INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	*DEHN, Inc.*	**Date Submitted**	*10/09/2024*
Project Title	*Design and Build of a Smart Clear Safety Box for 9222 PDU tester in production (DEHN_SAFE)*	**Planned Starting Semester**	*Spring 2025*

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	1-2
Computer		Systems	

Company and Project Overview:

DEHN is a German company specializing in electrical protection, safety equipment, and surge protection systems. Founded in 1910, the company is headquartered in Neumarkt, Bavaria. DEHN focuses on providing innovative solutions for lightning protection, surge protection, and safety systems across various industries, including energy, infrastructure, and communications.

DEHN's product range includes surge protective devices (SPDs), lightning protection components, earthing systems, and personal safety equipment. The company also offers services like risk analysis, training, and system maintenance. DEHN is known for its research and development in energy management and safety technology, aiming to improve energy efficiency and operational reliability for its clients worldwide.

The company operates globally, with subsidiaries and partners in numerous countries, including the USA Headquarters in Mooresville, NC recently opened, making it a key player in the field of electrical protection solutions. Access Website for Catalogs and products: https://www.dehn.us/en-us

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SPD Examples

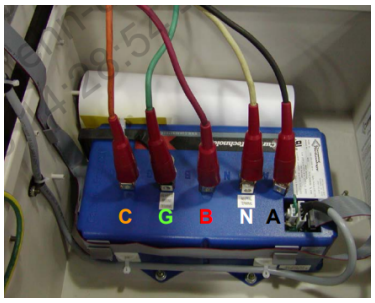
For this project, we plan to start the process of updating, modernizing, and automating testing of SPDs at the production line moving soon from Richmond, VA to Mooresville, NC (February 2025). This is one of four types of old analog testers used to verify the proper work of surge protection devices (SPDs) we assemble for our customers, providing the final OK before shipping.

Project Requirements:

1. **Project Overview**

The goal of this project is to design and deliver a clear plexiglass hinged covered safety box, to safely and reliably connect SPD (Surge Protection Device) single or 3-phase in fabrication onto the existing PDU (Power Distribution Unit) tester used in the production line.

The new box will provide the legacy testing system (PDU tester #: WI-PDU-KD-0053, rev. 2) with a safe enclosure to apply the high-voltage steps required to verify the proper function of manufactured SPDs while incorporating updated technology, improved functionality, and enhanced safety measures.



Picture 1: Existing PDU Tester

Picture 2: Potential design of box to be provided

Picture 3: SPD under test

2. Scope of Work

The project scope includes the design, development, testing, and documentation of the clear plexiglass safety box for the PDR tester with the following features:

a. Overall box dimension: 40” W x 28” D x 12” H on the back (8” H on the front)
b. Front and top covers of the box should be hinged to slide heavy SPDs under test and then close the box
c. Sides and cover must be provided in clear Plexiglas to observe unit visually while under testing
d. Bottom of box should be of non-conductive material, like Bakelite, plexiglass, or rubber covered material to withstand high-voltages up to 600 volts/phase
e. Safety switch to detect a cover is open must stop or reset testing
f. If covers are open, the high-voltage applied to the SPD should be cut-off for safety reasons to protect the technician or user
g. Red light should be provided on the box to indicate high-voltage is present while SPD unit is under testing
h. Cables and connectors to feed the box will be provided by team. A single modified port with a new harness will be preferable under the new design to consolidate all connections. Alternatively, the same power port today with a new hardness, plus a separate connector for low voltages and signals to the new box could be used.

Note: Access to modify the interconnect output port with the alligator clips,. as shown on Picture #3, will be provided. Additionally, any signal or power source to feed functions on the box will be available from PDU tester.

3. **Deliverables**

The following will be provided for the “Smart Clear Safety Box for 9222 PDU Tester” upon project completion:

- **Design Documentation**:
  - 2D mechanical drawings
  - 3D models (if available)
  - Bill of Materials (BOM)
- **User Documentation**:
  - User instructions for operation and maintenance

4. **Regulatory Compliance**

- The system must meet all relevant industry standards and safety regulations for electrical testing and personnel protection in a production environment.

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. 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):

- None.