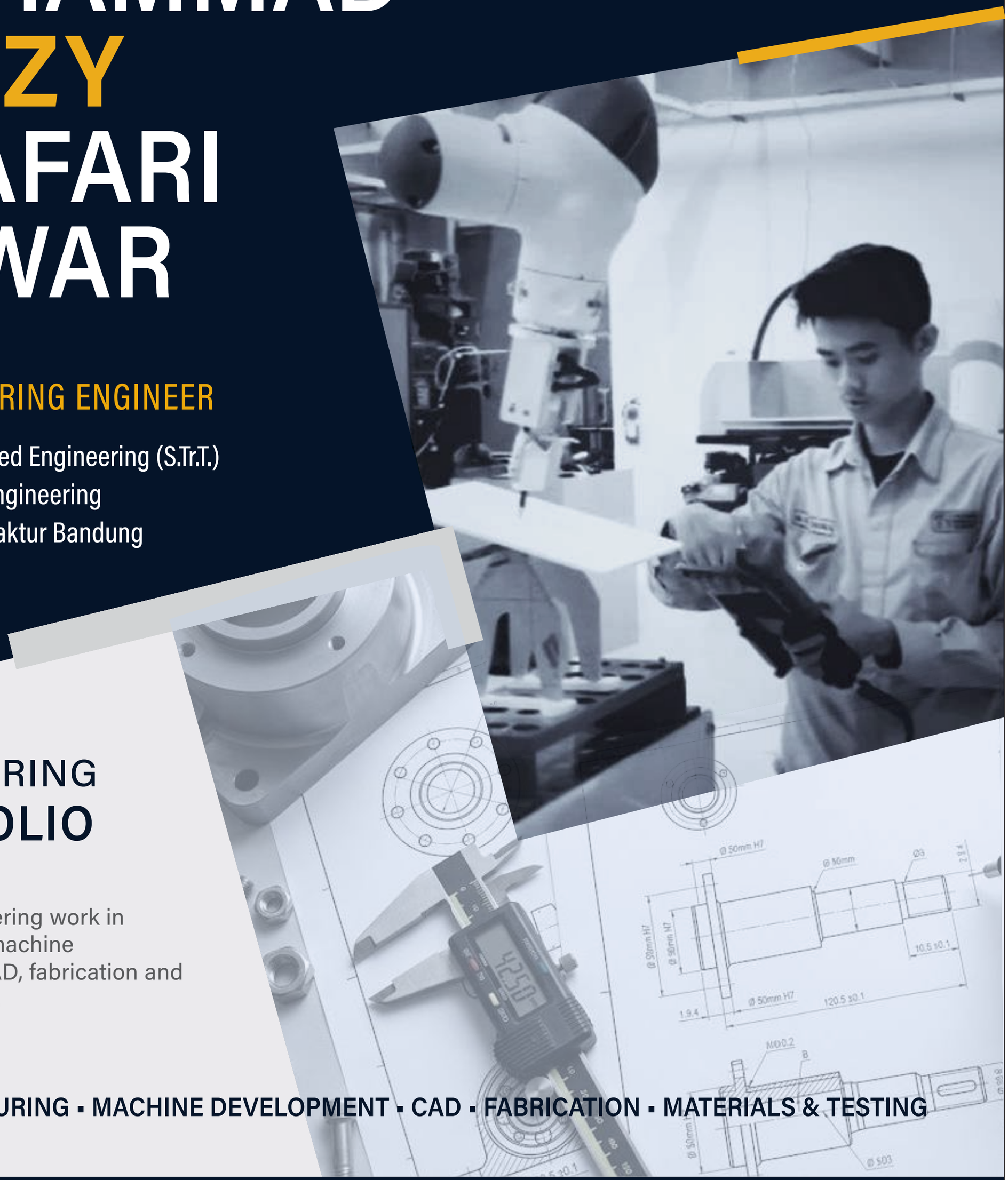
MANUFACTURING ENGINEERING GRADUATE
POLITEKNIK MANUFAKTUR BANDUNG

MUHAMMAD HIRZY ZHAFARI ANWAR

MANUFACTURING ENGINEER

Bachelor of Applied Engineering (S.Tr.T.)
Manufacturing Engineering
Politeknik Manufaktur Bandung

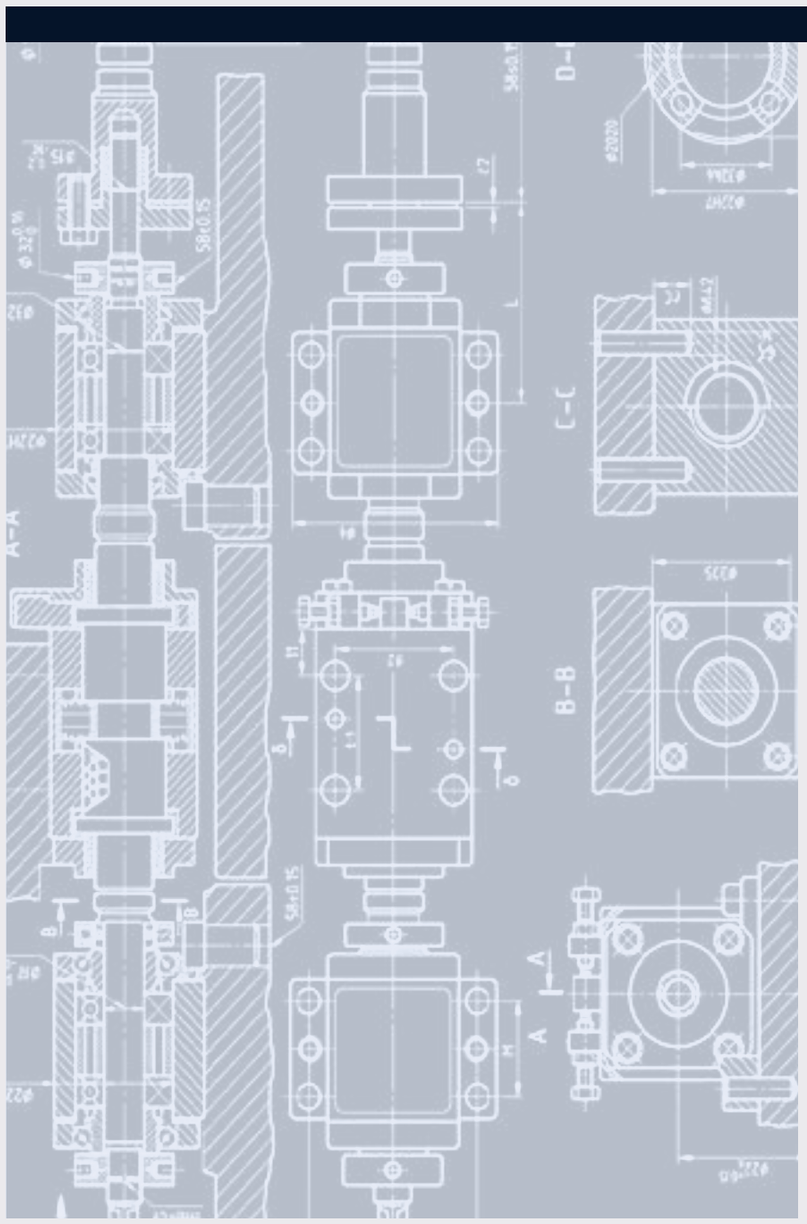


ENGINEERING PORTFOLIO

Selected engineering work in manufacturing, machine development, CAD, fabrication and materials testing.

MANUFACTURING ▪ MACHINE DEVELOPMENT ▪ CAD ▪ FABRICATION ▪ MATERIALS & TESTING

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CONTENTS

01 | PROFILE 03
Professional Identity ▪ Engineering Capability

02 | EXPERIENCE 04
Automotive Manufacturing Experience ▪ Inchcape

03 | PROJECTS 05
PALF Composite Development
Geophory — Hand Lay-Up Machine
Waste-Oil Incinerator

04 | PRACTICE 08
Manufacturing & Technical Practice

05 | TEAM 09
Teamwork & Leadership

06 | CREDENTIALS 10
Education & Certifications

07 | CONTACT 11
Contact & Professional Links

01 | PROFILE

PROFESSIONAL IDENTITY



MANUFACTURING ENGINEER

Manufacturing Engineering graduate from Politeknik Manufaktur Bandung with practical experience across automotive manufacturing, CAD, fabrication, machine development, materials development and testing.

Experience includes supporting production and engineering activities, developing technical documentation, working with manufacturing equipment, and contributing to engineering projects from preparation and fabrication through testing and evaluation.

ENGINEERING CAPABILITY

MANUFACTURING

- CNC Machining
- Manufacturing Processes
- Process Planning
- Fabrication
- Mechanical Assembly

ENGINEERING DESIGN

- Siemens NX
- SolidWorks
- 3D Modelling
- Technical Drawing
- Machine Development

MATERIALS & TESTING

- Composite Materials PALF
- Hand Lay-Up
- Tensile Testing
- Density Testing
- Microstructural Observation

QUALITY & MEASUREMENT

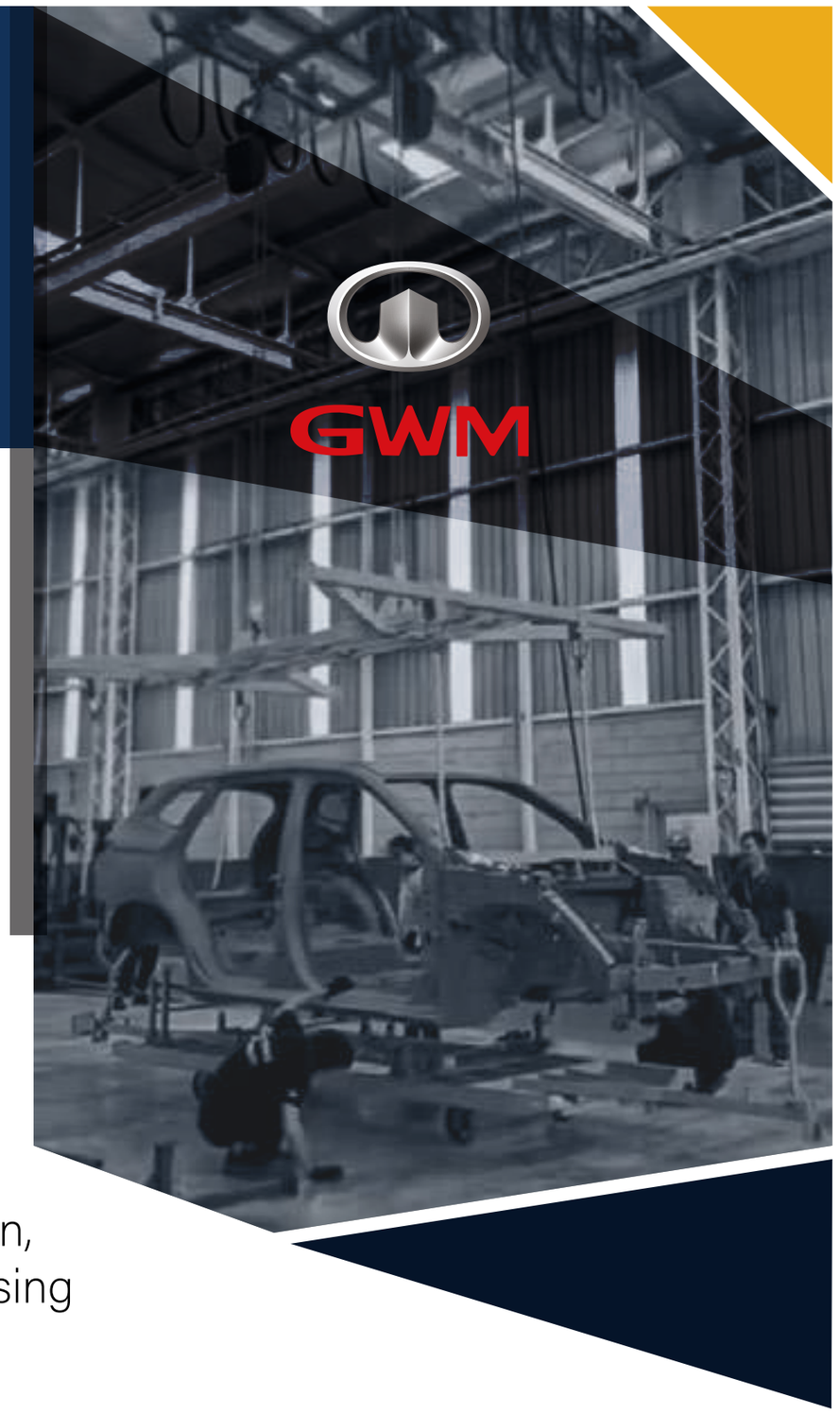
- Industrial Metrology
- Measurement
- Inspection
- Quality Inspection

ENGINEERING DOCUMENTATION

- Work Instructions
- Technical Documentation
- Data Processing
- Data Verification
- Engineering Reporting

02 | EXPERIENCE

AUTOMOTIVE MANUFACTURING



PT INCHCAPE INDOMOBIL ENERGI BARU

Manufacturing Engineering Intern — Automotive Engineering

Jan 2025 – Jul 2025 Wanaherang, Bogor, Indonesia

OVERVIEW

Supported production, engineering, quality control, and administrative activities within an automotive manufacturing environment, with practical exposure to technical documentation, data processing, inspection, assembly, and basic CAD design using Siemens NX.

PRODUCTION

- Production Planning & Coordination
- Production Process
- Inventory Management

ENGINEERING

- CAD & Technical Drawing
- Technical Review
- Engineering Documentation

QUALITY

- Inspection
- Data Verification
- Quality Control

OPERATIONS

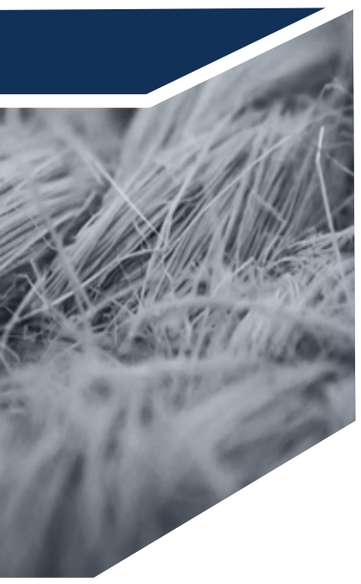
- Assembly
- Documentation
- Data Processing

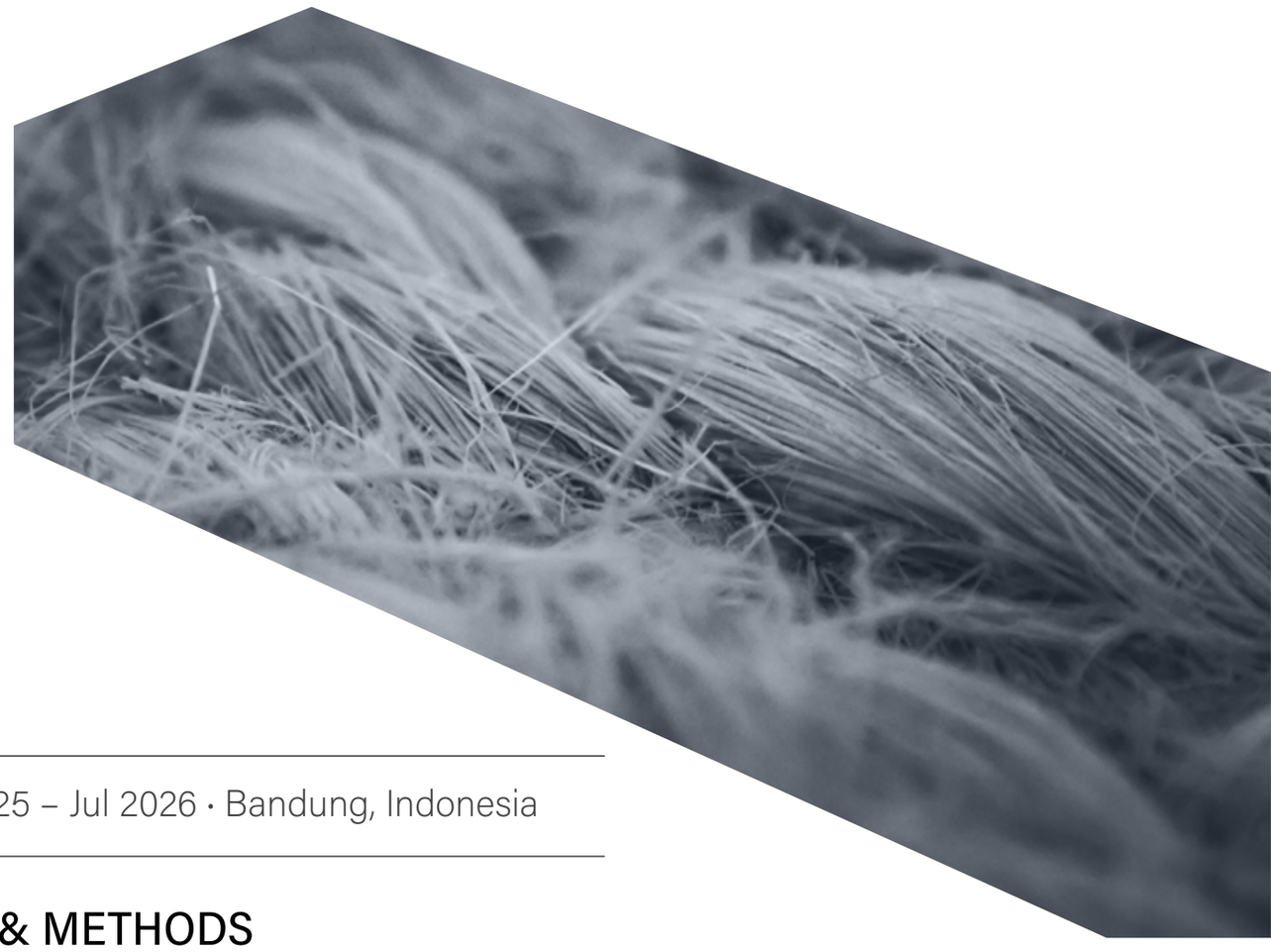






03 | PROJECTS





PROJECT 01

PALF COMPOSITE DEVELOPMENT

Development of PALF/Epoxy Composites for Electric Vehicle Interior Applications

Final Project & Research Publication | Dec 2025 – Jul 2026 · Bandung, Indonesia

CONTEXT

Development of pineapple leaf fiber (PALF)-reinforced epoxy composite using agricultural-waste material for potential application in non-structural electric vehicle interior components.

THE ENGINEERING QUESTION

Does increasing laminate number from 3 to 5 improve tensile performance under hand lay-up fabrication?

MY CONTRIBUTION

- Investigation
- Specimen Preparation
- Tensile Testing
- Data Collection & Analysis
- Data Visualization
- Writing — Original Draft

These contributions are documented in the final manuscript.

PROCESS & METHODS

01 FIBER PREPARATION
PALF cleaning, drying, cutting and 5% NaOH treatment.

02 COMPOSITE FABRICATION
Hand lay-up with controlled fiber placement, resin impregnation and roller consolidation.

03 SPECIMEN PREPARATION
Specimens prepared with reference to ASTM D3039

04 MATERIAL TESTING
Tensile testing and density testing with supporting dimensional measurements.

05 MICROSTRUCTURAL OBSERVATION
Optical microscopy at 100× magnification.

06 DATA ANALYSIS
Descriptive statistics, Shapiro–Wilk, Levene's test and Welch's ANOVA.

The fabrication procedure includes 5% NaOH treatment for 2 hours, 30:70 fiber/resin volume fraction, and room-temperature curing.

TESTING SETUP

10	5	5
SPECIMENS	3-Lamina	5-Lamina

Universal Testing Machine (UTM)
ASTM D3039 Reference

MATERIAL SYSTEM

PALF / EPOXY

- 30% Fiber Volume Fraction
- 70% Resin Volume Fraction
- ±45° Fiber Orientation
- 3-Lamina Configuration
- 5-Lamina Configuration
- Hand Lay-Up Manufacturing





03
PROJECTS

PROJECT 01
PALF COMPOSITE DEVELOPMENT

Development of PALF/Epoxy Composites
for Electric Vehicle Interior Applications



TENSILE STRENGTH (UTS)

3-LAMINA	5-LAMINA
29.32 MPa	26.37 MPa

Observed mean difference:

2.95 MPa

5-lamina group approximately **10.06% lower**

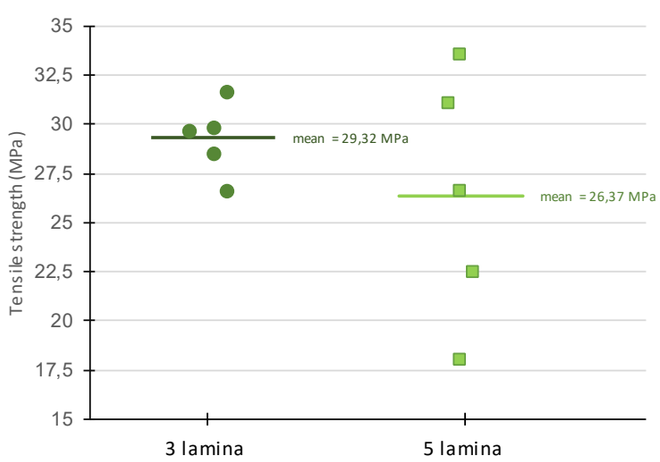
The difference is descriptive only and was not statistically significant.

VARIABILITY

Parameter	3-Lamina	5-Lamina
UTS Range	26.72–31.70 MPa	18.06–33.56 MPa
Variance	3.3857	39.476
Coefficient of Variation (CV)	6.28%	23.83%

The 5-lamina configuration showed substantially greater specimen-to-specimen variability.

STATISTICAL RESULT



ADDITIONAL MECHANICAL RESULTS

WELCH ANOVA

F = 1.015
p = 0.363
α = 0.05

YIELD STRENGTH

3-Lamina — 21.79 MPa
5-Lamina — 11.04 MPa

ELONGATION

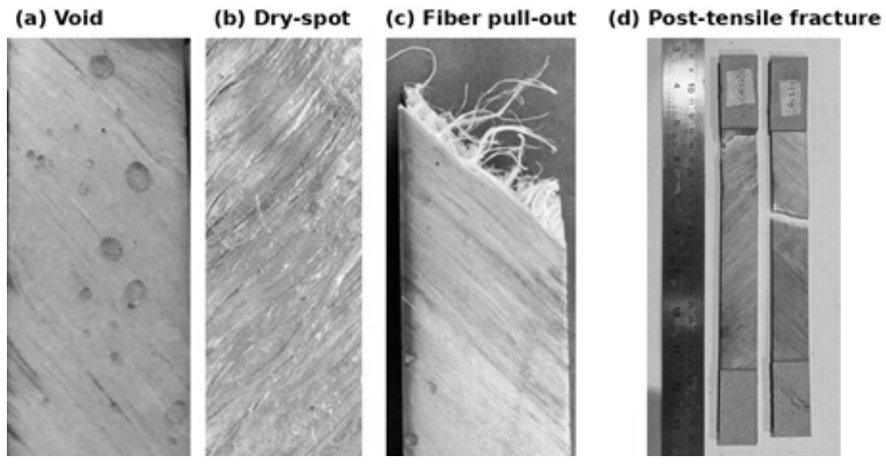
3-Lamina — 2.58%
5-Lamina — 5.49%

These values are presented descriptively, because no corresponding inferential test is documented in the source.

NO STATISTICALLY SIGNIFICANT DIFFERENCE

The measured tensile-strength difference between the 3-lamina and 5-lamina configurations was not statistically significant.

FAILURE-RELATED OBSERVATIONS



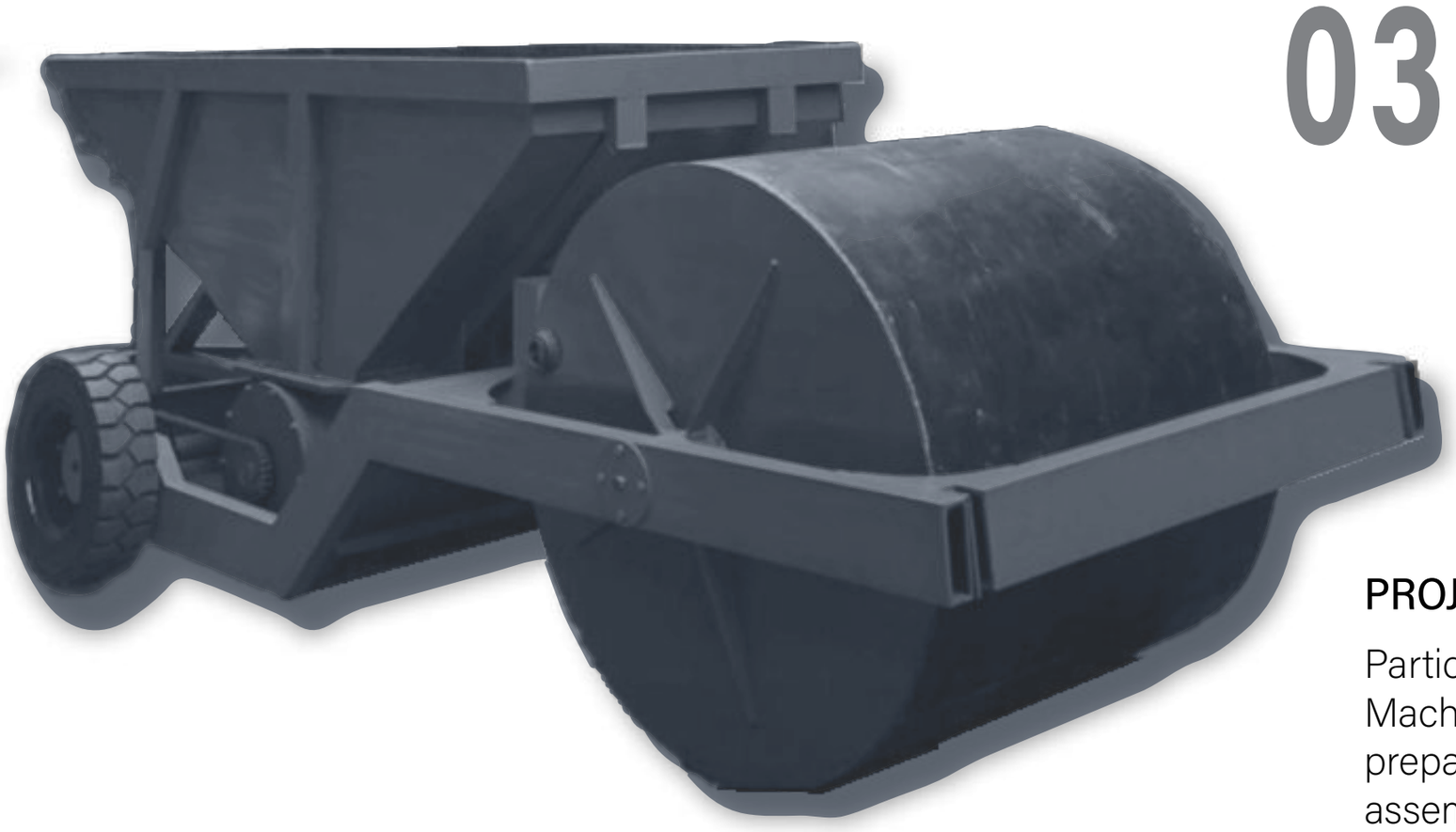
These observations are treated as possible contributors to the observed variability, rather than proven causal mechanisms.

ENGINEERING INTERPRETATION

Increasing the laminate number from 3 to 5 did not produce a statistically confirmed increase in tensile strength under the investigated hand lay-up conditions.

The 5-lamina configuration exhibited substantially higher variability, while the observed microstructural features provide possible explanations that require further investigation.

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03 | PROJECTS

PROJECT 02
GEOPHORY LAY-UP MACHINE

Machine Development Project

Aug 2024 – Dec 2024 • Bandung, Indonesia

PROJECT OVERVIEW

Participated in the development of a Geopori Lay-Up Machine, gaining hands-on experience in process preparation, equipment setup, fabrication, mechanical assembly, functional testing, and evaluation.

PROJECT FOCUS

Development of a Geopori Lay-Up Machine to support the laying process of geopori material, with hands-on experience in machine development, fabrication, assembly, and testing.

MACHINE DEVELOPMENT
Equipment development and setup

MANUFACTURING
Fabrication and mechanical assembly

TESTING & EVALUATION
Functional testing and process evaluation

ENGINEERING SCOPE

PROCESS PREPARATION
Preparation of materials, equipment and manufacturing process.

01 **FABRICATION**
Fabrication activities supporting machine development.

02 **MECHANICAL ASSEMBLY**
Assembly of machine components and mechanical structures.

03 **EQUIPMENT SETUP**
Equipment setup for the geopori laying process..

04 **FUNCTIONAL TESTING**
Testing machine operation and process functionality.

05 **EVALUATION & IMPROVEMENT**
Evaluation and participation in process-improvement activities.





ENGINEERING EXPERIENCE

Manufacturing Process
Hands-on exposure to the manufacturing process through machine development activities.

Mechanical Fabrication
Practical involvement in fabrication and assembly of machine components.

Machine Operation
Experience with equipment setup and functional testing.

Process Improvement
Participation in evaluation and improvement activities.



MY CONTRIBUTION

- Material & equipment preparation
- Process preparation
- Fabrication
- Mechanical assembly
- Equipment setup
- Functional testing
- Evaluation & improvement



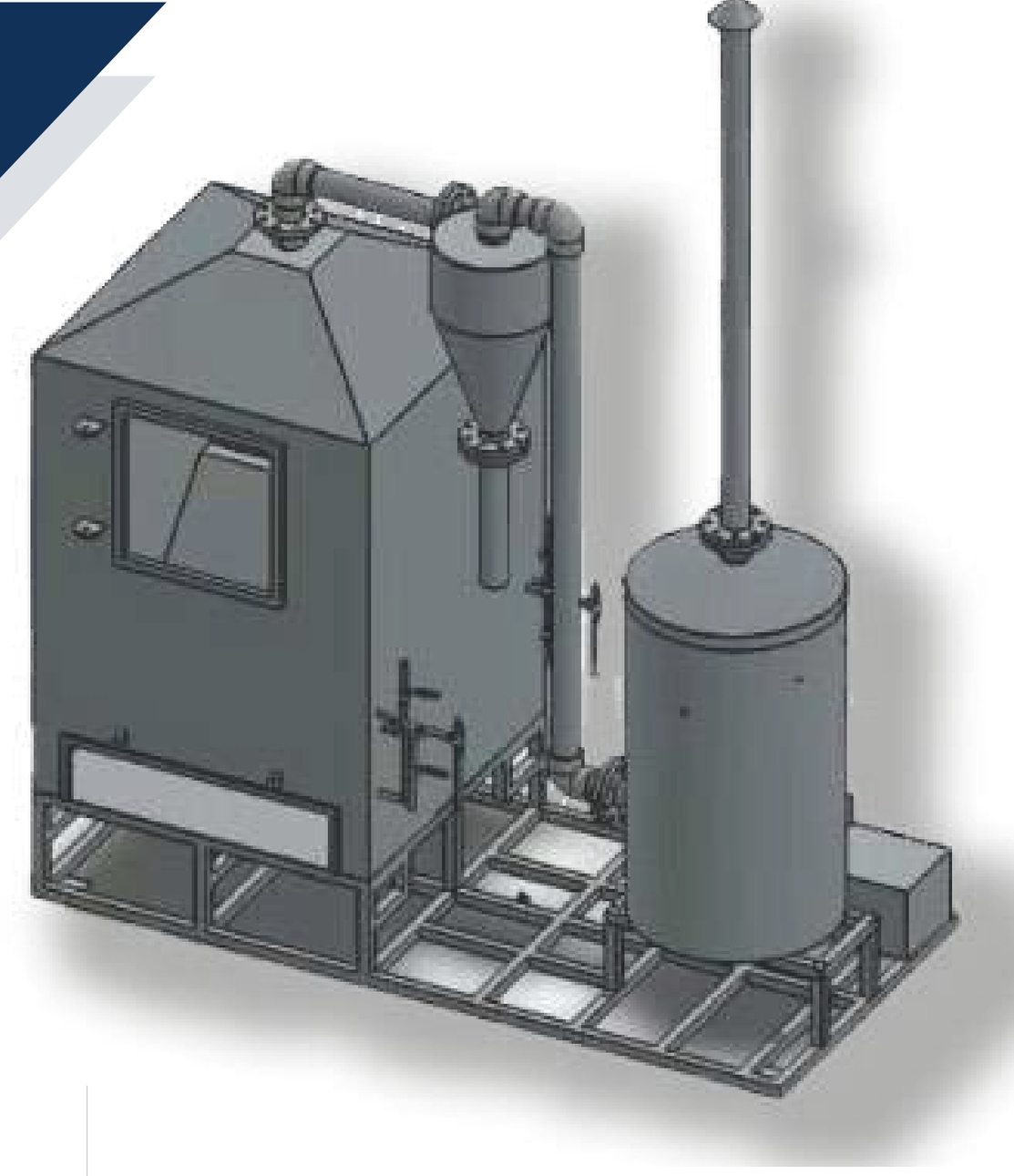
03 | PROJECTS

PROJECT 03

INCENERATOR MACHINE

COMBUSTION & AIR EMISSION CONTROL

Aug 2025 – Nov 2025 · Pangalengan, Indonesia



PROJECT OVERVIEW

Developed a waste oil combustion incinerator integrated with a wet scrubber system for air emission control. The project covered system design, fabrication, assembly, and testing, with a focus on improving combustion efficiency and reducing pollutants from exhaust gases.



ENGINEERING SCOPE

01 **SYSTEM DESIGN**
Development of the incinerator and air emission control system.

02 **FABRICATION**
Fabrication of machine and system components.

03 **MECHANICAL ASSEMBLY**
Assembly of the incinerator and wet scrubber system.

04 **SYSTEM TESTING**
Testing of system operation and functionality.

05 **EVALUATION**
Evaluation of system performance and project results.

06 **TEAMWORK**
Process with the team.

PROJECT FOCUS

INCINERATOR SYSTEM
Waste oil combustion system

AIR EMISSION CONTROL
Wet scrubber system

MACHINE DEVELOPMENT
Design, fabrication, assembly & testing

ENGINEERING EXPERIENCE

Thermal Systems
Practical exposure to thermal systems and combustion technology.

Mechanical Fabrication
Hands-on experience in fabrication and assembly activities.

Air Emission Control
Exposure to wet scrubber integration for exhaust-gas treatment.

System Testing
Experience in system testing and evaluation.

MY CONTRIBUTION

System design
Fabrication
Assembly
Testing
Evaluation
Team-based project activities

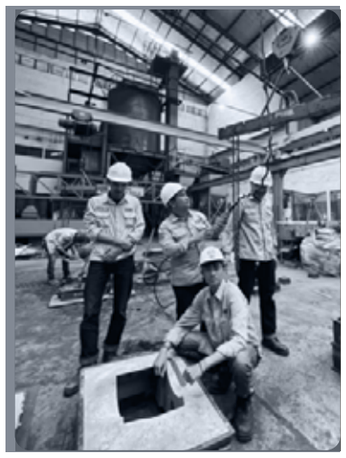


04 | PRACTICE

MANUFACTURING & ENGINEERING PRACTICE

PRACTICAL SKILLS • ENGINEERING SOFTWARE • PERSONAL CAPABILITIES

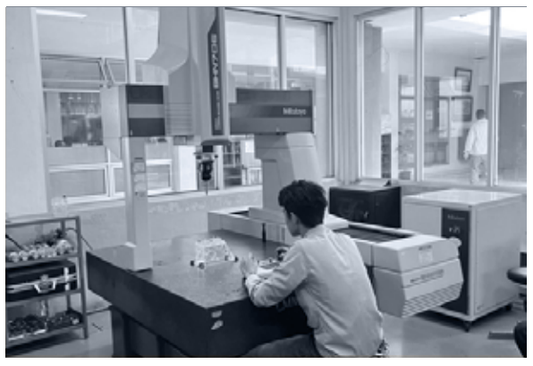
01 PRACTICAL MANUFACTURING SKILLS






MANUFACTURING PROCESSES

- CNC Machining & Programming
- Injection Molding
- Manufacturing Process Planning
- Welding & Fabrication
- Mechanical Assembly

ENGINEERING & QUALITY

- CAD Modeling
- Technical Drawing Interpretation
- Industrial Metrology
- Measurement
- Quality Inspection

PRACTICAL APPROACH

Hands-on practice in machining, molding, fabrication, assembly, and manufacturing process activities.

02 ENGINEERING SOFWARE CAPABILITIES

CAD AND 3D DESIGN SOFTWARE

PLM Software SIEMENS NX

- 3D Modelling
- Engineering Design
- Technical Drawing

SOLIDWORKS

- 3D Modelling
- Mechanical Design
- Part & Assembly

SketchUp

- 3D Modelling
- Design Visualization
- Concept Development

DATA & PRODUCTIVITY SOFTWARE

- Data Processing
- Data Analysis
- Reporting Support

- Technical Documentation
- Report Writing
- Data Management

- Technical Presentation
- Engineering Communication
- Project Documentation

03 PERSONAL CAPABILITIES

MIndset & Work Approach

ANALYTICAL THINKING
Approaching engineering problems through structured analysis and evaluation.

ADAPTABILITY
Able to adapt to new environments, processes, and technical tasks.

PROBLEM SOLVING
dentifying issues and developing practical solutions.

FAST LEARNING
Quickly learning new tools, processes, and technical requirements.

TEAMWORK
Working collaboratively in engineering and organizational activities.

05 TEAM

TEAMWORK & LEADERSHIP

COLLABORATION • LEADERSHIP • PROJECT EXECUTION

Beyond technical practice, I developed experience in team coordination, communication, and collaborative project execution through academic, organizational, and engineering activities.

01 LEADERSHIP





HMTM POLMAN BANDUNG

Head of External Relations Division

- Team Coordination
- External Relations
- Partnership & Collaboration
- Communication
- Event Coordination

02 ENGINEERING TEAMWORK



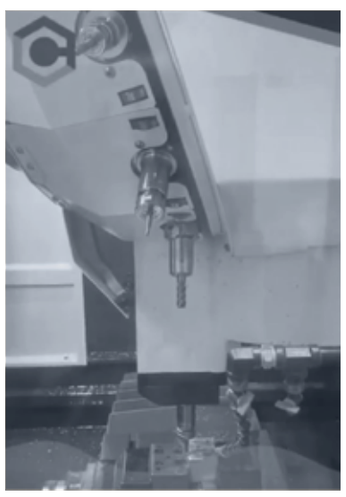


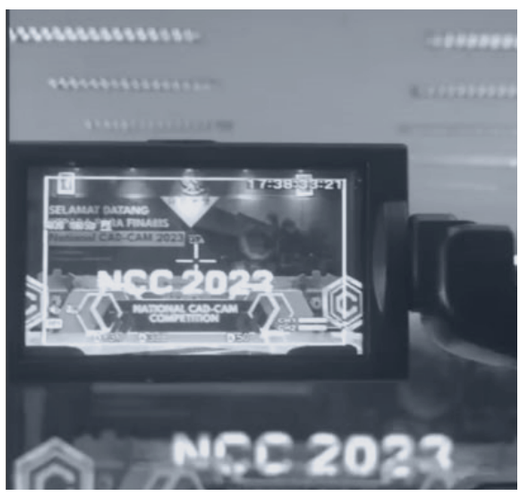
KMHE POLMAN BANDUNG

Automotive Student Team

- Engineering Teamwork
- Vehicle Development
- Design & Fabrication
- Project Execution

03 EVENT ORGANIZATION







NATIONAL CAD COMPETITION (NCC)

Organizing Committee

- Event Organization
- Team Coordination
- CAD Competition Support
- Participant & Event Coordination

04 COMMUNITY COLLABORATION





KKN TEMATIK DESA CIATER

Automotive Student Team

- Team Collaboration
- Program Execution
- Problem Solving
- Community Interaction

06 CREDENTIALS
EDUCATION & RECOGNITION

01

EDUCATION

- **Politeknik Manufaktur Bandung**
  Manufacturing Engineering
  2022–2026
  Bachelor of Applied Engineering (S.Tr.T.)
  GPA 3.00/4.00

- **SMAN 7 Banjarmasin**
  Natural Science Major
  2019–2022.



02

PRACTICAL TRAINING

- **Practical Training Certification**
  Mercedes-Benz / PT Inchcape Indomobil Energi Baru.

03

ACHIEVEMENTS & RECOGNITION

- Business Model Competition — Certificate of Appreciation
- National CAD-CAM Competition — Certificate
- Himpunan Mahasiswa Teknik Manufaktur — Organizational Certificates









07 | CONTACT

LET'S CONNECT

MUHAMMAD HIRZY ZHAFARI ANWAR

MANUFACTURING ENGINEER

Bachelor of Applied Engineering (S.Tr.T.)
Manufacturing Engineering
Politeknik Manufaktur Bandung

MANUFACTURING
A BETTER TOMORROW

ENGINEERING
PORTFOLIO



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Thank you for taking the time to review my engineering portfolio.

I look forward to opportunities to contribute, learn, and grow in manufacturing and engineering environments.

AVAILABLE FOR ENGINEERING OPPORTUNITIES

MANUFACTURING ENGINEERING ▪ MACHINE DEVELOPMENT ▪ CAD ▪ MANUFACTURING OPERATIONS

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LEARN.
BUILD.
IMPROVE.