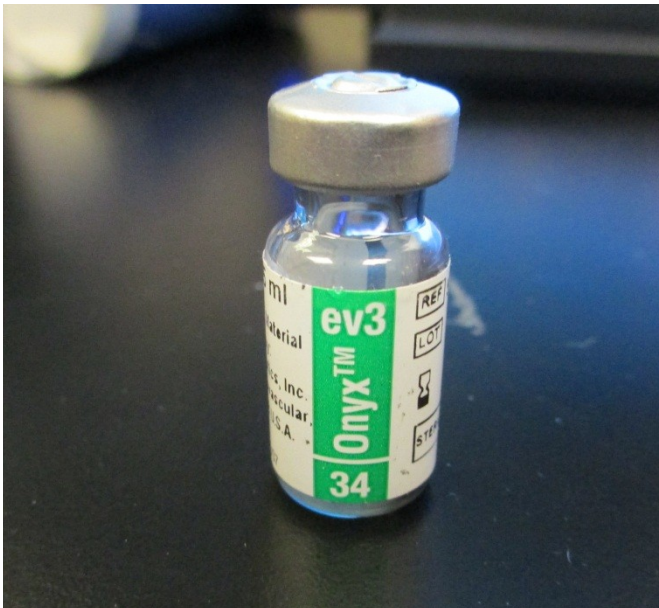
~20 metric tons to protect you from 20 grams of ^{60}Co

Model C – Helmet Collimation



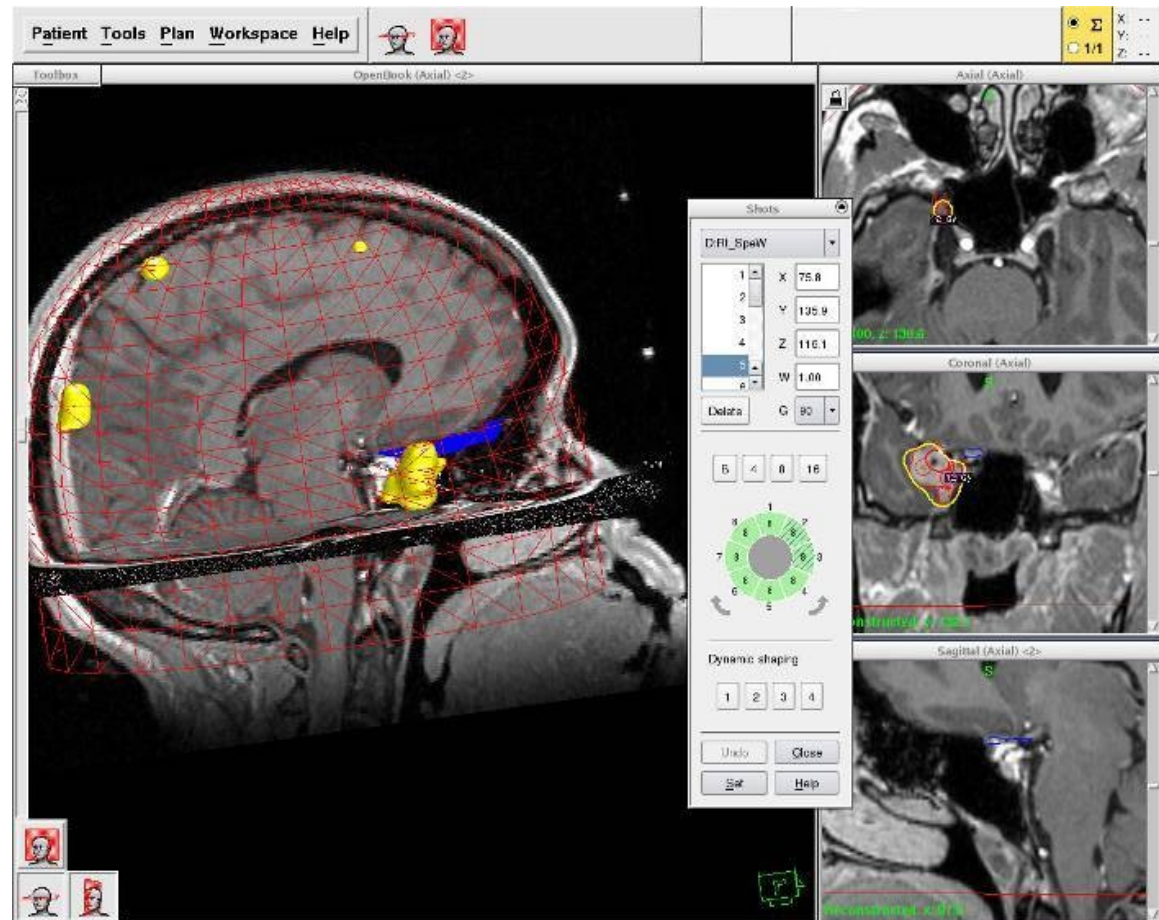
How Onyx is Medically Used?

- a liquid embolic glue
- minimally invasive therapy for arteriovenous malformations (AVM) in the brain



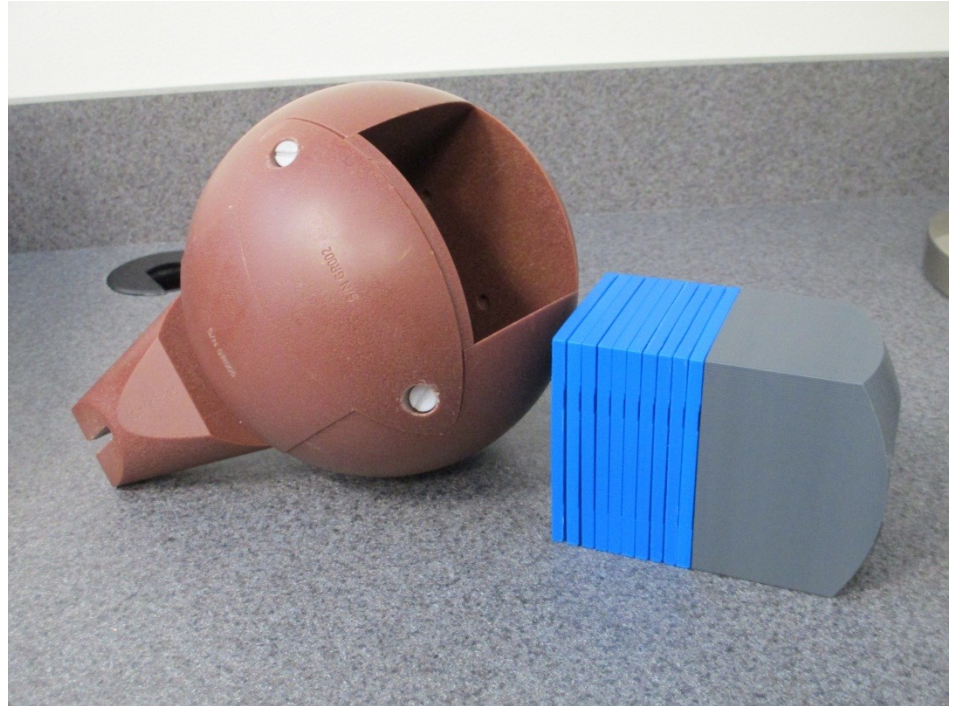
Research Problem

- Effect of onyx in Gamma Knife treatment planning

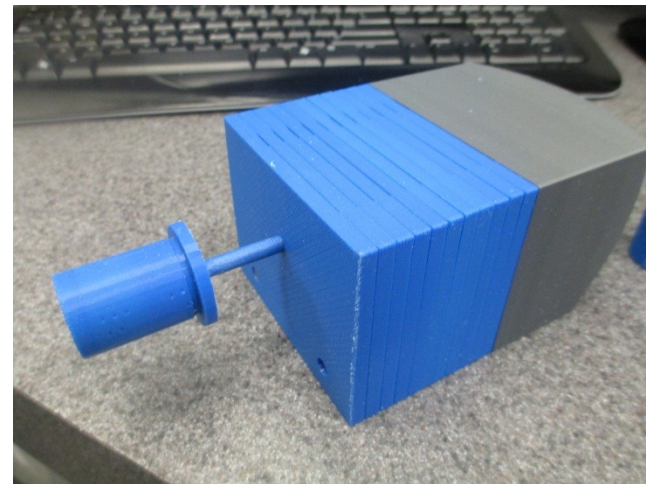
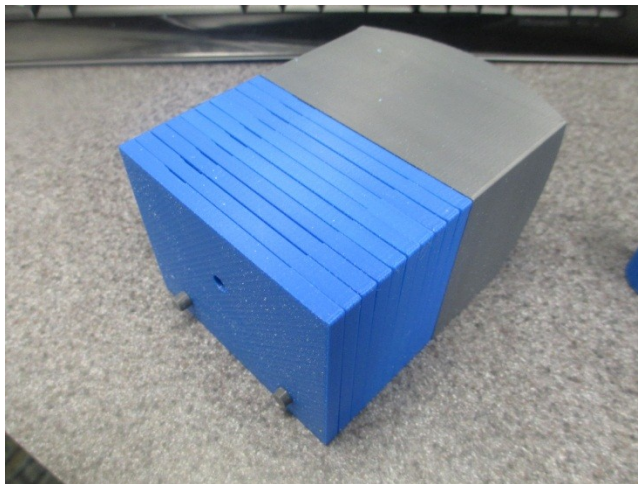
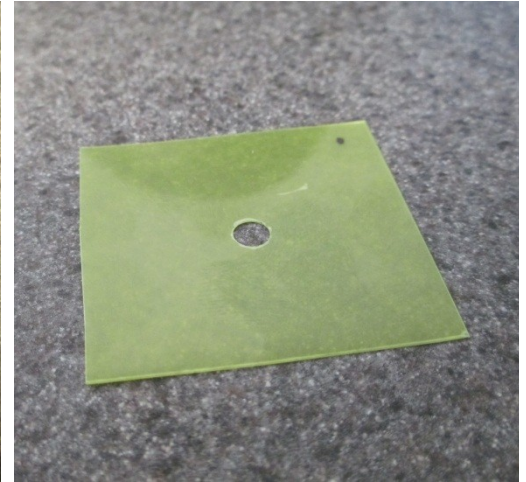
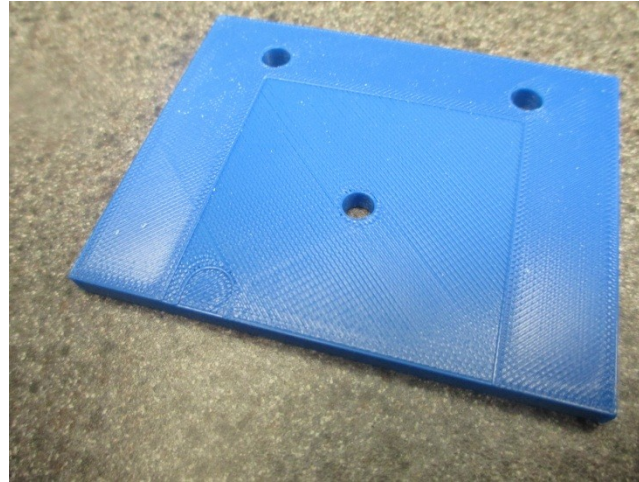


Use of Phantom

- What is a phantom and how it is used?



Custom-build Phantom



Cloud Manufacturing

1-Placing orders
over the internet

The screenshot shows a web browser window with the URL `avillage.web.virginia.edu/rpc/uPrintServiceRequest.aspx`. The page title is "University of Virginia Rapid Prototyping Lab (Site under construction)". Navigation links include Home, New Client Registration, Place an Order, Lab Tech Login, and Photos from the Lab. The main heading is "University of Virginia Rapid Prototyping Lab (Site under construction)". Below this, it says "Use this form to submit uPrint service requests." The form includes fields for "Your Name:" (First Name and Last Name), "Email:", and a section for "PTAO (UVA Clients)" with a "Pay by PTAO" checkbox and input fields for P, T, A, and O. There is an "Upload Your .STL Files" section with a "Choose File" button and a note "Select a file with the extension .STL Do this step last!". To the right is a "Processing Information" table with columns for Quantity, Length, Width, Height, Unit, and Color, and a checkbox for each row. Below the table is an "Additional Notes" text area.

UVA RPL: Service Request x
avillage.web.virginia.edu/rpc/uPrintServiceRequest.aspx

[Home](#) | [New Client Registration](#) | [Place an Order](#) | [Lab Tech Login](#) | [Photos from the Lab](#)

University of Virginia Rapid Prototyping Lab

(Site under construction)

Use this form to submit uPrint service requests.

Your Name: First Name Last Name
Email:

PTAO (UVA Clients)
 Pay by PTAO
P
T
A
O

Upload Your .STL Files
Select a file with the extension .STL
Do this step last!

Choose File No file chosen
Choose File No file chosen
Choose File No file chosen
Choose File No file chosen
Choose File No file chosen

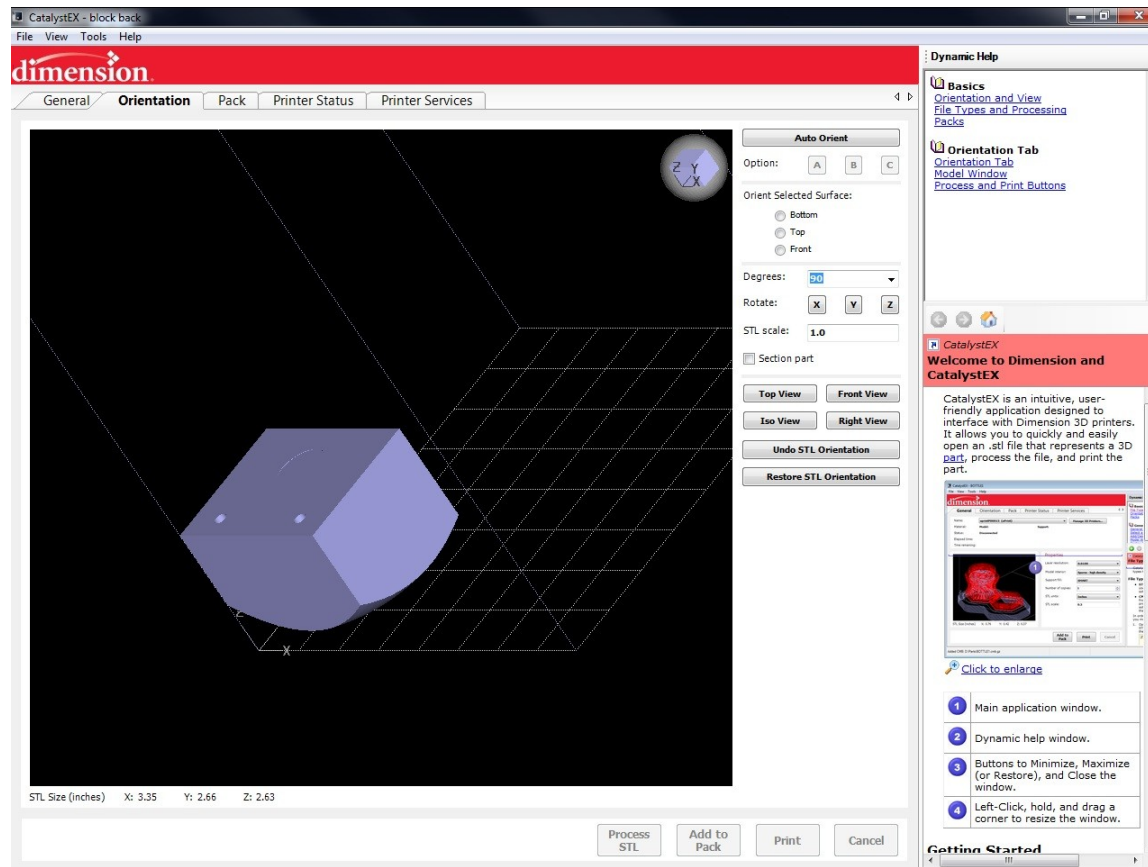
Processing Information
Check the box next to the rows you want to submit.

Quantity	Length	Width	Height	Unit	Color	<input checked="" type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input checked="" type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
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<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

Additional Notes

Cloud Manufacturing

2-Post processing - Calculation of support materials and printing time

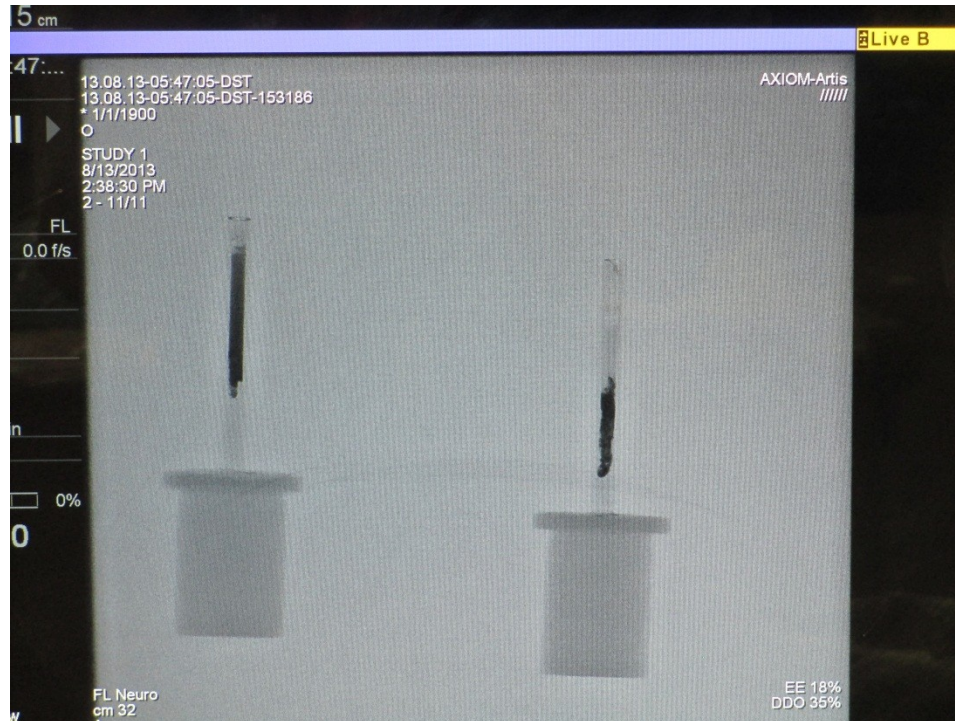


Parts Manufacturing



Testing

- Onyx inside the phantom treated with Gamma Knife
- Control with radiochromic film



Future Works

- Phantom with embedded sensor design.
- New phantom designs for different neurological problems.

Thank you.
Questions?

