

### College of Engineering

### **ME Team**



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# **Project Overview**

This project aims to develop a new surface modification capability for the DIII-D first wall, ensuring effective impurity removal for improved performance. The approach involves refining surface preparation techniques to enhance the quality of graphite tiles after nuclear fusion runs.

### **General Atomics DIII-D**

The DIII-D National Fusion Facility is operated by General Atomics for the U.S. Department of Energy. It is pioneering the science and innovative technology that will enable the development of nuclear fusion as a clean and sustainable energy source for the next generation.

# Surface Preparation Utilizing the DIII-D Robot System

### **Technical Solution**





Function of Glovebox Fasten tiles during sanding process

- Provide controlled space for sanding testing
- Contain spread of graphite dust as it is





Glovebox exploded view with 3x3 tile array















### **Test Results**

Mount





			X Test-Gri 0 09/20/25 Detected P Fe 2 Ni 1 Cr 5 V 3 Ti 2 Cu 5 V 3 V 3 V 3 V 3 V 3 V 3 V 3 V 3	#7 Image: Constraint of the second secon
Grit Size	Speed Setting	Range of Force Magnitude (N)	Dwell Time (s)	% Total 'impurities' removed
Grit Size 120	Speed Setting 4	Range of Force Magnitude (N) 41.86	Dwell Time (s) 40.38	% Total 'impurities' removed 100
<b>Grit Size</b> 120 120	Speed Setting 4 4	Range of Force Magnitude (N) 41.86 44.82	Dwell Time (s) 40.38 20.76	% Total 'impurities' removed 100 100
<b>Grit Size</b> 120 120 120	Speed Setting 4 4 4	Range of Force Magnitude (N) 41.86 44.82 ~50	Dwell Time (s) 40.38 20.76 ~40	% Total 'impurities' removed 100 100 100
<b>Grit Size</b> 120 120 120 120	Speed Setting 4 4 4 4	Range of Force   Magnitude (N)   41.86   44.82   ~50   58.47	Dwell Time (s) 40.38 20.76 ~40 19.93	% Total'impurities'removed100100100100100
Grit Size 120 120 120 120 80	Speed Setting 4 4 4 4 5	Range of Force   Magnitude (N)   41.86   44.82   ~50   58.47   47.38	Dwell Time (s) 40.38 20.76 ~40 19.93 61.08	% Total   'impurities'   removed   100   100   100   95.29
Grit Size 120 120 120 120 80 80	Speed Setting 4 4 4 4 5 5 6	Range of Force   Magnitude (N)   41.86   44.82   ~50   58.47   47.38   41.12	Dwell Time (s) 40.38 20.76 20.76 40 19.93 61.08 60.59	% Total   'impurities'   removed   100   100   100   95.29   89.97
Grit Size 120 120 120 120 80 80 80 80	Speed Setting 4 4 4 5 5 6 4	Range of Force   Magnitude (N)   41.86   44.82   ~50   58.47   47.38   41.12   30.05	Dwell Time (s) 40.38 20.76 20.76 40 19.93 61.08 60.59 91.75	% Total   'impurities'   removed   100   100   100   95.29   89.97   79.70

Effective Depth of Removal Range:  $0.2 \rightarrow 0.5$  [mm]



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The team thanks Dr. Shaffar, and Michael Lester at SDSU for arranging and advising this project. In addition, the team thanks Karl Schultz, Joshua Hicok, and Alec Stobbs from General Atomics.

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