

Optimizing Venting for EUV Technology Testing

Meet The Sponsors

ASML: Renowned for pioneering breakthroughs in the semiconductor industry, ASML stands at the forefront, empowering chipmakers worldwide with cutting-edge equipment, hardware, and software solutions. Through their revolutionary lithography technology, ASML enables the mass production of intricate patterns on silicon wafers, driving innovation and shaping the future of technology.

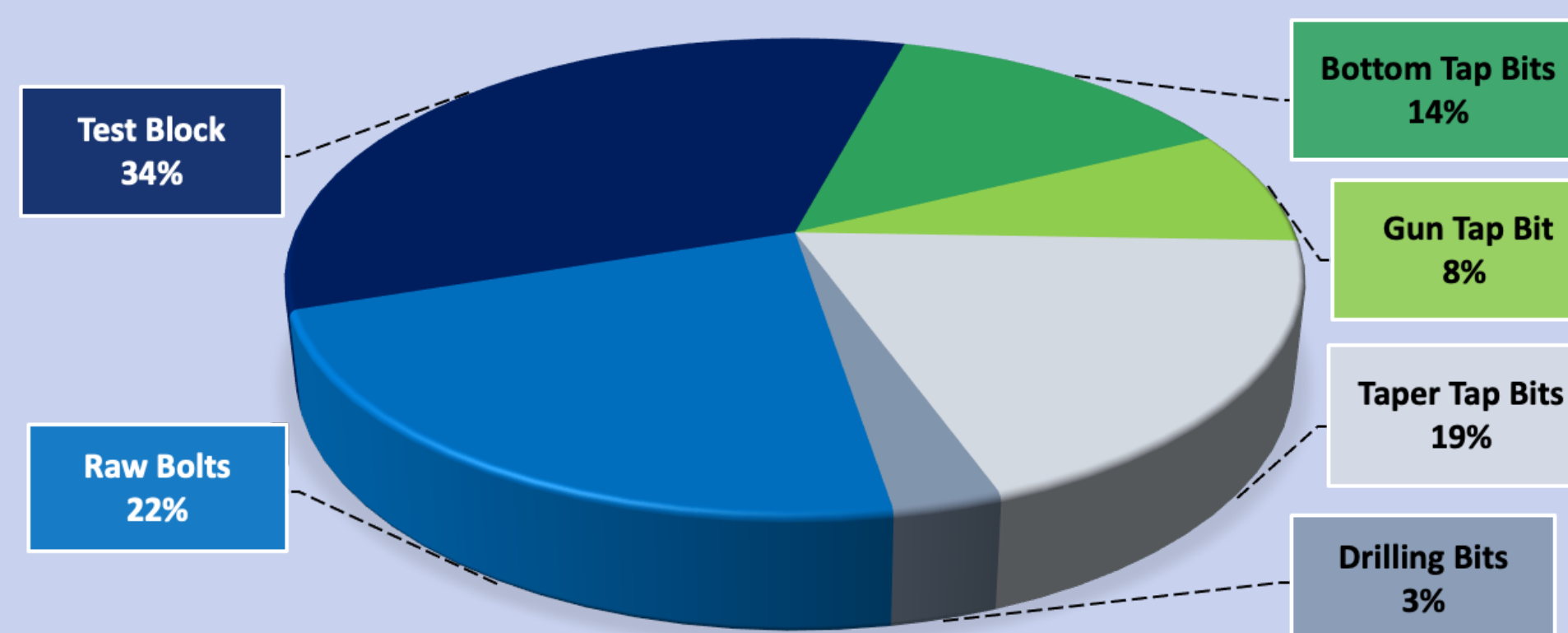
ASML Advisors: Brandon Verhoff, Kent Bruzzone

Project Overview

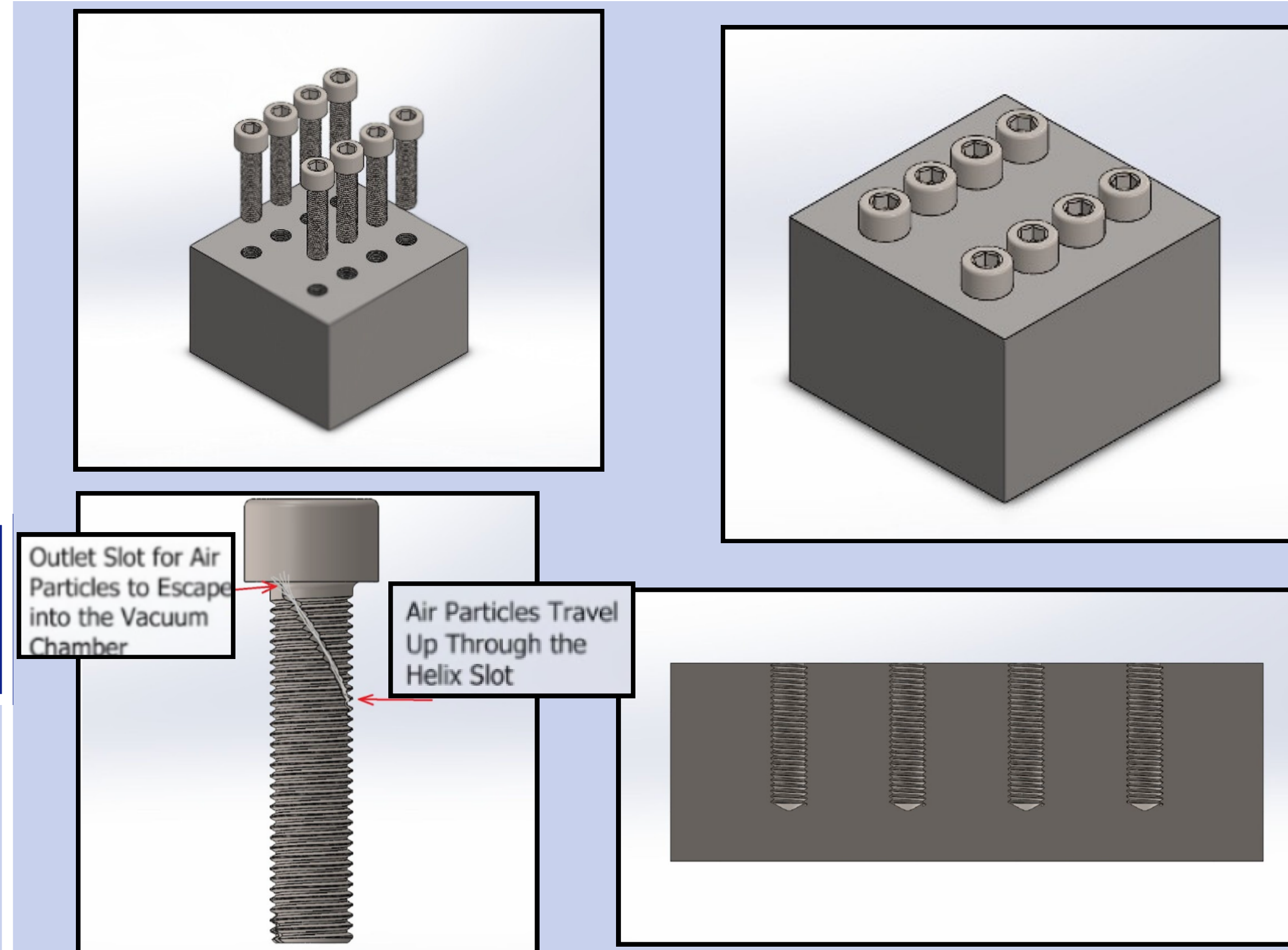
Problem: ASML currently employs center-vented screws to facilitate outgassing within their EUV lithography machine. The efficiency of the outgassing process directly impacts the system's performance and the production rate of microchips.

Objective: The goal of this project is to deliver an optimized and validated design solution for achieving optimal pump-down and outgassing parameters for a vented path. Specifically, we will focus on bolted hole sizes of 4mm, 6mm, and 8mm

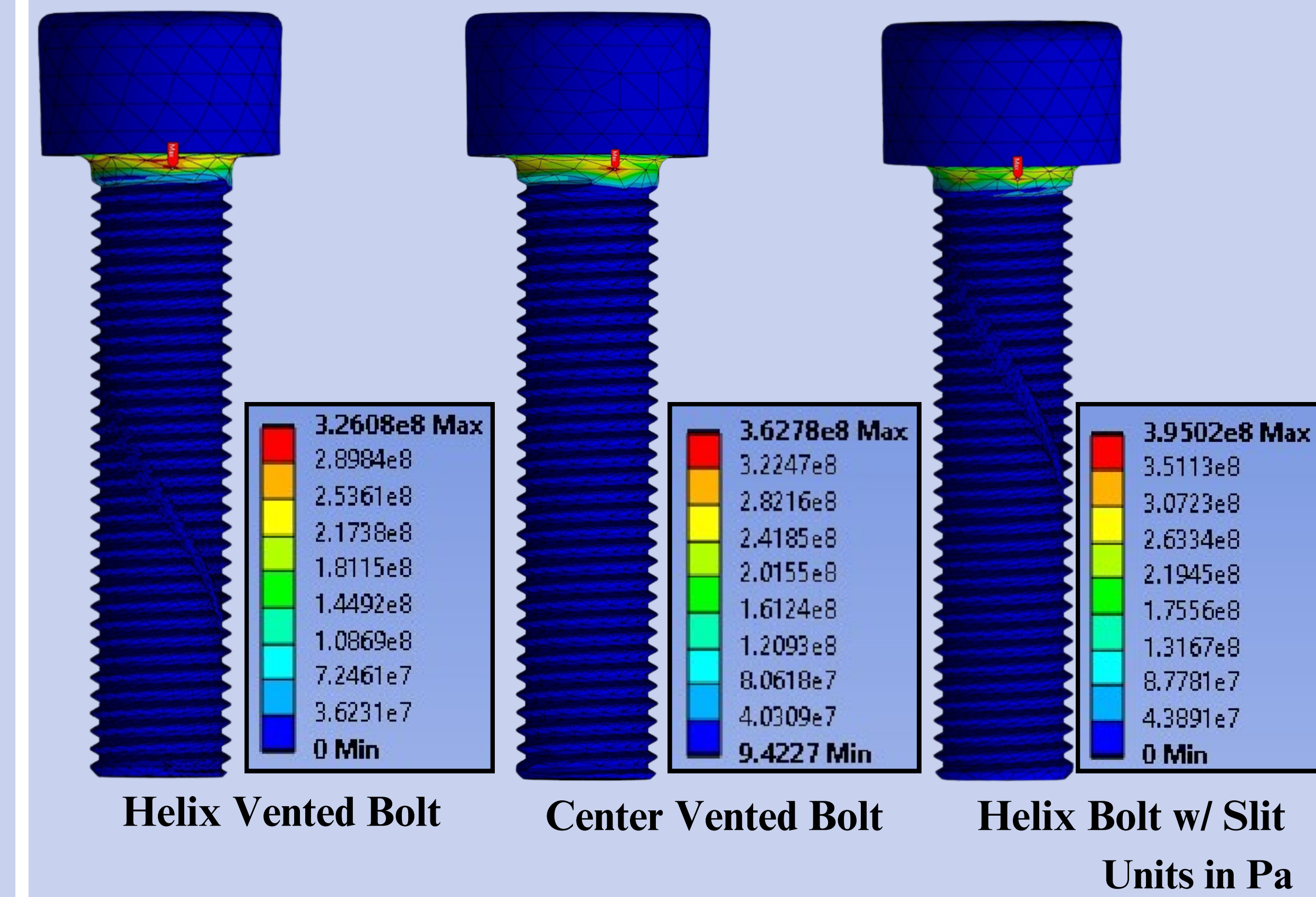
Budget



CAD



FEA Max Shear Stress Analysis



Major Testing Methods

Helium Leak Test

The Helium Leak tester is used to determine how fast the bolts release the trapped helium. The test block and vented bolt assembly will be placed into a Modular Vacuum chamber connected to a helium leak tester to measure the out gas rate of each bolt design.

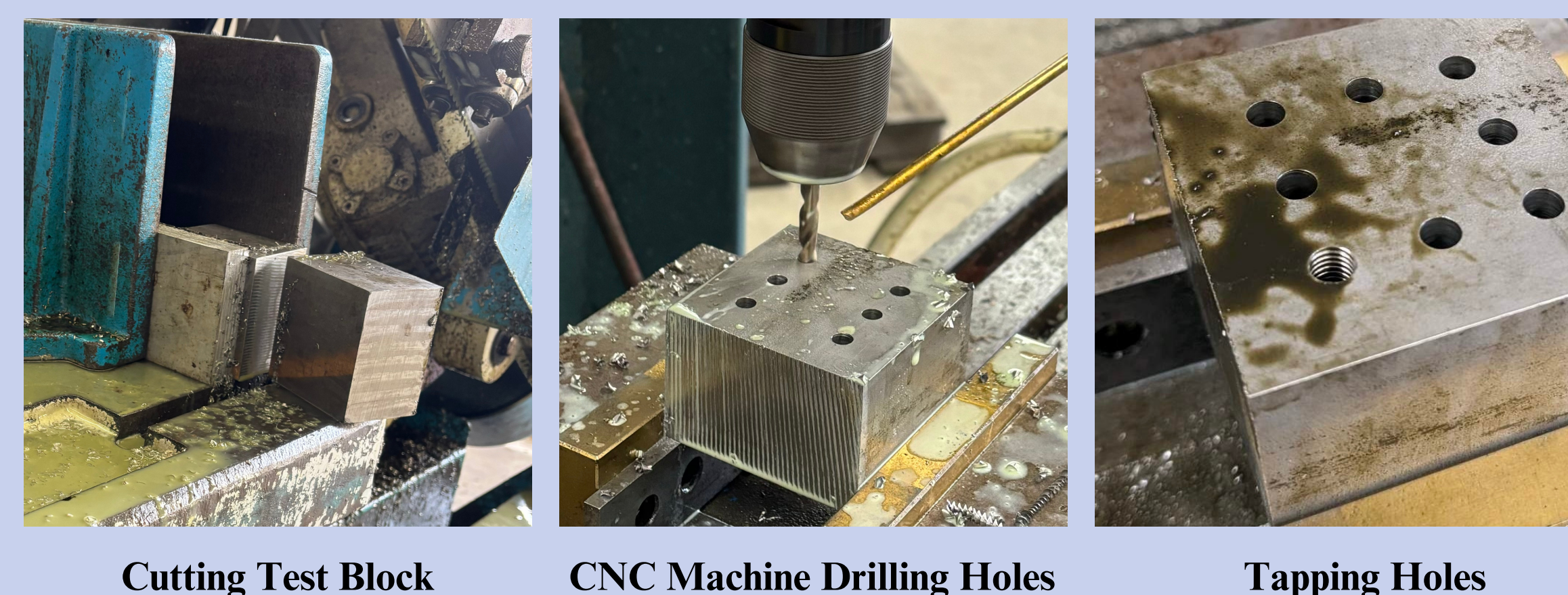
Intron Tensile Test

The Instron tensile tester is a piece of equipment that measures the tensile strength of a test subject. This machine is used to find the tensile strength of the helical slot vent bolt design, the center-vented bolts, and non vented bolts to compare the tensile strengths of each design.

20 Cycle Make or Break

The helical slot vented bolt, center vented bolt, and the non vented bolt are fastened then unfasten into the testing block at 25 ft*lbs. This process was repeated 20 cycles or until the bolt head shears off and monitor any visible changes to the bolt.

Manufacturing

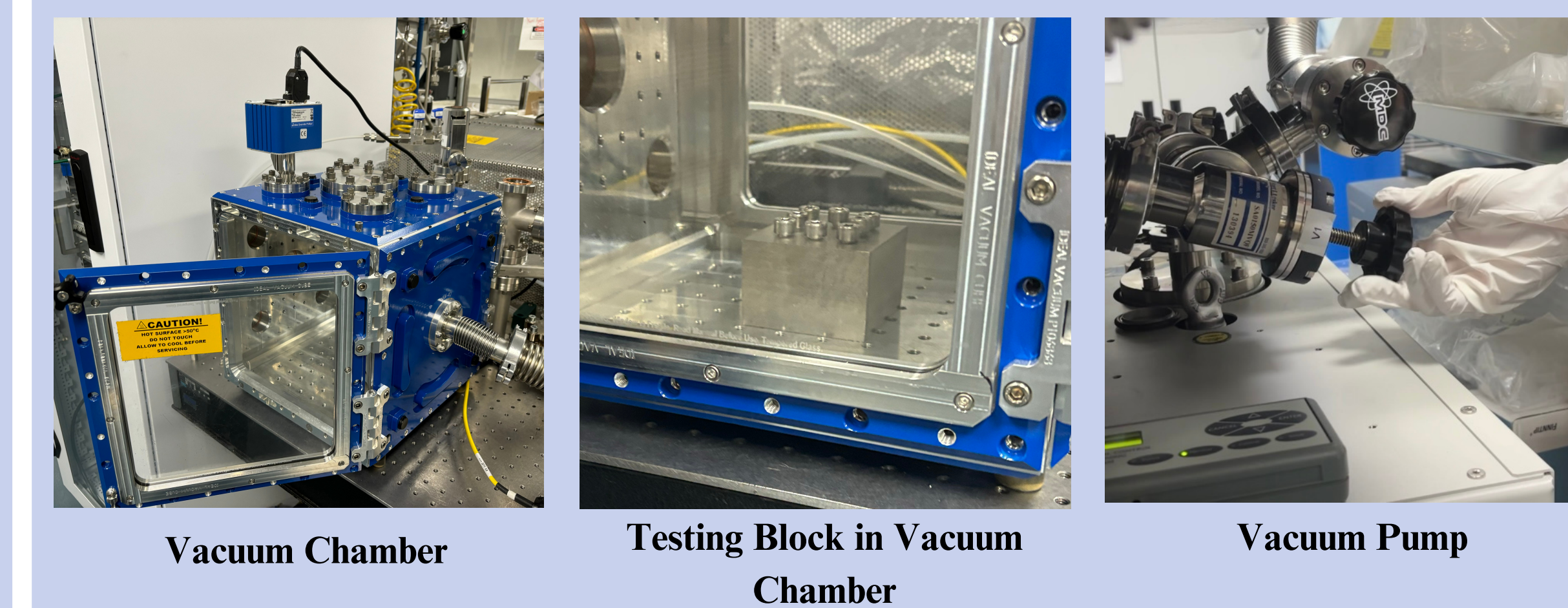


Cutting Test Block

CNC Machine Drilling Holes

Tapping Holes

Testing



Vacuum Chamber

Testing Block in Vacuum Chamber

Vacuum Pump

Meet The Team



Sofia Escobedo
Team Lead



Elijah Sowunmi
Manufacturing Engineer



Oliver Blasband
Design Engineer



Cassandra Morris
Safety Risk Engineer

Acknowledgments

We would like to give special thanks to Professor Shaffar, our ASML sponsors, our machine shop specialist, Mr. Lester, and lastly our lab supervisor, Ben Adams.

Spring 2024