



ITE COLLEGE CENTRAL
SCHOOL OF ENGINEERING

TED

Technical Engineer Diploma
in Machine Technology

PROJECT FAIR 2020

Final Year Project Showcase

27 February 2020

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ABOUT

TED PROJECT FAIR

The Technical Engineer Diploma (TED) in Machine Technology Project Fair is an annual event that showcases the completed Final Year Projects (FYP) of the graduating TED students to industry partners, employers and guests.

The graduating TED students have been engaged in product design and development for the last nine months, covering all aspects including brainstorming and conceptualisation, design and production as well as pitching and presentation of their projects. The end-products that you are viewing at the fair today are the culmination of the TED students' effort and hard work.

The TED Project Fair is a key component of the "Staatlich Geprüfter Techniker" (State Certified Technical Engineer) course offered by our collaboration partner, Gottlieb-Daimler-Schule 1, Baden-Württemberg, Germany.

We thank you for your support and attendance at the TED Project Fair 2020.

HOLD-FAST GATE AND GRIPPER

Project developed in collaboration with
Aluputer Industrial Pte Ltd



Members

Muhamad Hidayat Bin Rahiman
(Project Leader)
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Jayancy Shalini D/O Thomas
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Supervisor

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Synopsis

Aluputer Industrial requires a total of 11 workers to execute an anodising process. Each cycle takes at least seven minutes to be completed. The jiggging process requires at least three workers, while un-jiggging requires four workers and another four workers are needed to handle the trolleys. To unjig, workers use a single gripper to move the cylinders from the rack to the box because of chemicals coated on the outer side of the tubes.

Innovation

By creating a device that could hold down all the locking-springs at the same time, the workers are able to work at a faster pace. The team also designed a gripper that can hold on to six pieces at one time to accommodate the box which has a six by 12 configuration.

Benefits

- Increased productivity
- Reduced cycle time (From seven to four minutes)
- Manpower savings (From eleven to six workers)



PART COLLECTOR FOR A SPRING COILING MACHINE

Project developed in collaboration with
BAUMANN Spring Co (S) Pte Ltd



Members

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(Project Leader)
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Supervisor

Mr Toh Nam Hor

Synopsis

On the production floor at Baumann Spring, parts produced by coiling machines are collected using polyethylene bags. When a pre-set quantity is reached, the machine stops automatically, the operator will then replace the filled bag with an empty one and restart the machine. This results in frequent start-stops in the production cycle.

Innovation

The team designed a PLC-driven mechanised collector system which comprises a funnel with six containers. When one container is filled, it automatically switches to the next. When the fifth container is filled, a tower lamp and buzzer is activated to alert the operator to replace the filled containers. This allows the process to continue without stoppage.

Benefits

- Minimized downtime
- Increased productivity



SMART PRE-ASSEMBLY KIT PACKING STATION

Project developed in collaboration with
Carrier Transicold (S) Pte Ltd



Members

Jerome Nathaniel Goh
(Project Leader)
Tan Wei Xiong Bernard
Yah Qin Feng
Lim Ee Kuang

Supervisor

Mr Yeo Hock Jin, Andrew

Synopsis

The current process requires the operator to pick and pack the correct quantity of parts based on the recipe list provided. The process is susceptible to counting error.

Innovation

The team created a digital display that indicates the correct quantity of each part to be packed.

To minimise the frequency of packing errors, the team designed a PLC-driven mechanism with the ability to set a customised quantity for each part. This helps the operator in the packing process.

Benefits

- Increased productivity
- Reduced human errors



SMART PRESSURE INJECTOR

Project developed in collaboration with
Carrier Transicold (S) Pte Ltd



Members

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(Project Leader)
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Supervisor

Mr Davydd Chew Khong Lim

Synopsis

At Carrier Transicold, workers inject nitrogen gas into an enclosed air con pipe/vessel manually by monitoring a pressure gauge and subsequently closing the valve. As a result, human error can occur. In addition to eliminating error, the company wanted to track the pressure injected for process monitoring.

Innovation

The team combined sensors and pneumatic control systems with data acquisition capability to set up a system to inject the nitrogen gas with continuous pressure monitoring. Gas injection automatically stops when the required pressure is attained. When the pressure is too low, there is a system to alert workers. Data for each pressure injection will be recorded for process analysis.

Benefits

- Increased productivity
- Reduced human errors
- Collection of data for analysis



THREE-PHASE INDUCTION MOTOR CHARACTERISATION

Project developed in collaboration with
Kim Sin Medicine Manufactory Pte Ltd



Members

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Supervisors

Ms Linda Lim Chiok Kia
Mr Chin Hon Cheong

Synopsis

The company uses a grinder, driven by a three-phase single-speed induction motor, to grind medicinal herbs. If the operator overfills the grinder, it will stall.

Innovation

The team conducted a study on the impact of current or voltage on the motor when it is overloaded.

An inverter and a transducer were used to adjust the speed and monitor the current of the motor respectively. The data was analysed to study possible trends and relationships. The company plans to use the outcome of the study to automate the grinding process.

Benefits

- Increased productivity
- Reduced rate of motor downtime



APPLICATIONS OF 3D METAL PRINTING

In-house project



Members

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(Project Leader)
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Supervisor

Dr Goh Chwee Sim

Synopsis

3D metal printing can be applied to different niche applications for various industries. The team established the capability of the 3D metal printer, by characterising the properties of several metal printed parts and fabricating different types of 3D printed parts. The team also conducted mechanical testing on printed specimens, using different parameters to determine the tensile and hardness properties of the materials.

The results on the mechanical properties can be used for both functional and structural applications in the future.

To demonstrate the competence of the 3D printing process, the team fabricated various complex 3D printed parts such as musical box mechanisms.

Benefits

- Establishment of 3D printing capability
- Fabrication of complex parts using 3D metal printing



SEMI-AUTOMATED BARREL CLEANING FIXTURE

Project developed in collaboration with Mitsubishi Overseas Headquarters Pte Ltd



Members

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Supervisors

Mr Ramanath S H
Mr Ricky Tan Yuan Sheng

Synopsis

Barrels are used in compression moulding to manufacture rubber belts used for mechanical power transmission. The barrels, heated to 120°C, are rotated on a fixture with mounted rollers and are simultaneously scrubbed clean. This process of ensuring moulded belt quality is carried out periodically by using a chemical to remove residual slags.

Innovation

A previous project team had completed the first phase of redesigning the fixture design with motorised rollers to eliminate manual barrel rotation. As part of the second phase, the current project team designed a roller brush mechanism to effectively clean various barrel sizes with minimal human involvement.

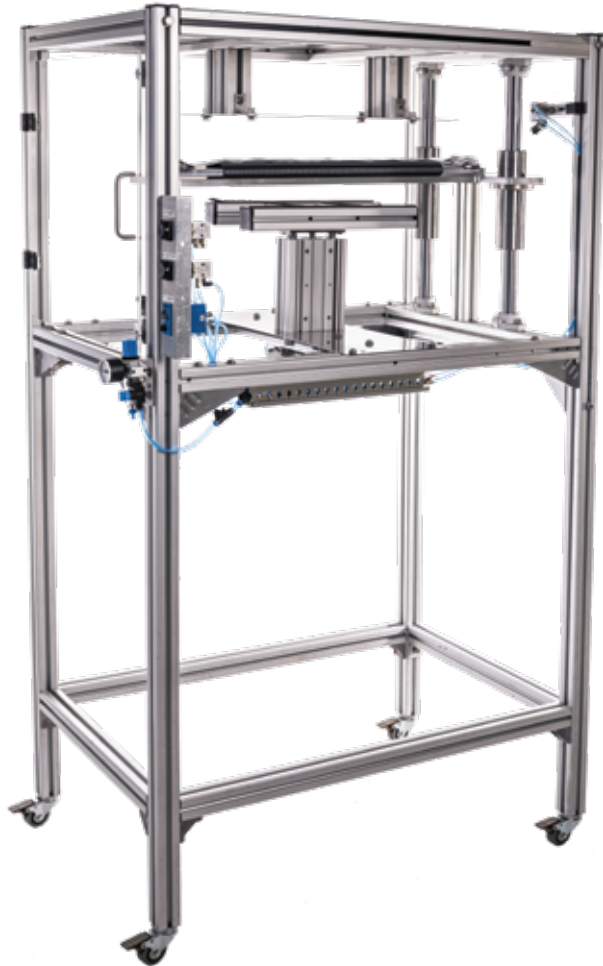
Benefits

- Reduced human fatigue
- Increased productivity
- Improved safety



SLEEVE MARKING FIXTURE

Project developed in collaboration with
Mitsuboshi Overseas Headquarters Pte Ltd



Members

Tan Heng Yi
(Project Leader)
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Qusyairi Bin Yuszri
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Supervisor

Mr Tan Chee Keong

Synopsis

In the current belt marking printing process, operators manually place heat transfer films on the belt sleeves. The operator will visually align film on the sleeve in between two plates on the printing fixture, one of which is heated to 110°C. This leaves the operator susceptible to burn injury. On top of that, production yield is not ideal.

Innovation

The team designed a film-holding fixture that aligns the film accurately and consistently. The film-holding fixture can be taken out from the printing fixture so that placement of the films can be done in a safe environment.

Benefits

- Increased productivity
- Increased safety



SLIDE OPEN SHOWCASE

Project developed in collaboration with
Trika(S) Pte Ltd



Members

Ting Hong Bin
(Project Leader)
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Supervisor

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Synopsis

A traditional wall-mounted window-framed product showcase usually has a front door that pivots at 90 degrees with a side-hinge opening. This poses a problem for the arrangement of display items, especially expensive ones like jewellery and watches. When the door is open, it obstructs the display artist and leaves the items vulnerable to snatch theft. Securing the top section of the door is particularly difficult with taller showcase units.

Innovation

The team designed a hidden slide-out mechanism that allows the base section of the showcase to slide downwards and swing open in one swift, smooth and uninterrupted movement. This turns the rear display back wall into a slide-out display tray, thus eliminating the need for a swing door and hinges.



ANTI-WRINKLE FOLDING MECHANISM

Project developed in collaboration with
Process Innovation Technology SEA Pte Ltd



Members

Choo Hwee Peng (Project Leader)
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Supervisor

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Synopsis

The company die-cuts single-sided adhesive polymeric gaskets. To prepare the die-cut materials, rectangular polymeric sheets are roller-pressed to a sticky tape. The pressed sheets are then dropped in a zig-zag manner into a box placed after the roller. When the stack works its way to the top of the box, the pressed sheets may start to entangle.

Innovation

The team designed a fixture to guide the pressed sheets to the box in a consistent manner. The fixture also incorporated a sensor to alert the operator when the box is full.

Benefits

- Increased productivity
- Improved quality of work piece produced



SPINSHOT TENNIS BALL COLLECTION UNIT

Project developed in collaboration with
Spinshot Singapore



Members

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(Project Leader)
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Jerald Chua Qing Rong
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Supervisor

Mr Lorenz Lam

Synopsis

Tennis ball machines are designed to assist coaches and players during training and allow players to play without a partner. The ball machine shoots out balls in sync with pre-set directions within the tennis court compound. At the end of each playing session, manual nets are used to retrieve the scattered tennis balls in the court. This has been a long-standing problem.

Innovation

The team designed a tennis ball collector that also doubles up as a trolley for the ball machine. After each training session, the coach / player will be able to collect and load a hundred balls into the device for smoother and seamless transportation back to the service line.

Benefits

- Reduction of ball-picking time
- Reduced fatigue and prevention of back injury
- Increased portability



ENCLOSURE DESIGN FOR ENVIRONMENTAL MONITORING SYSTEM

Project developed in collaboration with
Shanghai Technician School



Members

Team ITE:
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Mr Li Pan

Synopsis

This is the third collaborative project between the ITE Technical Engineer Diploma in Machine Technology programme and the Shanghai Technician School (STS). The team from STS developed a cloud-based intelligent environmental monitoring system to detect the concentration of pollutant gases in the factory.

In this joint project, the TED team designed an enclosure for the system which can be wall-mounted.

Benefits

- Ensures safe working environment



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- Selfpac3D Pte Ltd
- Tan Tan Kit – Lien Tiny Chest

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