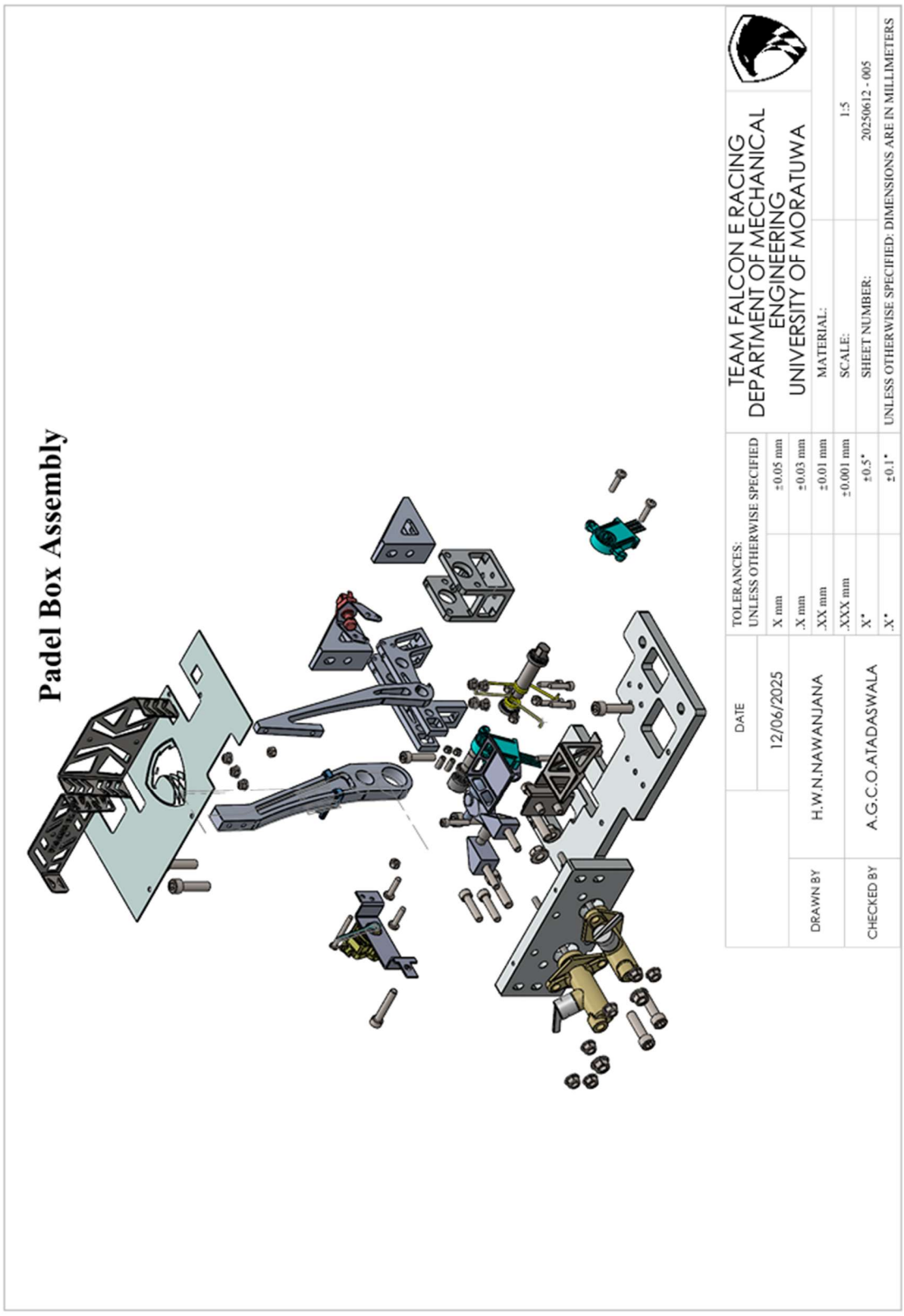
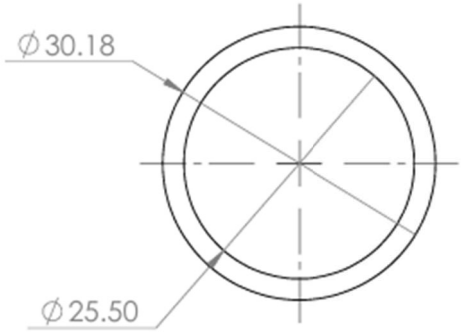
Brake system

Pedal box assembly



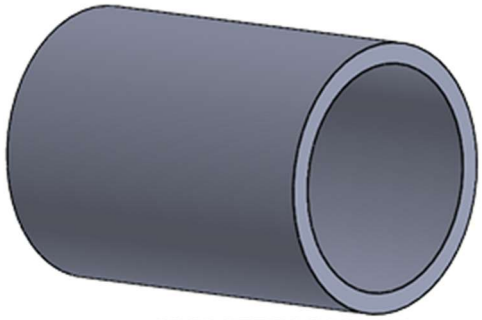
BR-0001-029

BIAS BAR SLEEVE



TOP VIEW

SIDE VIEW



ISOMETRIC VIEW

	DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
	29/05/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA	.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING	.XX mm	±0.01 mm	MATERIAL:	STEEL
		.XXX mm	±0.001 mm	SCALE:	1.5:1
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER	X°	±0.5°	SHEET NUMBER:	20250529-001
		.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Manual Lathe operations

1. A medium carbon steel billet was securely mounted in CNC bed.
2. According the drawing the CNC operation such as milling and lathe was carried out for obtain the sleeve with accurate dimensions and target surface finish

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

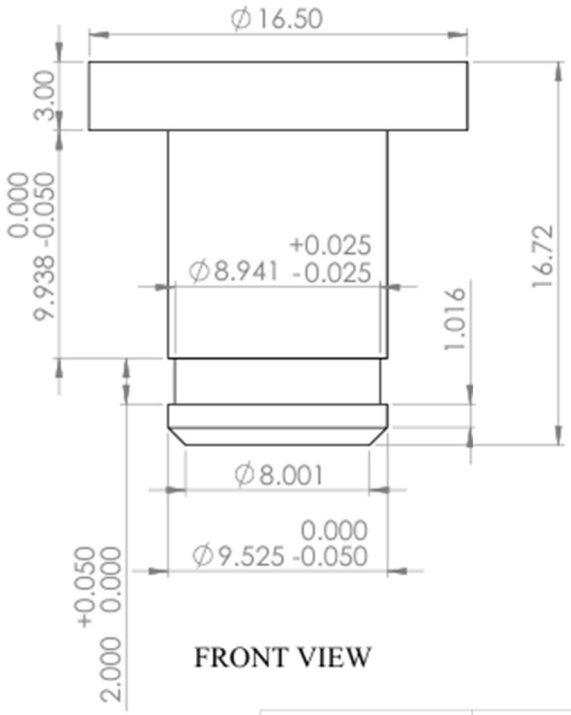
Property	Medium carbon steel	High carbon steel	Al 6061 T6	Titanium
Availability	5	5	3	1
Machinability	4	3	5	2
	3	4	2	5
Yield Stress	4	3	2	5
Fatigue	3	4	2	5
Cost	4	2	2	1
Weight of a unit volume (light weight is better)	3	2	5	4
	26	**23**	**21**	**23**

Process

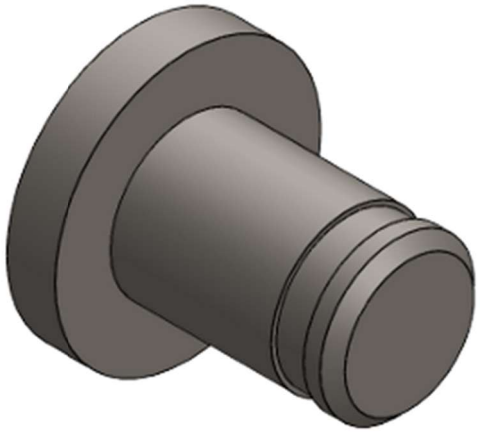
Criteria	Manual Lathe	Metal 3D print	CNC-Lathe
Cost	3	1	4
Time	3	1	4
Power consumption	4	1	3
Surface Finish	4	2	5
	14	**5**	**16**

BR-0002-054

BRAKE ROTOR PINS X 24 NOS



FRONT VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		27/03/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	S.P.BOGAHAWATTHA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	AISI 4130
			.XXX mm	±0.001 mm	SCALE:	4:1
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250327-001
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual Lathe operations

1. A medium carbon steel billet was securely mounted in CNC bed.
2. According the drawing the CNC Lathe operation was carried out for obtain the sleeve with accurate dimensions and target surface finish.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

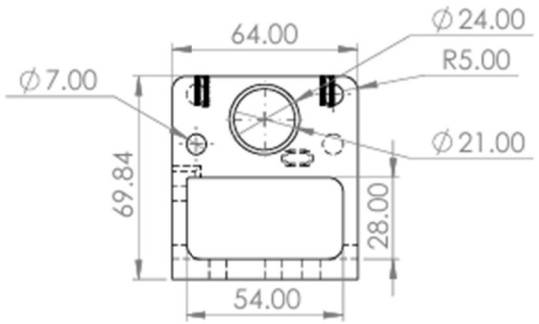
Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	5	3	2	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	21	**23**	**23**	**26**	**23**

Process

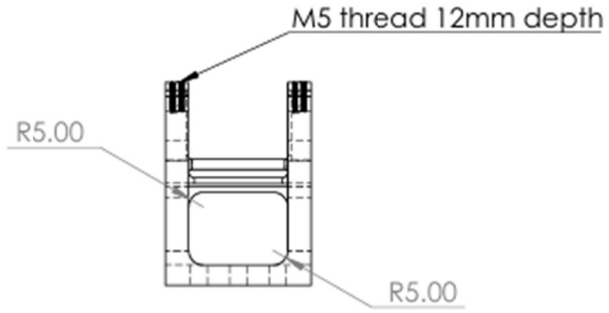
Criteria	Manual Lathe	Metal 3D print	CNC-Lathe
Cost	3	1	5
Time	3	1	4
Power consumption	4	1	3
Surface Finish	4	2	5
	14	**5**	**17**

BR-0011-002

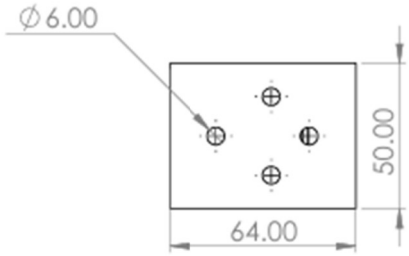
ACCELERATOR PEDAL HOLDER



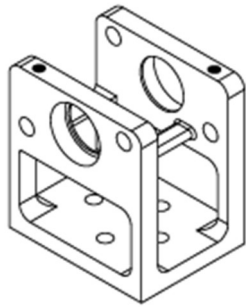
SIDE VIEW



FRONT VIEW



BOTTOM VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		23/03/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	S.P.BOGASWATTHA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061-T6
			.XXX mm	±0.001 mm	SCALE:	1:2
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X*	±0.5*	SHEET NUMBER:	20250323-002
			.X*	±0.1*	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual cutting using band saw

1. Clamping the work piece on to the **bed** of band saw machine.
2. Then a cylindrical billet was cut into shapes for milling operations.

CNC Milling operations

1. Aluminum workpiece secured on **machine bed**.
2. CNC milling performed to achieve **final shape, holes, surface finish, and precise alignment** for assembly.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	5	3	2	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	21	**23**	**23**	**26**	**23**

Process

The first process is making a work piece from an Al 6061 chunk.

Criteria	Shaping	Band saw cutting manual	CNC-Milling
Cost	3	5	1
Time	2	1	3
Power consumption	2	4	1
	7	**10**	**5**

The second process is milling to form the work piece to desired shape.

Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	3	1	2
Time	2	1	4
Power consumption	3	1	4
Surface Finish	4	2	5
	12	**5**	**15**

Acceleration pedal shaft - BR-0011-003

Process flow

Manual cutting using grinder

1. Clamping the work piece on to the **bench wise and cut at certain length**.

CNC Milling operations

1. Workpiece secured on **machine bed**.
2. CNC milling performed to achieve a key bar with **final shape, thickness, surface finish, and precise alignment**.

Manual cutting using hand saw

1. Clamped the key bar on to the **bench wise and cut at certain length** using hand saw.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

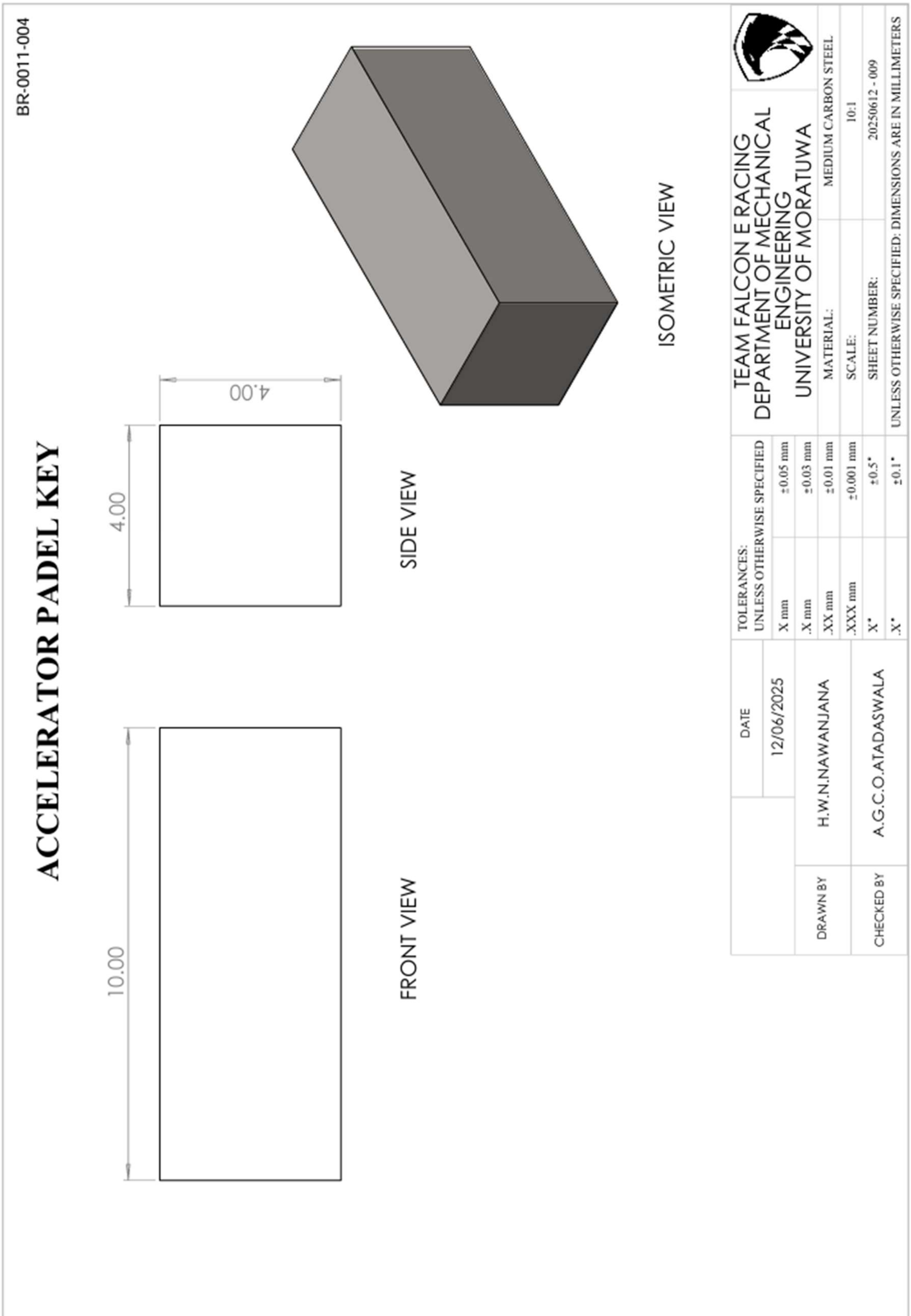
Property	Low carbon steel	Al 6061 T6	Titanium
Availability	5	5	1
Machinability	4	5	2
Hardness	5	2	5
Yield Stress	4	2	5
Fatigue	4	2	5
Cost	4	5	1
Weight of a unit volume (light weight is better)	3	5	4
	29	**26**	**23**

Process

The second process is milling for make the work piece into desired shape.

Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	3	1	2
Time	2	1	4
Power consumption	3	1	4
Surface Finish	4	2	5
	12	**5**	**15**

Acceleration pedal key - BR-0011-004



Process flow

Manual cutting using grinder

2. Clamping the work piece on to the **bench wise and cut at certain length**.

CNC Milling operations

3. Workpiece secured on **machine bed**.
4. CNC milling performed to achieve a key bar with **final shape, thickness, surface finish, and precise alignment**.

Manual cutting using hand saw

2. Clamped the key bar on to the **bench wise and cut at certain length** using hand saw.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

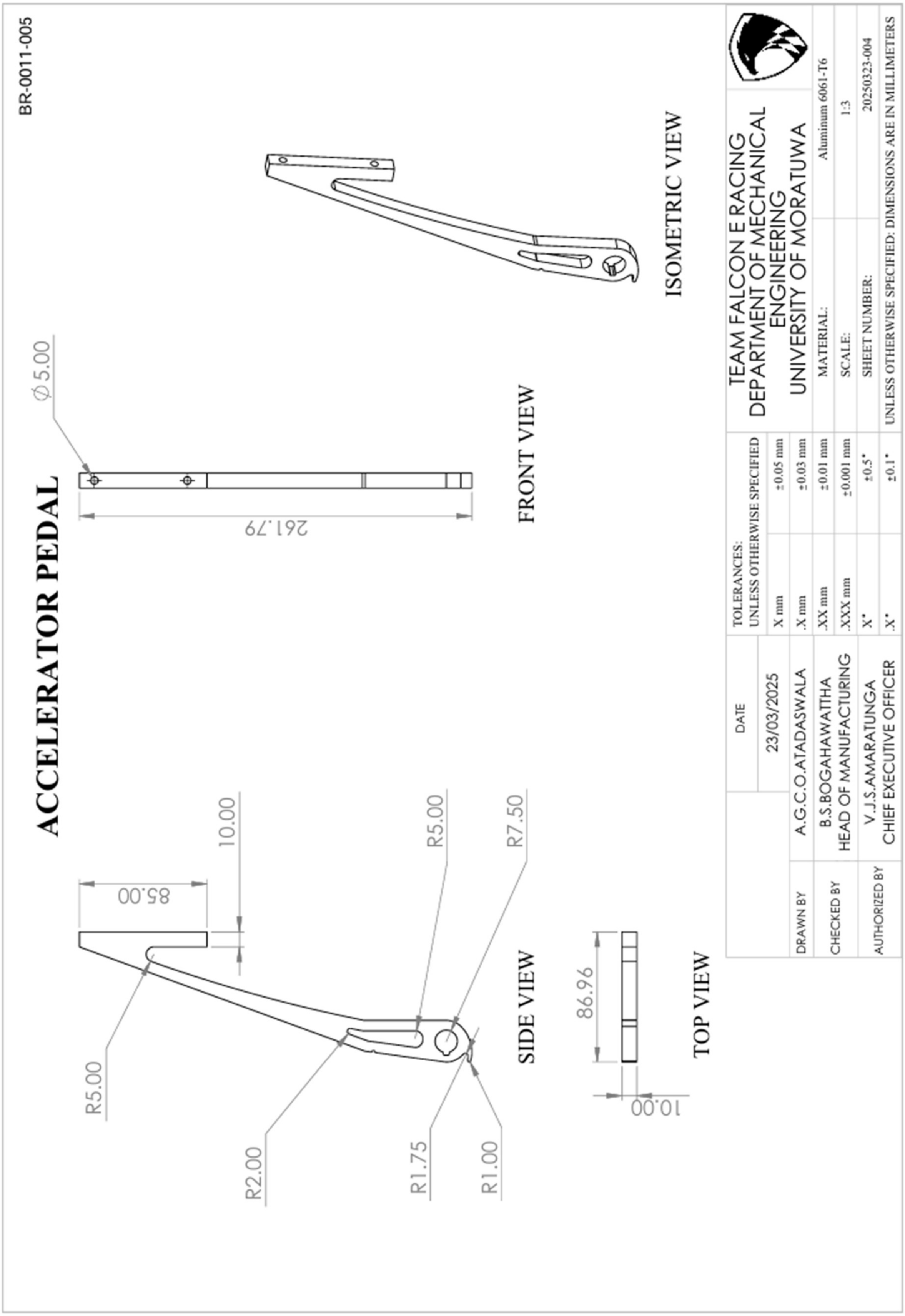
Property	Low carbon steel	Al 6061 T6	Titanium
Availability	5	5	1
Machinability	4	5	2
Hardness	5	2	5
Yield Stress	4	2	5
Fatigue	4	2	5
Cost	4	5	1
Weight of a unit volume (light weight is better)	3	5	4
	29	**26**	**23**

Process

The second process is milling for make the work piece into desired shape.

Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	3	1	2
Time	2	1	4
Power consumption	3	1	4
Surface Finish	4	2	5
	12	**5**	**15**

Accelerator pedal - BR-0011-005



Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual cutting using band saw

1. Clamping the work piece in between the clamps and the Aluminum 6061 T6 billet was cut into the desired shape.

CNC Milling operations

1. Workpiece secured on **machine bed**.
2. CNC milling performed to achieve a precisely cut pedal with **final shape, thickness, surface finish, and precise alignment**.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

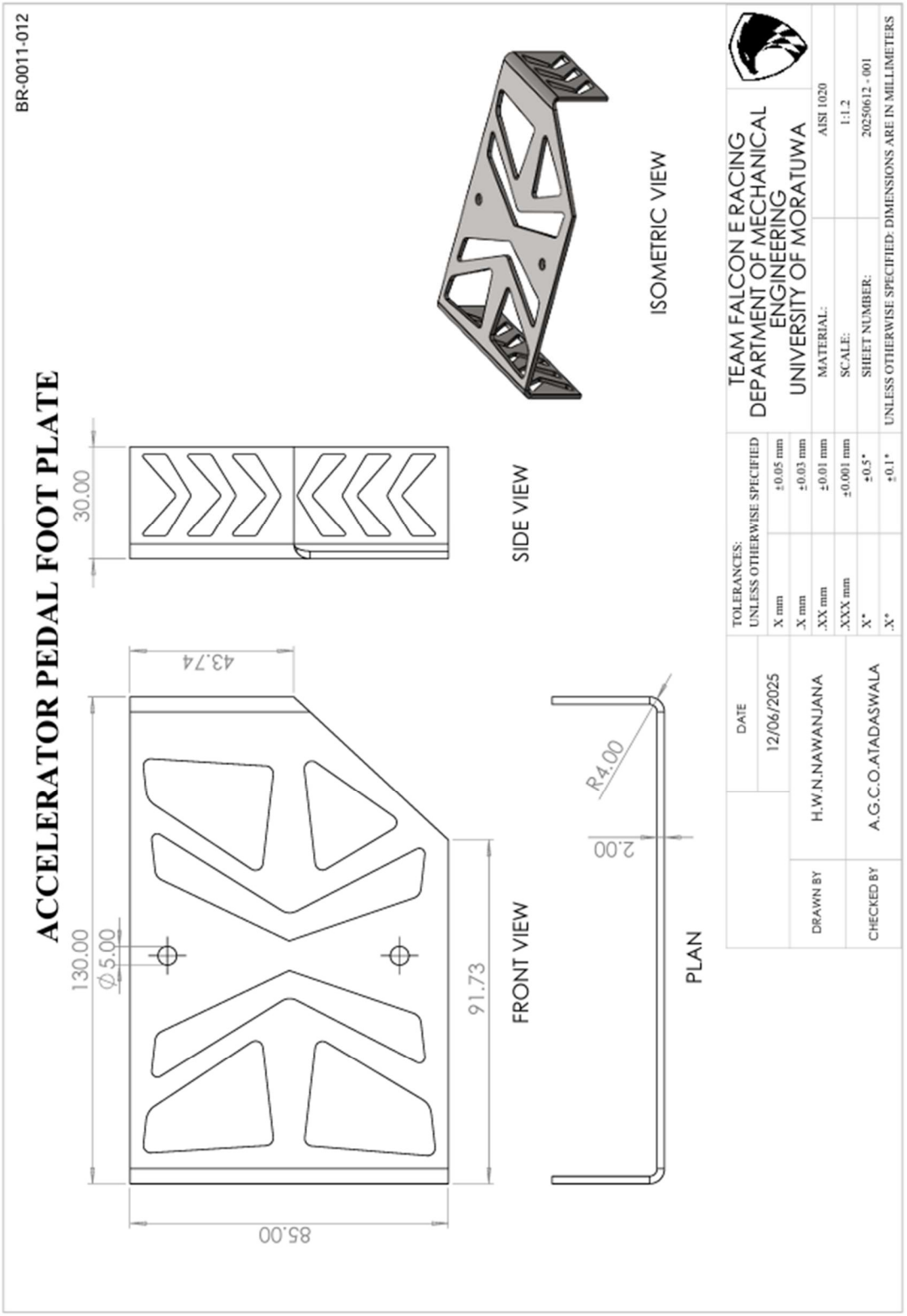
Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	2	3	3	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	18	**23**	**24**	**26**	**23**

Process

The second process is milling for make the work piece into desired shape.

Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	1	1	2
Time	3	1	4
Power consumption	3	1	4
Surface Finish	3	2	5
	10	**5**	**15**

Acceleration pedal foot plate - BR-0011-012



Process flow

Laser cutting

1. 1.5 mm zinc-coated sheet metal placed on machine bed.
2. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.
3. Then the bending's are formed using bending machine.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

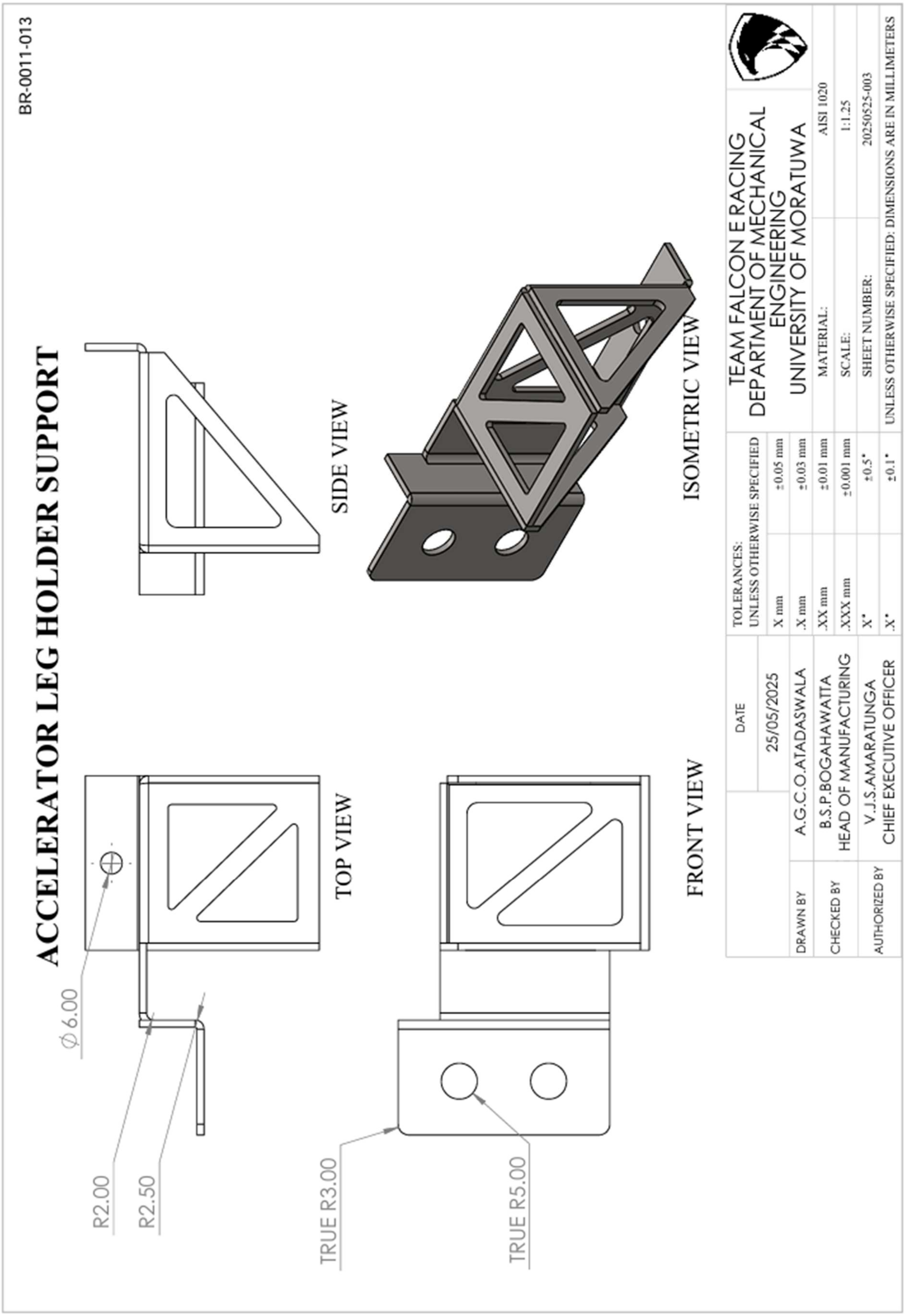
Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	4	2	5
Cost	4	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	22	**21**	**21**	**17**	**23**

Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**

Acceleration pedal footrest supporting bracket - BR-0011-013



Process flow

Laser cutting

1. 1.5 mm zinc-coated sheet metal placed on machine bed.
2. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.
3. Then the bending's are formed using bending machine.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	4	2	5
Cost	4	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	22	**21**	**21**	**17**	**23**

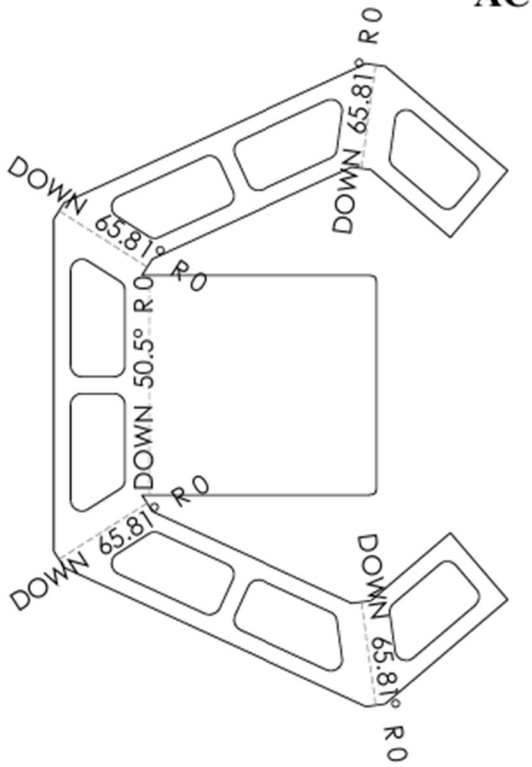
Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

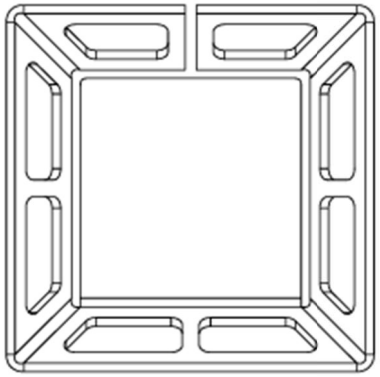
Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**

BR-0011-014

ACCELERATOR LEG HOLDER

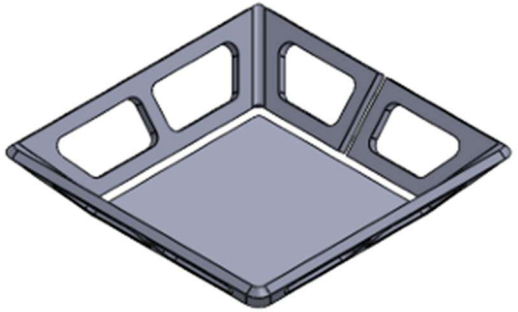


Flattern View



TOP VIEW

SIDE VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		25/05/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	AISI 1020
			.XXX mm	±0.001 mm	SCALE:	1:1
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250525-002
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Laser cutting

1. 1.5 mm zinc-coated sheet metal placed on machine bed.
2. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.
3. Then the bending's are formed using bending machine.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	4	2	5
Cost	4	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	22	**21**	**21**	**17**	**23**

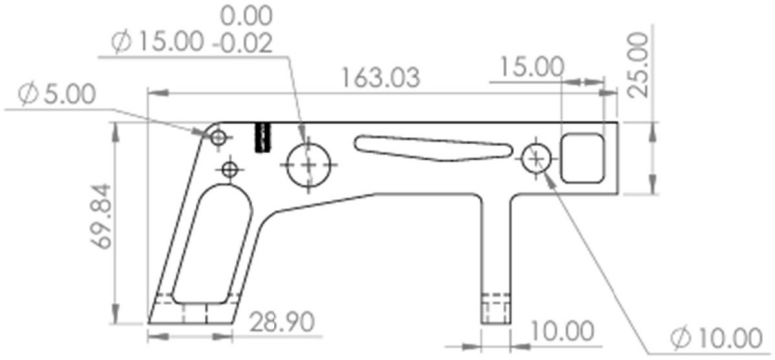
Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

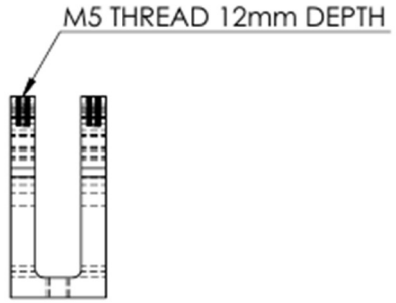
Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**

BR-0011-015

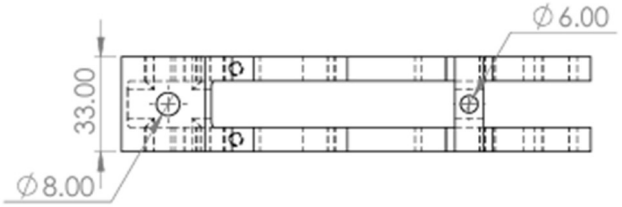
BRAKE PEDAL HOLDER



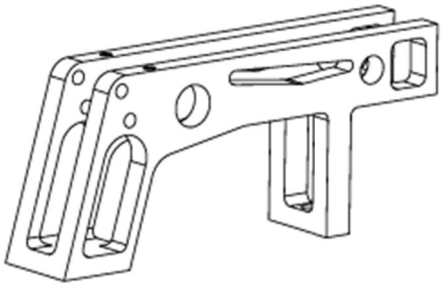
SIDE VIEW



FRONT VIEW



TOP VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		23/03/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	S.P.BOGAHAWATTHA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061-T6
			.XXX mm	±0.001 mm	SCALE:	1:2
AUTHORIZED BY	V.J.S. AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250323 - 001
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Laser cutting

1. 1.5 mm zinc-coated sheet metal placed on machine bed.
2. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.
3. Then the bending's are formed using bending machine.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	4	2	5
Cost	4	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	22	**21**	**21**	**17**	**23**

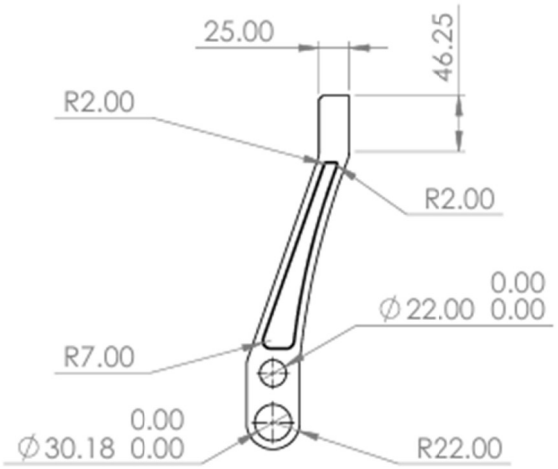
Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

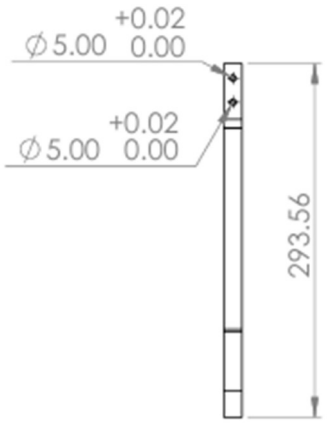
Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**

BR-0011-016

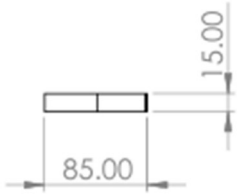
BRAKE PEDAL



RIGHT VIEW



FRONT VIEW



TOP VIEW

ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		14/02/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061 - T6
			.XXX mm	±0.001 mm	SCALE:	1:5
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250214 - 002
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual cutting using band saw

1. Clamping the work piece in between the clamps and the Aluminum 6061 T6 billet was cut into the desired shape.

CNC Milling operations

2. Workpiece secured on **machine bed**.
3. CNC milling performed to achieve a precisely cut pedal with **final shape, thickness, surface finish, and precise alignment**.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

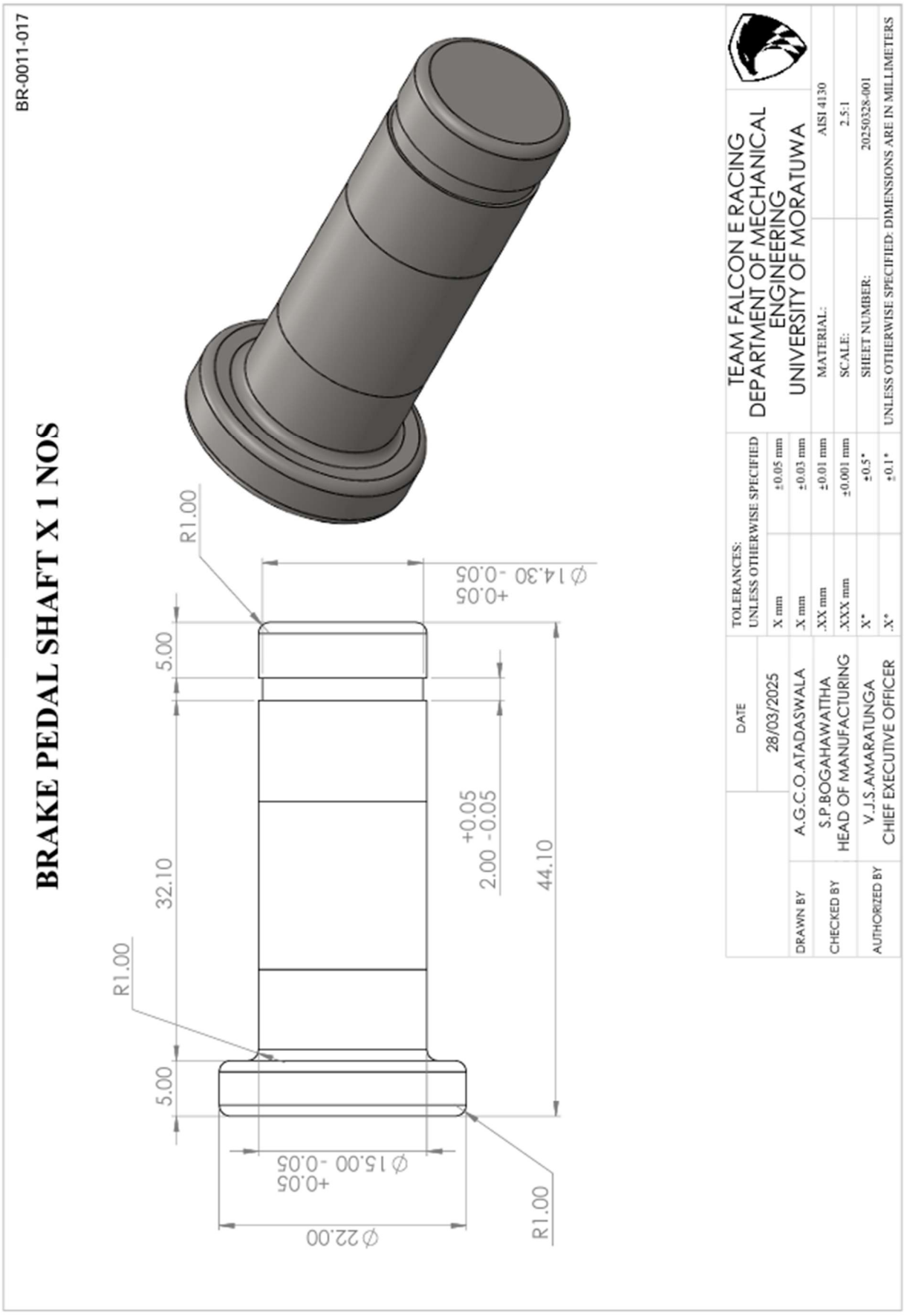
Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	2	3	3	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	18	**23**	**24**	**26**	**23**

Process

The second process is milling for make the work piece into desired shape.

Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	1	1	2
Time	3	1	4
Power consumption	3	1	4
Surface Finish	3	2	5
	10	**5**	**15**

Brake pedal shaft - BR-0011-017



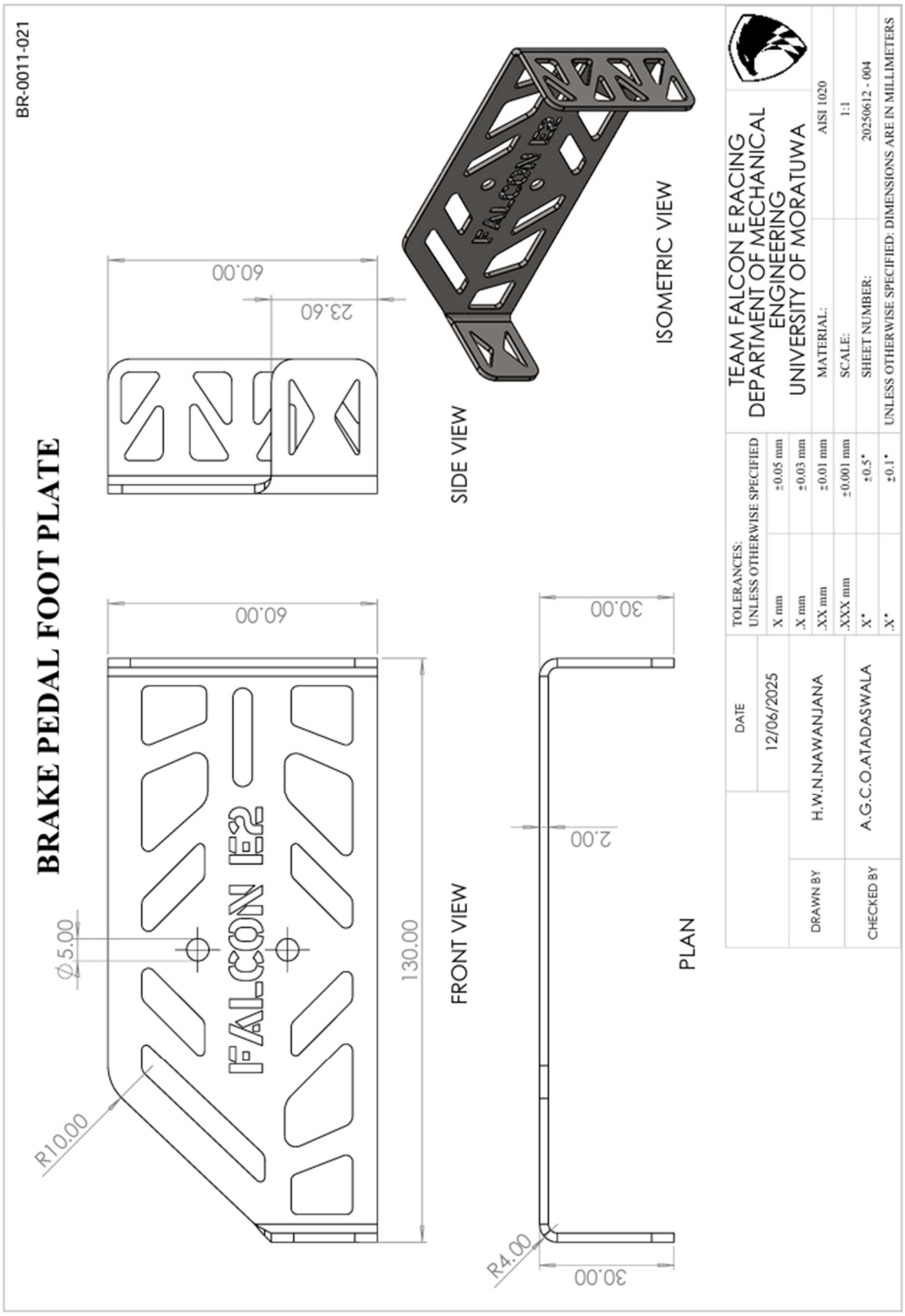
Process flow

- **Cutting (Manual)**
  The chromoly steel bar is manually cut to approximate length using a band saw .
  This prepares the raw material to a manageable size for further operations and minimizes material waste.
- **CNC Lathe – Precision Turning Operations:**
  The cut workpiece is securely clamped into a CNC lathe.
  Operations performed on the lathe may include turning the outer diameter to specified dimensions, facing both ends to achieve flatness, cutting grooves or chamfers. This process guarantees concentricity, dimensional accuracy, and a smooth surface finish.

Property	**Chromoly Steel**	**AISI 1020**	**Al 6061-T6**	**Titanium**
Availability	4	5	4	1
Machinability	4	4	5	1
Hardness	4	3	2	5
Yield Strength	4	3	2	5
Lightweight (Density)	3	4	5	4
Total Score	27	26	26	23

Criteria	**Cutting (Manual)**	**CNC Lathe**
Cost	4	2
Time Efficiency	3	4
Accuracy	4	5
Surface Finish	2	5
	20	28

Brake pedal foot plate - BR-0011-021



Process flow

Laser cutting

1. 1.5 mm zinc-coated sheet metal placed on machine bed.
2. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.
3. Then the bending's are formed using bending machine.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	4	2	5
Cost	4	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	22	**21**	**21**	**17**	**23**

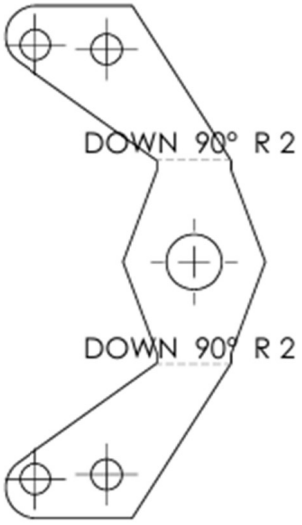
Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

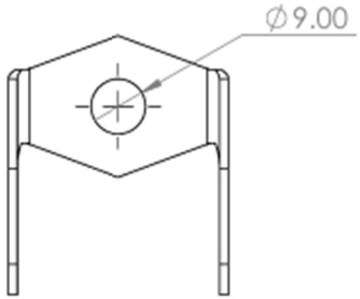
Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**

BR-0011-022

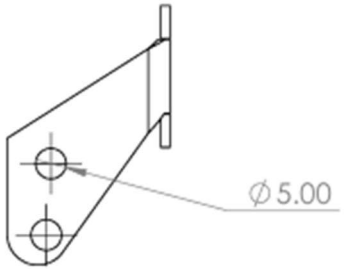
BOT MOUNT X 1 NOS



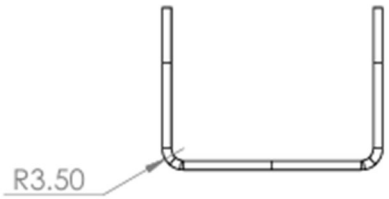
FLATTERN VIEW



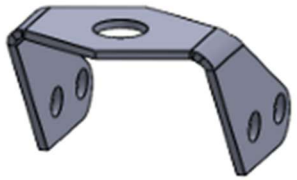
FRONT VIEW



SIDE VIEW



TOP VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		25/05/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	AISI 1020
			.XXX mm	±0.001 mm	SCALE:	1:1
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250525-001
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Bot mounting bracket - BR-0011-022

Process flow

Laser cutting

1. 1.5mm zinc-coated sheet metal placed on machine bed.
2. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.
3. Then the bending's are formed using bending machine.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	4	2	5
Cost	4	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	22	**21**	**21**	**17**	**23**

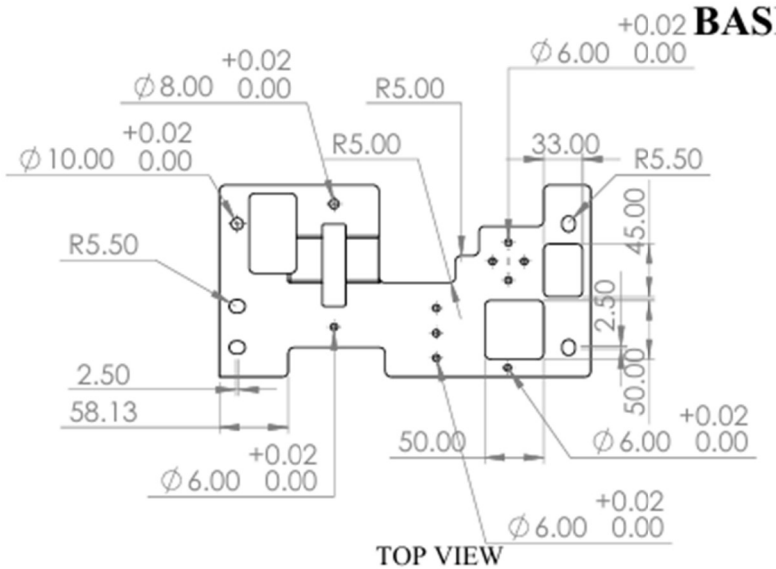
Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**

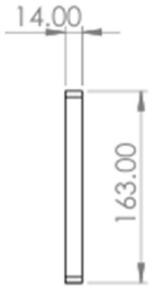
BR-0011-023

BASE PLATE

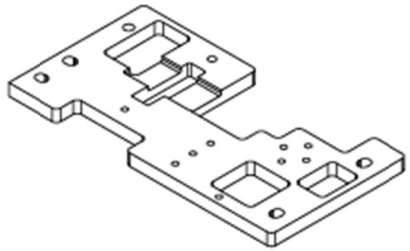


TOP VIEW

SIDE VIEW



FRONT VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		15/02/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTHA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061 - T6
			.XXX mm	±0.001 mm	SCALE:	1:5
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250214 - 005
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Base plate - BR-0011-023

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual cutting using band saw

1. Clamping the work piece in between the clamps and the Aluminum 6061 T6 billet was cut into the desired shape.

CNC Milling operations

1. Workpiece secured on **machine bed**.
2. CNC milling performed to achieve a precisely cut pedal with **final shape, thickness, surface finish, and precise alignment**.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	2	3	3	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	18	**23**	**24**	**26**	**23**

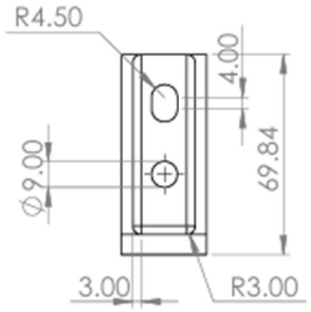
Process

The second process is milling for make the work piece into desired shape.

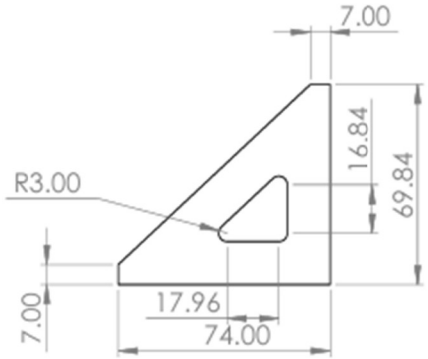
Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	1	1	2
Time	3	1	4
Power consumption	3	1	4
Surface Finish	3	2	5
	10	**5**	**15**

BR-0011-024

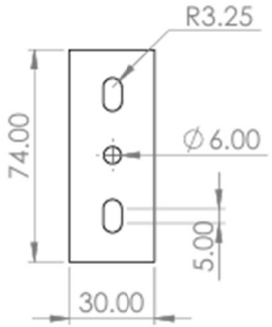
MASTER CYLINDERS HOLDER PLATE RIB 2



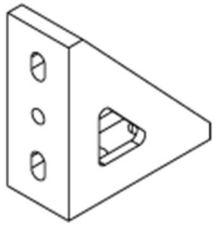
TOP VIEW



FRONT VIEW



REAR VIEW



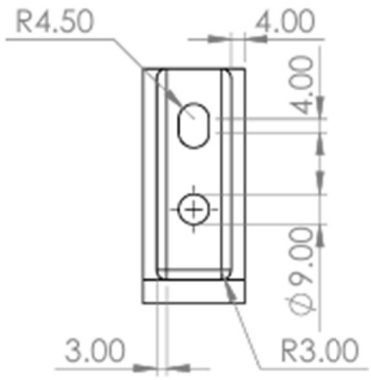
ISOMETRIC VIEW

	DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
	15/02/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA	.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING	.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061 - T6
		.XXX mm	±0.001 mm	SCALE:	1:2
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER	X*	±0.5*	SHEET NUMBER:	20250215 - 003
		.X*	±0.1*	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

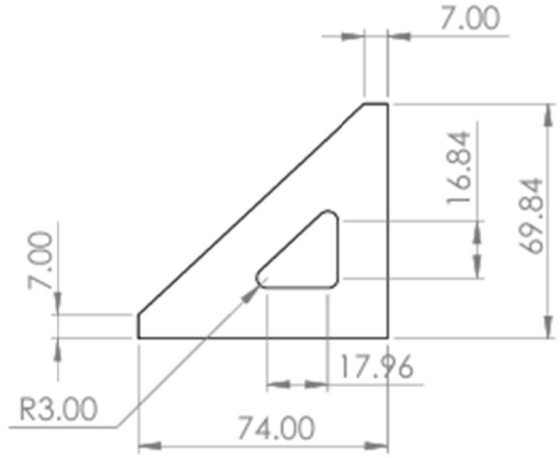
Rib support - BR-0011-024

BR-0011-024

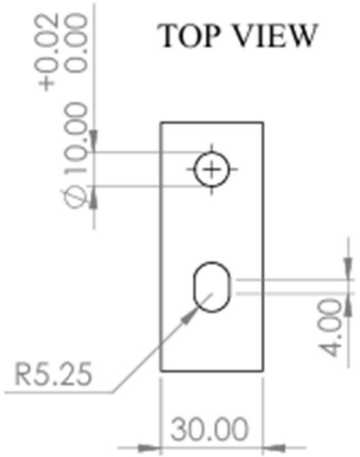
MASTER CYLINDERS HOLDER PLATE RIB 1



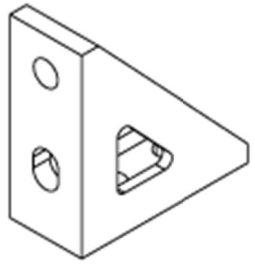
TOP VIEW



SIDE VIEW



BACK VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		15/02/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061 - T6
			.XXX mm	±0.001 mm	SCALE:	1:2
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250215 - 002
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual cutting using band saw

1. Clamping the work piece in between the clamps and the Aluminum 6061 T6 billet was cut into the desired shape.

CNC Milling operations

1. Workpiece secured on **machine bed**.
2. CNC milling performed to achieve a precisely cut pedal with **final shape, thickness, surface finish, and precise alignment**.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	2	3	3	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	18	**23**	**24**	**26**	**23**

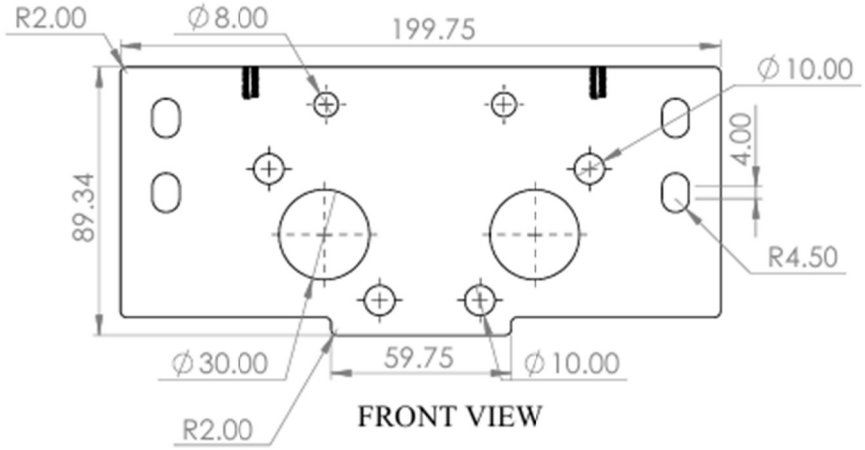
Process

The second process is milling for make the work piece into desired shape.

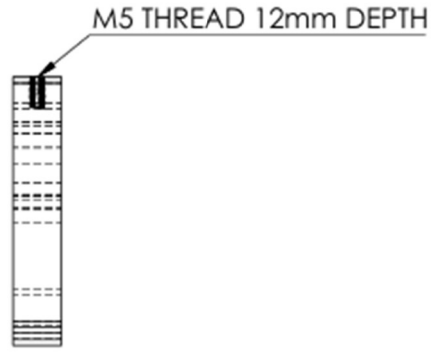
Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	1	1	2
Time	3	1	4
Power consumption	3	1	4
Surface Finish	3	2	5
	10	**5**	**15**

BR-0011-025

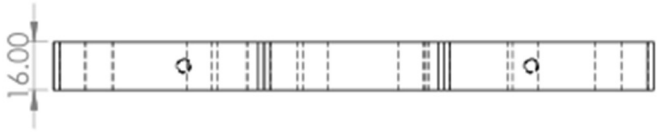
MASTER CYLINDER HOLDER PLATE



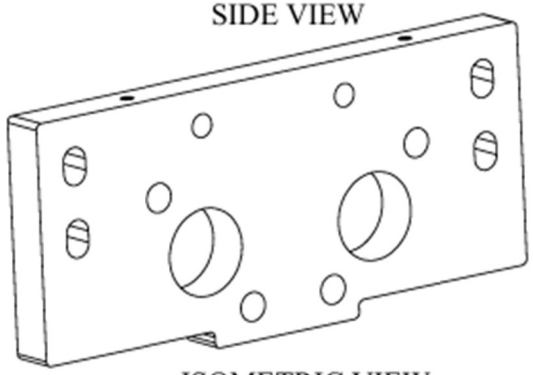
FRONT VIEW



SIDE VIEW



BOTTOM VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		23/03/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	S.P.BOGAHAWATTHA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061-T6
			.XXX mm	±0.001 mm	SCALE:	1:2
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250323-003
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Master cylinder holder plate - BR-0011-025

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual cutting using band saw

1. Clamping the work piece in between the clamps and the Aluminum 6061 T6 billet was cut into the desired shape.

CNC Milling operations

1. Workpiece secured on **machine bed**. 1
2. CNC milling performed to achieve a precisely cut pedal with **final shape, thickness, surface finish, and precise alignment**.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	2	3	3	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	18	**23**	**24**	**26**	**23**

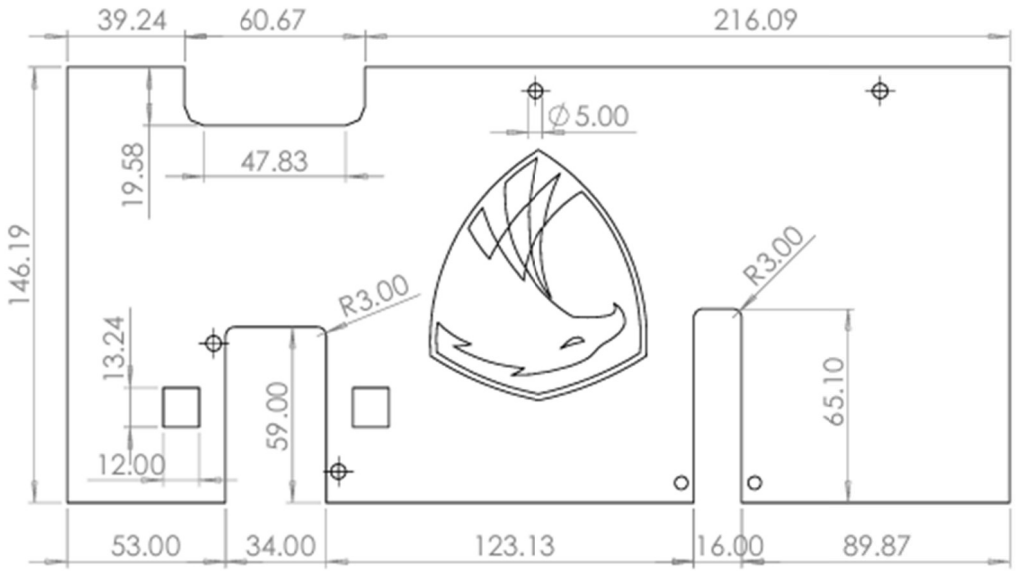
Process

The second process is milling for make the work piece into desired shape.

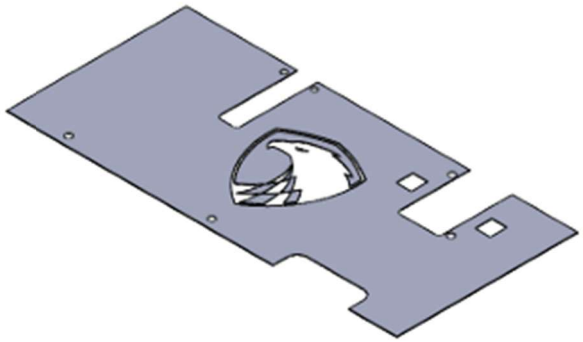
Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	1	1	2
Time	3	1	4
Power consumption	3	1	4
Surface Finish	3	2	5
	10	**5**	**15**

BR-0011-053

PEDAL BOX COVER



PLAN



ISOMETRIC VIEW

SIDE VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		12/06/2025	X mm	±0.05 mm		
DRAWN BY	H.W.N.NAWANJANA		.X mm	±0.03 mm		
			.XX mm	±0.01 mm	MATERIAL:	ALUMINIUM
			.XXX mm	±0.001 mm	SCALE:	1:2
CHECKED BY	A.G.C.O.ATADASWALA		X°	±0.5°	SHEET NUMBER:	20250612 - 003
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Pedal box cover plate - BR-0011-053

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual cutting using band saw

1. Clamping the work piece in between the clamps and the Aluminum 6061 T6 billet was cut into the desired shape.

CNC Milling operations

2. Workpiece secured on **machine bed**.
3. CNC milling performed to achieve a precisely cut pedal with **final shape, thickness, surface finish, and precise alignment**.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	5	3	5	1
Machinability	5	3	1	5	2
Hardness	1	3	5	2	5
Yield Stress	1	4	5	2	5
Fatigue	2	3	5	2	5
Cost	2	3	3	5	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	18	**23**	**24**	**26**	**23**

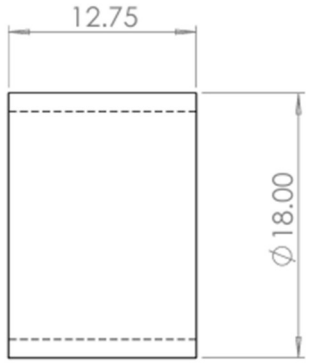
Process

The second process is milling for make the work piece into desired shape.

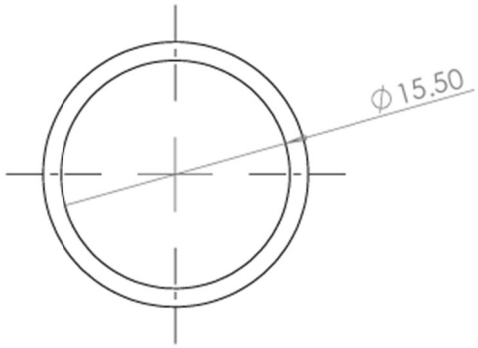
Criteria	Conventional Milling	Metal 3D print	CNC-Milling
Cost	1	1	2
Time	3	1	4
Power consumption	3	1	4
Surface Finish	3	2	5
	10	**5**	**15**

BR-0011-055

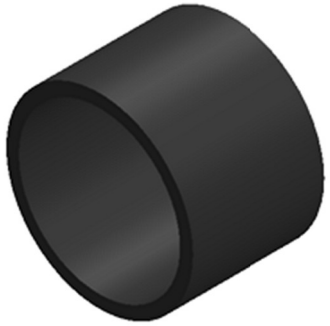
ACCELERATOR PEDAL SHAFT SLEEVE



FRONT VIEW



SIDE VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		20/02/2025	X mm	±0.05 mm		
DRAWN BY	W.A.A.L FERNANDO		.X mm	±0.03 mm		
			.XX mm	±0.01 mm	MATERIAL:	MEDIUM CARBON STEEL
			.XXX mm	±0.001 mm	SCALE:	2.5:1
CHECKED BY	B.S.P.BOGAHAWATTHA HEAD OF MANUFACTURING		X°	±0.5°	SHEET NUMBER:	20250220_001
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Manual Lathe operations

1. A medium carbon steel billet was securely mounted in a three-jaw chuck, and a facing operation was performed to achieve an open end.
2. Subsequently, a drilling operation was carried out, progressively enlarging the hole to an inner diameter of 15.5mm.
3. Following the drilling process, a turning operation was performed, gradually reducing the outer diameter to approximately 18mm, after which the component was polished to achieve the final outer diameter.
4. Finally, a sleeve was cut off at 13mm, and both ends were ground to achieve a precise length of 12.75mm.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

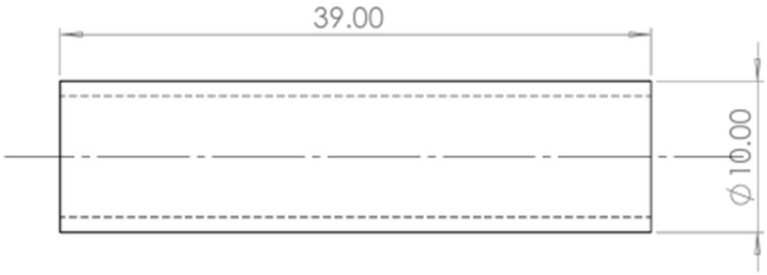
Property	Low carbon steel	High carbon steel	Al 6061 T6	Titanium
Availability	5	5	3	1
Machinability	4	3	5	2
Hardness	3	4	2	5
Yield Stress	4	3	2	5
Fatigue	3	4	2	5
Cost	4	2	2	1
Weight of a unit volume (light weight is better)	3	2	5	4
	26	**23**	**21**	**23**

Process

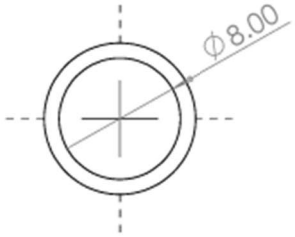
Criteria	Manual Lathe	Metal 3D print	CNC-Lathe
Cost	5	1	2
Time	3	1	4
Power consumption	4	1	3
Surface Finish	4	2	5
	16	**5**	**14**

BR-0011-056

BRAKE PEDAL HOLDER SLEEVES



FRONT VIEW



SIDE VIEW

ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		20/02/2025	X mm	±0.05 mm		
DRAWN BY	W.A.A.L FERNANDO		.X mm	±0.03 mm		
			.XX mm	±0.01 mm	MATERIAL:	Aluminum 6061 - T6
			.XXX mm	±0.001 mm	SCALE:	2.5:1
CHECKED BY	B.S.P.BOGAHAWATTHA HEAD OF MANUFACTURING		X°	±0.5°	SHEET NUMBER:	20250220_002
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Process flow

Aluminum 6061 billet heat treated from T0 to T6 to improve hardness, tensile strength, and dimensional stability for machining.

Manual Lathe operations

1. The aluminum 6061-T6 billet was securely mounted in a three-jaw chuck, and a facing operation was performed to clean the surface and create a smooth, flat face for further operations.
2. After the facing, a drilling operation was conducted to create a through hole of a specific inner diameter. The hole was gradually enlarged to meet the specified size (8mm), ensuring a precise fit.
3. Following the drilling operation, a turning process was carried out to reduce the outer diameter in between specified length to the required measurement. The turning operation was done in gradual steps until the final diameter was reached, after which the part was polished for a clean finish.
4. The final step involved cutting the sleeve at the specified length and grinding both ends to ensure a precise and smooth surface, meeting the required dimensional tolerances.
5. Then for short sleeve, the 8mm hole was enlarge into 10mm and same process done in longer sleeve, was carried out.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

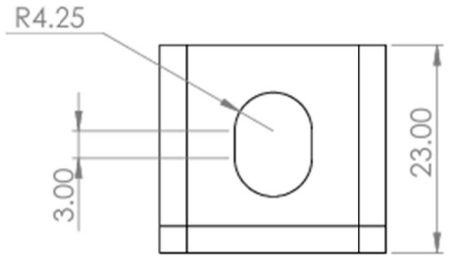
Property	Low carbon steel	High carbon steel	Al 6061 T6	Titanium
Availability	5	3	5	1
Machinability	4	3	5	2
Hardness	3	4	2	5
Yield Stress	4	3	2	5
Fatigue	3	4	2	5
Cost	3	2	5	1
Weight of a unit volume (light weight is better)	3	2	5	4
	25	**21**	**26**	**23**

Process

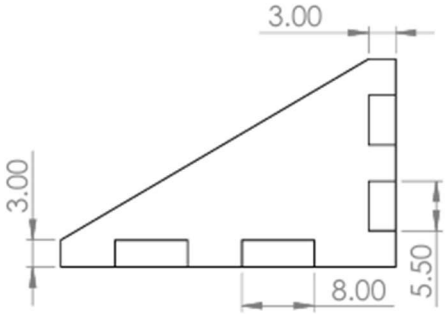
Criteria	Manual Lathe	Metal 3D print	CNC-Lathe
Cost	5	1	2
Time	3	1	4
Power consumption	4	1	3
Surface Finish	4	2	5
	16	**5**	**14**

BR-0001-057

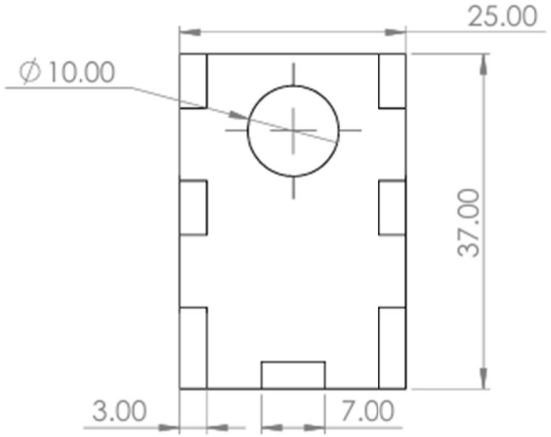
BRAKE PEDAL HOLDER RIB x 2 NOS



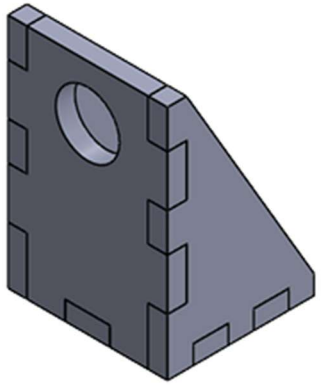
TOP VIEW



SIDE VIEW



FRONT VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		25/05/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	AISI 1020
			.XXX mm	±0.001 mm	SCALE:	1.5:1
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X°	±0.5°	SHEET NUMBER:	20250525-005
			.X°	±0.1°	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Brake pedal holder rib - BR-0001-057

Process flow

Laser cutting

1. 1.5mm zinc-coated sheet metal placed on machine bed.
2. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.

Then the parts were kept together and laser welded.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	4	2	5
Yield Stress	3	4	5	2	5
Fatigue	2	3	4	2	5
Cost	5	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	25	**21**	**20**	**17**	**23**

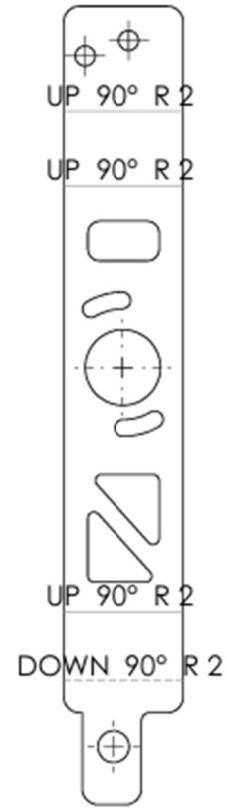
Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**

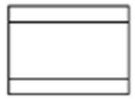
BR-0011-058

BRAKE ENCORDER MOUNT

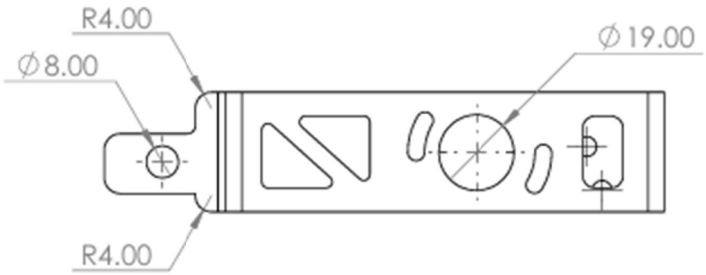


FLATTERN VIEW

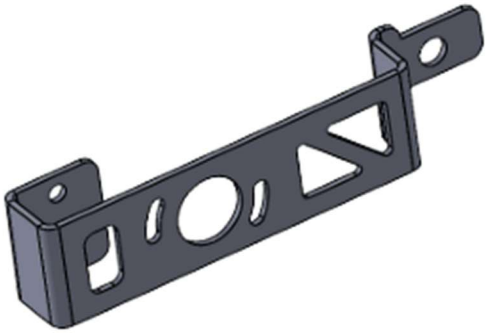
TOP VIEW



SIDE VIEW



FRONT VIEW



ISOMETRIC VIEW

		DATE	TOLERANCES: UNLESS OTHERWISE SPECIFIED		TEAM FALCON E RACING DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MORATUWA	
		25/05/2025	X mm	±0.05 mm		
DRAWN BY	A.G.C.O.ATADASWALA		.X mm	±0.03 mm		
CHECKED BY	B.S.P.BOGAHAWATTA HEAD OF MANUFACTURING		.XX mm	±0.01 mm	MATERIAL:	AISI 1020
			.XXX mm	±0.001 mm	SCALE:	1:1.5
AUTHORIZED BY	V.J.S.AMARATUNGA CHIEF EXECUTIVE OFFICER		X*	±0.5*	SHEET NUMBER:	20250525-004
			.X*	±0.1*	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	

Brake Encoder Mount - BR-0001-058

Process flow

Laser cutting

1. 1.5mm zinc-coated sheet metal placed on machine bed.

3. Laser power adjusted based on thickness. Cutting paths, bend paths and micro cuts defined as per design. Beam focused and laser cutting executed.

Then the parts were kept together and laser welded.

Decision matrix

The following decision matrices for material and process selection illustrate the relative value of each option. The overall scores derived from these matrices facilitate the identification of the most suitable choice based on defined criteria.

Material

Property	AISI 1020	AISI 4140	AISI 4340	Al 6061 T6	Titanium
Availability	5	4	3	1	1
Machinability	5	2	1	3	2
Hardness	3	4	4	2	5
Yield Stress	3	4	5	2	5
Fatigue	2	3	4	2	5
Cost	5	2	1	1	1
Weight of a unit volume (light weight is better)	2	2	2	5	4
	25	**21**	**20**	**17**	**23**

Process

The process is laser cutting and the manual bending for make the work piece into desired shape.

Criteria	Plasma cutting	Laser cutting	EDM
Cost	2	4	1
Time	5	5	4
Power consumption	3	4	3
Surface Finish and complex shapes	4	5	3
	14	**18**	**11**