



Company Information

Company Name	<i>BMW Manufacturing Co. LLC</i>	Date Submitted	<i>05/13/2025</i>
Project Title	<i>Design Improvements for an Automated wire brush cleaner for traverse bars (BMW_BRUSH)</i>	Planned Starting Semester	<i>Fall 2025</i>

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical	3	Electrical	2
Computer	2	Systems	

Company and Project Overview:

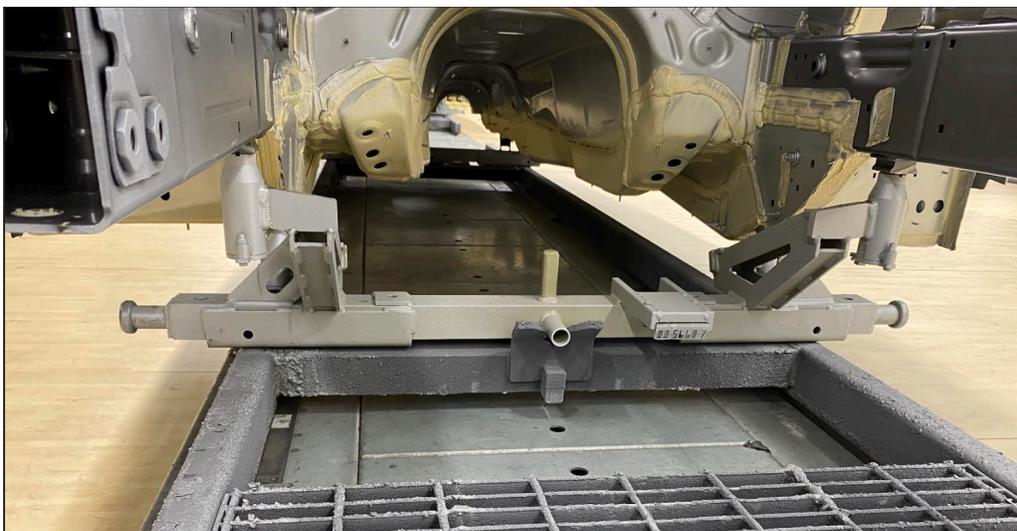
BMW Manufacturing in Spartanburg SC employs 11,000 people at its eight million square-foot campus. The Spartanburg plant assembles the BMW X3, X4, X5, X6, X7, and XM Sports Activity Vehicles and Coupes and their variants. For 30 years, our associates have been proud to assemble more than 6.5 million safe, premium-quality BMWs for our customers around the world. According to the U.S. Department of Commerce, the BMW Group is one of the largest automotive exporters by value from the U.S. with a total export value of about \$10.1 Billion in 2023.



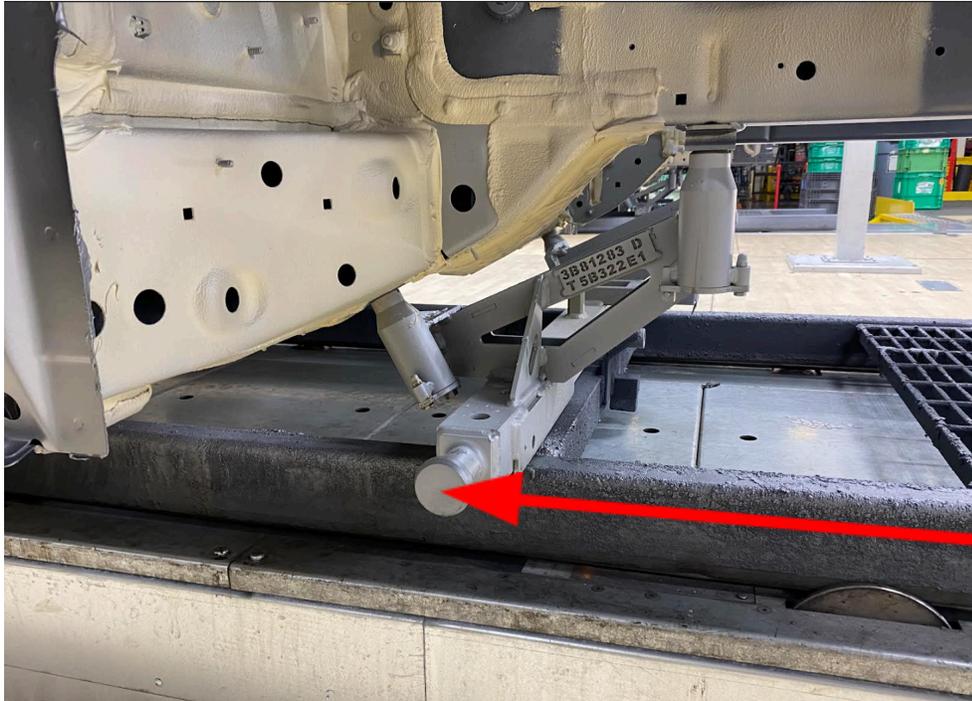
This project will involve the paint shop operations. BMW Manufacturing's highly- innovative and eco-friendly paint shop comprises of two halls, Paint Shop North and Paint Shop South totaling ~145,000 m² (1,560,767 ft²). It is here where car bodies are painted to a flawless finish, not only assembling an impressive appearance but maximum corrosion protection. The shop has more than 240 highly efficient robots working together with paint shop associates who monitor the car through every stage of the process. This provides BMW maximum flexibility in terms of responding to customers' special wishes for specific colors or matte paints. This project is associated with the maintenance of a key fixture for the paint shop.

Project Requirements:

When vehicle bodies go through the paint operation, they are carried on a skid. See photo below:



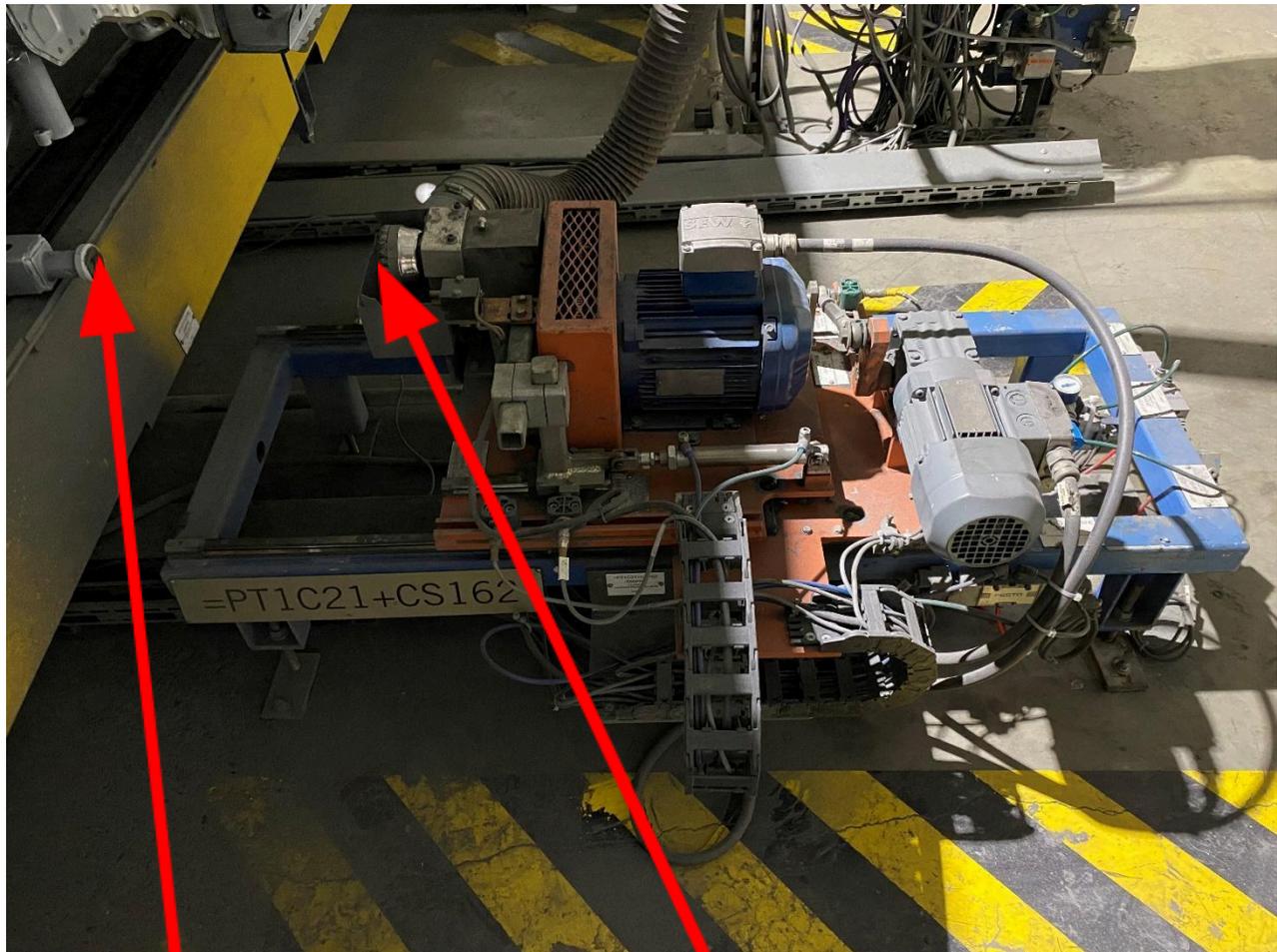
The painting is an electrostatic paint process. The paint is charged and due to electrostatic attraction, it adheres to the vehicle body that is grounded through the transport skid. This photo shows the grounding location, which is on the transverse bar.



Grounding location

In order for the electrostatic paint process to work properly, this grounding lug face must be cleaned of any paint built up after each cycle.

This is the current apparatus that is used to clean the lug:



Lug to be cleaned

Wire brush

The wire brush engages with the lug and rotates to clean the lug face.

The current system cleans the lug face, but it suffers from mechanical and reliability issues. Therefore, the project objective is to design a replacement system that will perform this function in a more reliable way than the current system. Parts from the current system can be used if useful.



Expected Deliverables/Results:

- Expected equipment availability of 98% or better. Equipment will experience approximately 6,000 cycles per week, minimal weekend maintenance should be required, other than changing wire brushes.
- Full CAD drawing package and bill of materials to allow someone else to reproduce the design
- This project is a “design only” project and the students will not be building a prototype. It will be built by a BMW selected vendor at a later date. Since a third party is building the design, extensive effort will need to be made to develop the drawing and code documentation package and test its sufficiency with a third party.

Disposition of Deliverables at the End of the Project:

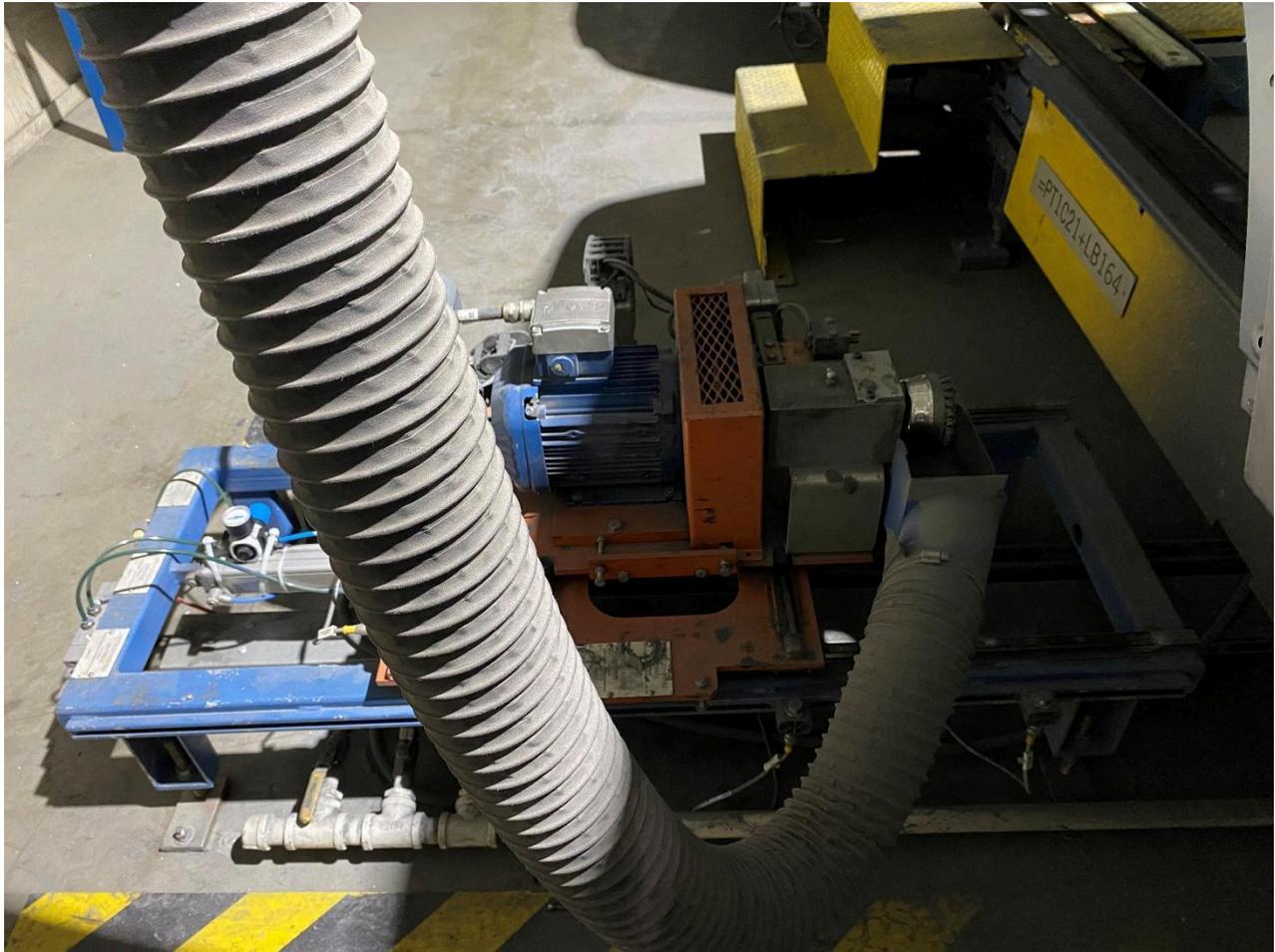
Students are graded based on their display and presentation of their team’s work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter’s location, it must be returned to campus for the Expo. It is also a mandatory part of this Program that the Industry supporter attend the 2 expos to grade their team’s performance. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Interest in the design of electro-mechanical manufacturing systems
- Ability to travel to BMW’s Spartanburg SC facility in the first semester for an overview of the current system and system constraints.. Mileage will be reimbursed by ISL when reimbursement is submitted in accordance with ISL procedures.

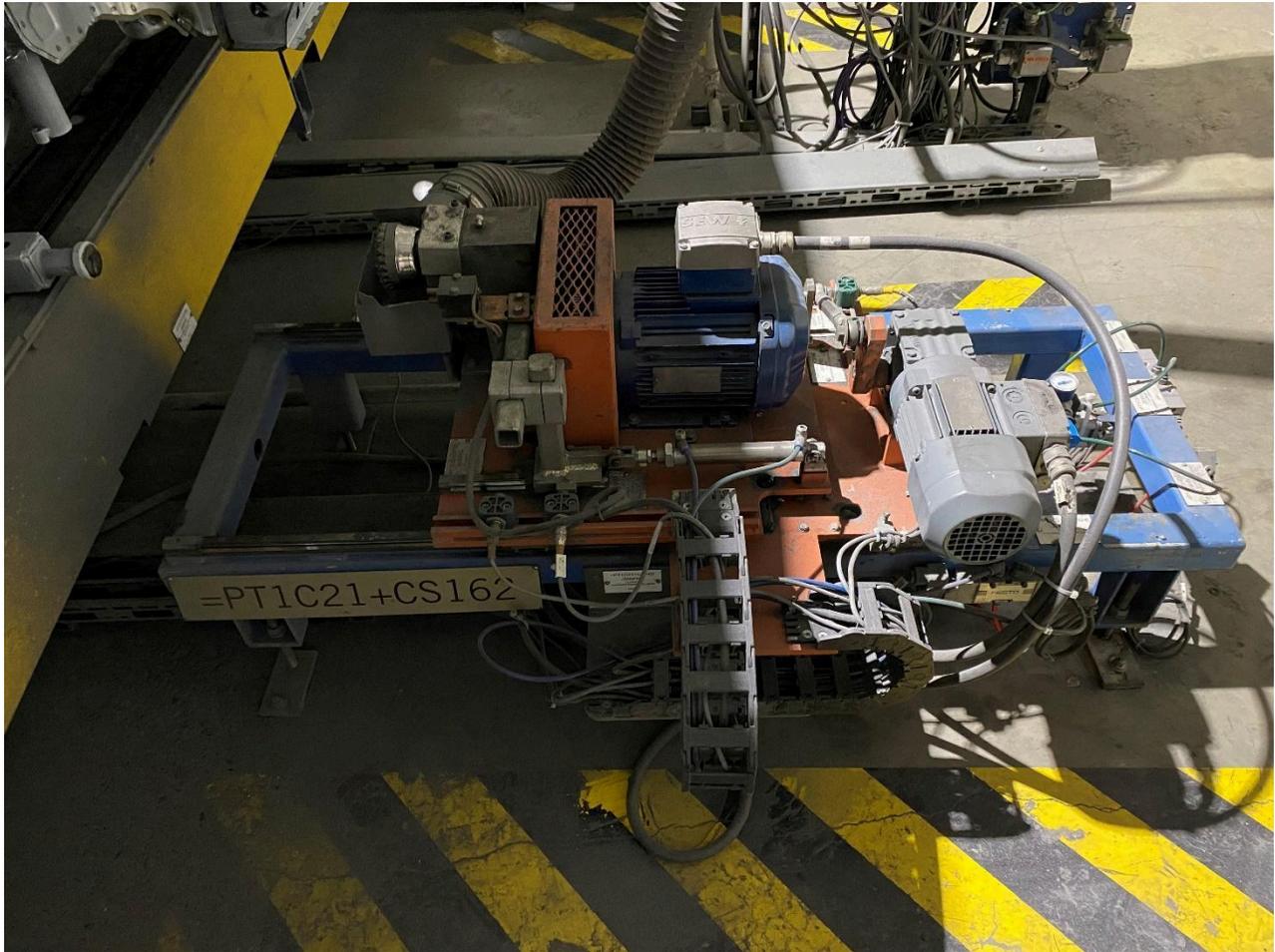


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