

## LIST OF LABORATORIES AND EQUIPMENT

### A. Workshop/ Laboratory

MEVE-SP has 6 workshops and laboratories which are used for teaching and learning activities, research of students and lecturers.

#### 1. Machining Workshop

The Machining Workshop is led by one Workshop Head and one technician. The Machining workshops are used for practical activities in teaching and learning process. The knowledge and skills taught in this workshop are customized to the needs of the industry. Some of practical assignments carried out by the students at this workshop including making Chuck keys, Vise, T Slot Bolts, various type of gears, etc. The equipment in Machining Workshop can be seen in Table 15.

Table 1 List of equipments in Machining Workshop

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
Turning Maro	10	√		36
Turning Maximat	14	√		36
Scrap	8	√		36
Milling	10	√		36
T Slot	2	√		36
Surface Grinding	3	√		10
Cylindrical Grinding	1	√		10
Tool Grinding	1	√		20
Saw	3	√		40
Radial Boring	1	√		40
Bench Boring	5	√		40
Boring	3	√		40
Pedestal Gerinder	3	√		20





Fig. 1. Equipments in Machining Workshop

## 2. Fabrication Workshop

The Fabrication Workshop is led by a workshop head and one technician. In Fabrication Workshop, the students are taught the practical skill in sheet metal forming, many types of joining process of the sheet metal, especially the welding process. In this workshop, the students produce various products such as cabinets, tables, window and door trellises, fences etc. The equipments in Fabrication Workshop can be seen in Table 16 and Fig. 5.

Table 2 List of equipments in Fabrication Workshop

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
Welding Maching SMAW	16	√		40
TIG welding	4	√		20
MIG Welding	1	√		20
Acyteline	3	√		20
Bending machine	2	√		36
Rolling Maching	2	√		20
Saw Machine	1	√		40
Gulotine Machine Hydraulik	2	√		20
Guillotine Lever	1	√		20
Boring	2	√		20
Bench Boring	2	√		20
Tool Grinder	5	√		20
Press Machine	1	√		20
Punch Machine	1	√		20
Base	1	√		40
Furnace Forging	1	√		20
Furnace Heat Treatment	2	√		20





Fig. 2. Equipments in Fabrication Workshop

### 3. CNC,CAD,CAM Laboratory

This laboratory is used to make products such as nuts, bolts, etc. In this laboratory, the learning process uses a computerized system and the students are required to be able in writing a code for making a component (CAM). Then the code is executed to make a product. The equipments in this laboratory is displayed in Table 17 and Fig. 6.

Table 3 List of equipments in CNC,CAD,CAM Laboratory

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
Turning NC TU 2A	5	√		36
Milling NC TU 3A	5	√		36
FMS Turning	1	√		36
FMS Milling	1	√		36
Turning ET 120 & ET 242	2	√		20
Milling VMC 100 & VMC 200	1	√		20
Pedestal Grinder	1	√		20
Compressor	1	√		20
Saw Machine	1	√		20
3D Printing	1	√		20





Fig. 3. Equipments in CNC Workshop

#### 4. Design Engineering Laboratory

Design Engineering Laboratory is used for engineering design process. This laboratory has many computers to support the teaching/learning process. In addition, several drawing tables are also provided to assist students in mechanical drawing manually. The equipments in Design Engineering Laboratory is shown in Table 18 and Fig. 7.

Table 4 List of equipments in Design Engineering Laboratory

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
Drawing tables	32	✓		40
Computer	87	✓		40
Lap Top	13	✓		40
Data Display	9	✓		40
3D Printing	2	✓		20



Fig. 4. Equipments in Design Engineering Laboratory



## 5. Material and Metrology Laboratory

The Materials and Metrology Laboratory is used to carry out a materials testing and to measure a product to check whether they comply with the predetermined specifications and tolerances. This laboratory is used by students and lecturers in learning process, student's final project and research. The equipments in this laboratory is displayed in Table 19 and Fig. 8.

Table 5 List of equipments in Material dan Metrologi Laboratory

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
Auto Climator	1	√		30
Profile Proyektor	1	√		30
Micrometer	1	√		30
Vernier Caliper	1	√		30
Height gauge	1	√		30
Measure Block	1	√		30
Center	1	√		30
Pneumatic system	1	√		30
Hydraulic System	1	√		30
Furnace	2	√		20
Hardness Test	3	√		20
Impact Test	2	√		20
Torsion Test	1	√		20
Deflection Test	1	√		20
Tensile Test	2	√		20
Microscope	1	√		20
Grinder surface	1	√		20



Fig. 5. Equipments in Material dan Metrologi Laboratory

## 6. Construction Laboratory

The Construction Laboratory is used to carry out several testings related with mechanical phenomenons in construction. This laboratory is used by students and lecturers in learning process, students's final project and research. The equipments in this laboratory is shown in Table 20 dan Fig.9

Table 6 List of equipments in Construction Laboratory

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
Impact Jet	1	√		20
Orifis	1	√		20
Friction Loses	1	√		20
Venturi	1	√		20
Frame Work	1	√		20
Shear Force	3	√		20
Buckling	2	√		20
Gear Transmision	1	√		20
Critical Rotation	1	√		20
Centrifugal Pump	1	√		12



Fig. 6. Equipments in Construction Laboratory

## 7. Energy Conversion Laboratory

The Energy Conversion Laboratory is used to carry out a testing related with energy such as heat treatment and renewable energy. This laboratory is used by students and lecturers in learning process, student's final project and research. Table 21 and Fig. 10 show equipments in this laboratory

Table 71 List of equipments in Conversion Energy Laboratory

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
Hydrolic unit	1	V		40
Engine Trial	3	V		10
Pneumatic unit	1	V		10
Airflow Characteristics Apparatus	1	V		10
Windmill Apparatus	1	V		10
Water Wheel Apparatus	1	V		10

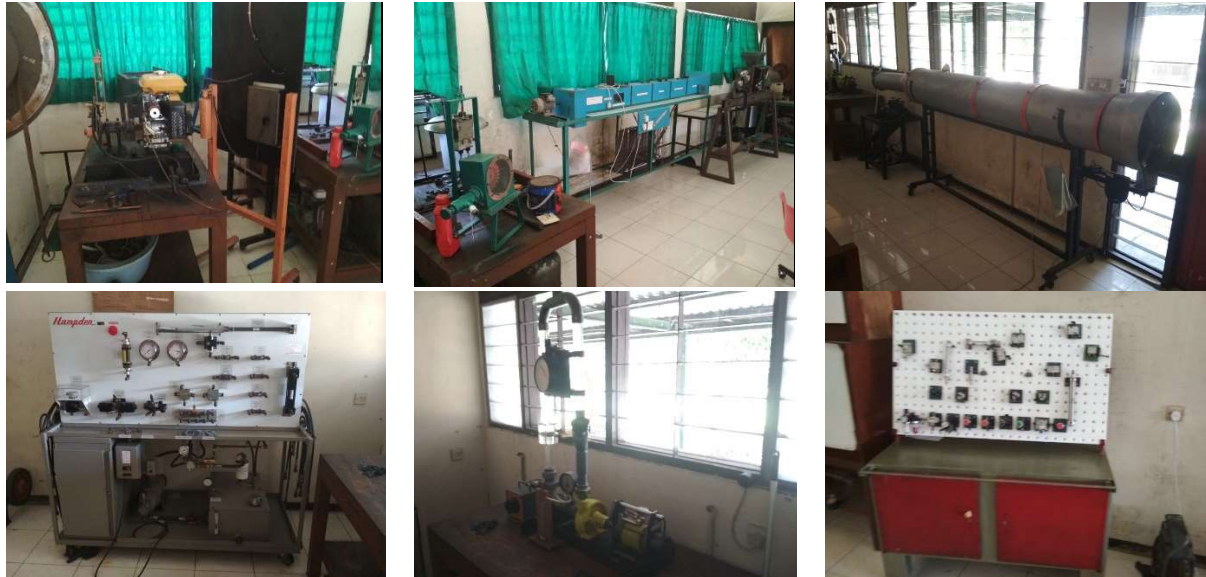


Fig. 10. Equipments in Energy Conversion Laboratory

## 8. Manufacturing Laboratory

The Manufacturing Laboratory is used to make a product in the mechanical engineering. This laboratory is used by students and lecturers in learning process, students's final project and research. Table 22 and Fig. 11 exhibit the equipments in this laboratory

Table 82 List of equipments in Manufacturing Laboratory

Equipments	Unit	Condition		Usage time average (hours/weeks)
		Good	Not good	
WELDING MACHINE SMAW-DC	6	V		40
WELDING MACHINE TIG DC	4	V		40
MIG-MAG WELDING	4	V		40
Cutting Machine	2	V		40

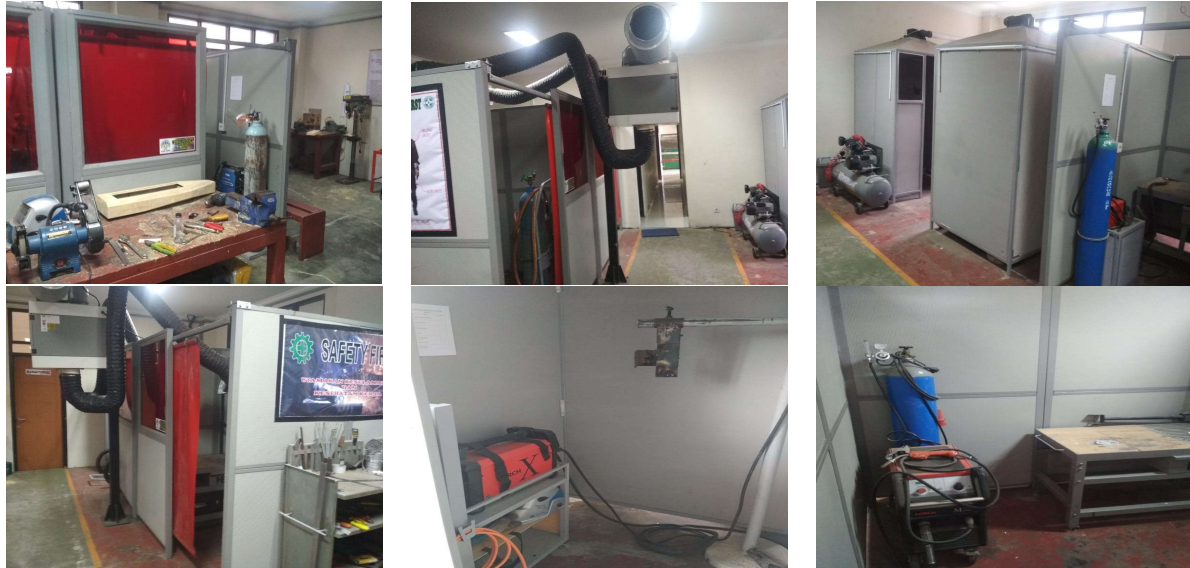


Fig.11. Equipments in Manufacturing Laboratory

## B. Infrastructure at MEVE-SP

In addition to laboratory equipments, machine and tools that are available in every workshop and laboratory, MEVE-SP has adequate supporting infrastructures. MEVE-SP has many classrooms, lecturers and administration staff workspaces, supporting workshops and laboratories, libraries, etc. Table 21 shows the conditions of infrastructures such as buildings and other physical facilities

Table 9 Infrastructures condition in MEVE-SP

Infrastructure	Unit	Surface (m <sup>2</sup> )	Condition		Usage time average (hours/weeks)
			Good	Not good	
Classroom	5	380	V	-	40
Construction Laboratory	1	108	V	-	40
Manufacturing Laboratory	1	300	V	-	40
Material and Metrology Laboratory	1	300	V	-	40
Energy Conversion Laboratory	2	150	V	-	40
Machining WorkShop	1	600	V	-	40
Fabrication Workshop	1	600	V	-	40
CNC, CAD and CAM Laboratory	1	446	V	-	40
Drawing Studio (Design Engineering Laboratory)	2	162	V	-	40
Computer Laboratory (Design Engineering Laboratory)	3	210	V	-	40
Examination Room	1	81	V	-	12
Library (Mechanical Engineering Department)	1	81	V	-	40
Library (Engineering Faculty)	1	120	V	-	40
Library (Universitas Negeri Padang)	1	1200	V	-	40
Integrated Material & Metrologi Laboratory	1	200	V	-	40



Each lecturer has their workspace equipped with table and cabinet. They can do their works, such as making various learning tools, writing reports of research and community service, discussing and give a guidance to students about final project and academic problem etc. Every lecturer has a workspace about 15 m<sup>2</sup>. Data of lecturer workspace is given in Table 22.

In MEVE-SP, internet is provided in entire campus, supported by network of WIFI @ UNP and unp@wifi.id with a high speed. In MEVE-SP, all systems can be accessed online. For security systems, MEVE-SP is equipped with 16 points of CCTV to protect all inventories in MEVE-SP. The online library can be accessed on the page: <http://opac.unp.ac.id>. UNP also provides WIFI.ID services, in collaboration with Telkomsel so that lecturers and students can use the internet anywhere.

Table 10 Workspace of lecturers and other infrastructures in MEVE-SP

Room specification	Number of rooms	Total area (m <sup>2</sup> )
<b>Ruang kerja Dosen</b>		
One room for 4 lecturers	2	120
One room for 3 lecturers	4	120
One room for 2 lecturers	3	90
One room for 1 lecturer	6	195
Sub Total		525
<b>Other infrastructures</b>		
Material Warehouse	1	16
Warehouse of Fabrication Workshop	1	36
Warehouse of Machining Workshop	1	36
Warehouse of Construction Laboratory and Conversion Energy Laboratory	1	27
Warehouse of Material and Metrology Laboratory	1	24
Student organization room	1	24
Prayer room	1	8
Kitchen	1	6
Staff Restroom	1	16
Student Restroom	2	90
Room for electrical panel	1	1.5
Garden	1	1600
<b>Sub Total</b>		
<b>Grand Total</b>		