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# PROJECT IDEATION

**Project Title: Trumpf – TruBend 3000 Series Bending Press Machine 'Automated Bending Aid'**

**Project Description:** *Please provide a description of the problem to be addressed and clearly indicate the value addition in your proposed project when compared to existing solutions. If you already have an approach to solving the proposed problem, include it in your response.*

Siemens Engineering Company Limited is an engineering and financial services corporation headquartered in Karachi, Sindh, Pakistan. It has multiple regional offices all over the country. In the last decade, Siemens has shifted its business model initially focused on Energy Management to Digitalization incorporating IoT (Internet of Things) with emphasis on automation. MS (Medium voltage and System) division is responsible for the production of Medium and Low voltage switchgears. Complete switchgear body is manufactured using Punch machines and Bending press machines. 8BD4, medium voltage panel is one of the most popular switchgear in Pakistan, it requires large sized (like 2440x1220 cm) CRC and galvanize sheets to be transformed into different shapes as per customized engineering designs. We propose a cost effective technique to equip 3000 series bending press machine with bending aid to enhance the efficiency of the bending process resulting in increased productivity and added safety precautions. Bending aid serves as a support to the CRC and galvanize sheets during the bending process. The bending aid can be implemented through numerous techniques, such as using servo motors, hydraulic pumps or pneumatic pistons, calibrated using a microcontroller for precision of the angle of elevation, interconnected with controller's crystal oscillator for the calculation of the number of bending cycles against time and distance sensors for automation, keeping safety measures in record along with surveillance through live wireless video transmission for the supervisor to his/her workstation.

**Project Motivation:** *Please describe your motivation for undertaking this project.*

In order to bend large CRC and galvanize sheets, technician require at least two helpers. TruBend 5000 series bending press machine have a bending aid but it is very expensive compared to the 3000 series bending press machine. In Siemens production line, two TruBend 3000 series bending press machines are used. Four helpers (two helper on each machine) are required to provide manual support in the bending process of two machines and estimated annual expense for each labor is **Rs 600,000/-** therefore by automation of this process will result in cutting down company's expense of **Rs 2,400,000/- annually.**

**Expected Deliverable:** *List all the expected tangible outcomes at the end of this project.*

Expected deliverable for this project is a working industrial grade robotic arm/bending aid support which will be implemented at Siemens - MS (Medium voltage & Systems) production line to Trumpf – TruBend 3000 series bending press machine.

**Skills Needed:** *Mention skills set you believe are needed to successfully complete this project.*

- Mechanical design creation and implementation
- Hands on experience with microcontrollers/microprocessors (ESP32, Arduino & Raspberry Pi)
- Hands on experience with hardware and building tools
- PCB designing, soldering and welding
- Programming in C and Python

**Specific Course Requirements:** *Are there any courses (already offered or to be offered in future) in specific that you believe will help you in successfully completing this project.*

1. EE 391 – Engineering, Innovation & Design
2. ME 431 – Engineering Materials
3. EE 361 – Principles of Feedback Control
4. EE 375 – Microcontroller & Interfacing
5. EE 442 – Embedded Systems
6. EE 424 – Data Communication & Networks

**Proposed Group Members:** *Provide majors of group members in brackets.*

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**Proposed Faculty Adviser:** *University faculty member.*

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**External Adviser:** *Industrial supervisor.*

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