GET IN TOUCH WITH US.

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FOUR-ROLL BENDING

PRECISION STRUCTURAL SPECIALIST CORP.

2021 - 2022

MLION CORP

INNOVATIVE SOLUTIONS REDEFINED

WHAT WE DO

IN 2016, SEVERAL MINI HYDROELECTRIC POWER PLANT OWNERS AND OPERATORS BROUGHT FORTH AN IDEA OF HAVING A PIPE PRODUCTION FACILITY MOBILIZED TO ROLL PIPES ON SITE.

Mini Hydro Power Plants are typically built on hilly terrain whereby they supply small sustainable electricity to communities in the nearby areas. However, due to the terrain it has been built on, it is often inaccessible.

Pipes have been traditionally rolled in factories and then transported to nearest ports by vessels and transferred to site by trucks. Pipes dimensions can range from 1 meter in Diameter to as large as 3 meters. These makes land transport extremely difficult to truck to site. The transport cost typically made up a large percentage of the pipe cost and in some extreme cases, they had to be air lifted to site.

Mlion Corporation took up this challenge to figure out a solution to solve this problem. Our main criteria were to have a way to have a factory mobilized in a remote location, with no grid power, being fully sustainable, roll pipes efficiently that meets ASTM or AWWA standards.

Another key aspect of being truly mobile, would be to have the equipment being able to fit within a 20-foot container. This would therefore allow for easy transportation to site by trucks and raw materials such as plates can be brought to site and rolled.

In 2019, what started as a request, became reality when we started Precision Structural Specialists Corporation in Davao. The factory consisting of a fully equipped Four Rolled Bend Machine and welding facility, would serve as a test bed to enable us to further improvements and achieve the goal of mobilizing on site for future projects. We ensured that all equipment could fit within a 20-foot container and we have successfully run the entire factory on generator power. Since 2020, we have been fully operational and have served many construction projects with pipes casings and load bearing usages.

INNOVATIVE SOLUTIONS REDEFINED.

TARGET MARKET

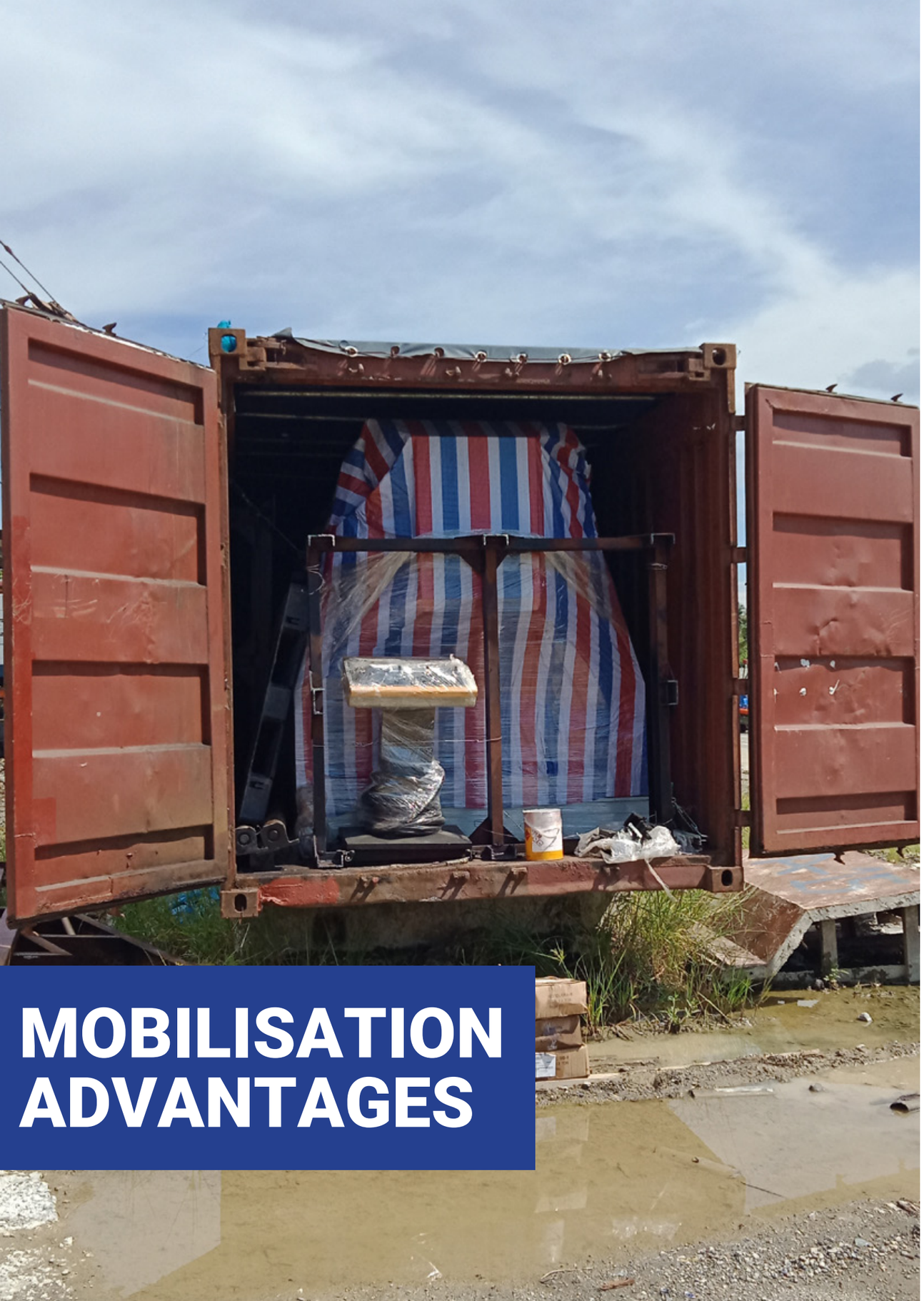
APPLICATION/ TARGET MARKET

- **CIVIL CONSTRUCTION APPLICATION**
  - Steel Pile Casing
  - Pile Shoes

- **WATER PIPE APPLICATION**
  - Hydroelectric

VALUE ADDED SERVICES

- Provide man-power (Welders, helpers, Machine Operators) to weld on site
- Sell Installation and commissioning machinery & equipment.
- Provide supervision and train people to use the equipment.



MOBILISATION ADVANTAGES

- Our FRB plant designed based on the concept of a **mobile plant.** Able to produce pipes even in rural/mountainous area.

- **Relocation of plant** – Dismantling, packing, reassembly, test run and full production in less than a month. (exclude tranportation shipping period).

- **Self-sustainable & Protection** – No grid power required and can be fully sustainable on diesel generators. Most equipments are IP-65 grade weather resistant, to withstand the rigors of harsh environments.

ECONOMIC ADVANTAGES

• **FRB Mobile Plant** has economic advantage due to the logistics cost saved by shipping plates as raw material of finished pipes. Due to the empty space inside of pipes, freight of large diameter pipes are highly inefficient.

• **Low wastage** as plates can be precut to finished sizes. Furthermore, FRB can switch sizes without any wastage incurred. Unlike Spiral welded pipes, wastage is incurred during tuning of the line, and due to the coil on the feeding table.

MACHINERY & EQUIPMENT LIST

MAIN MACHINE & EQUIPMENTS

- Four Roll Bending Machine
- Welding Manipulator/Column Boom
- Sub-Merge Arc Welding (SAW) Tractor

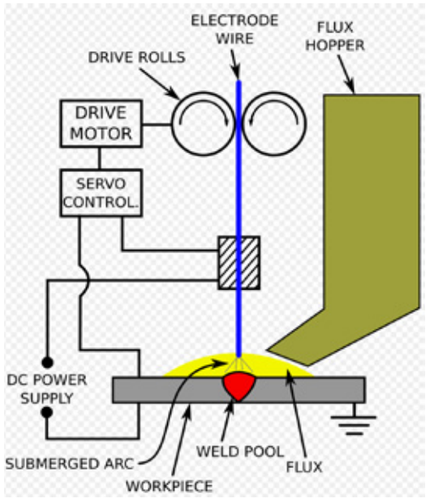
SECONDARY EQUIPMENTS

- Flux Oven (Flux Baking)
- Air Dryer (Flux Recovery System)
- Air Compressor
- Manual MIG (Metal Inert Gas)
- Arc Welding (Electrode) Machine
- Pipe Rotator

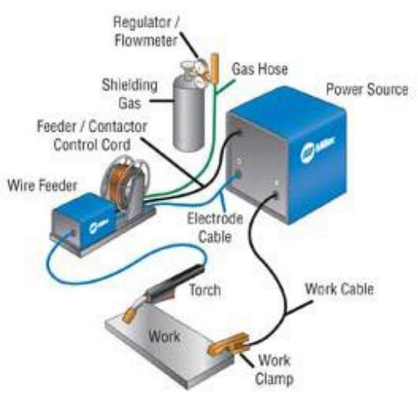
WELDING SYSTEM

TYPE OF WELDING SYSTEM

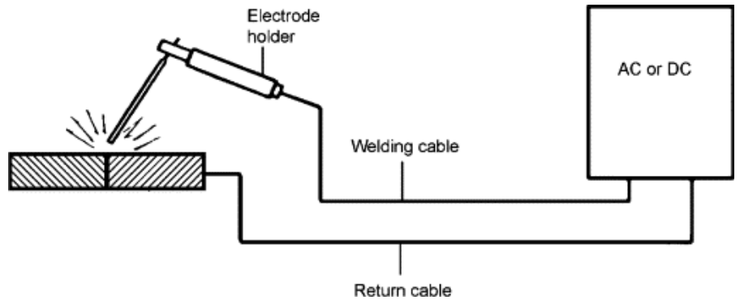
SAW
SUBMERGE ARC WELDING SYSTEM

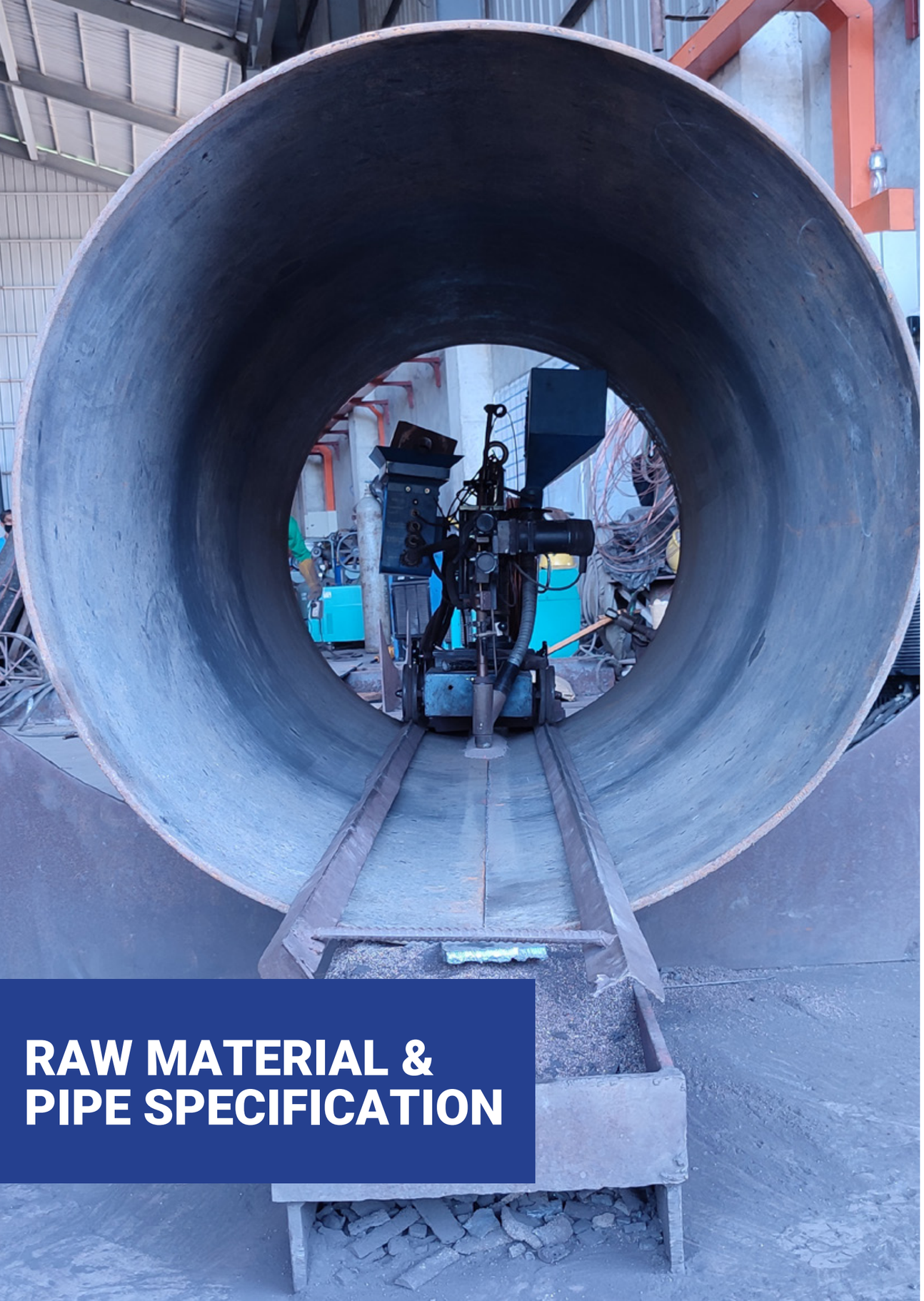


MIG
METAL INERT GAS WELDING SYSTEM



MMA
MANUAL METAL ARC WELDING SYSTEM





**RAW MATERIAL &
PIPE SPECIFICATION**

RAW MATERIAL

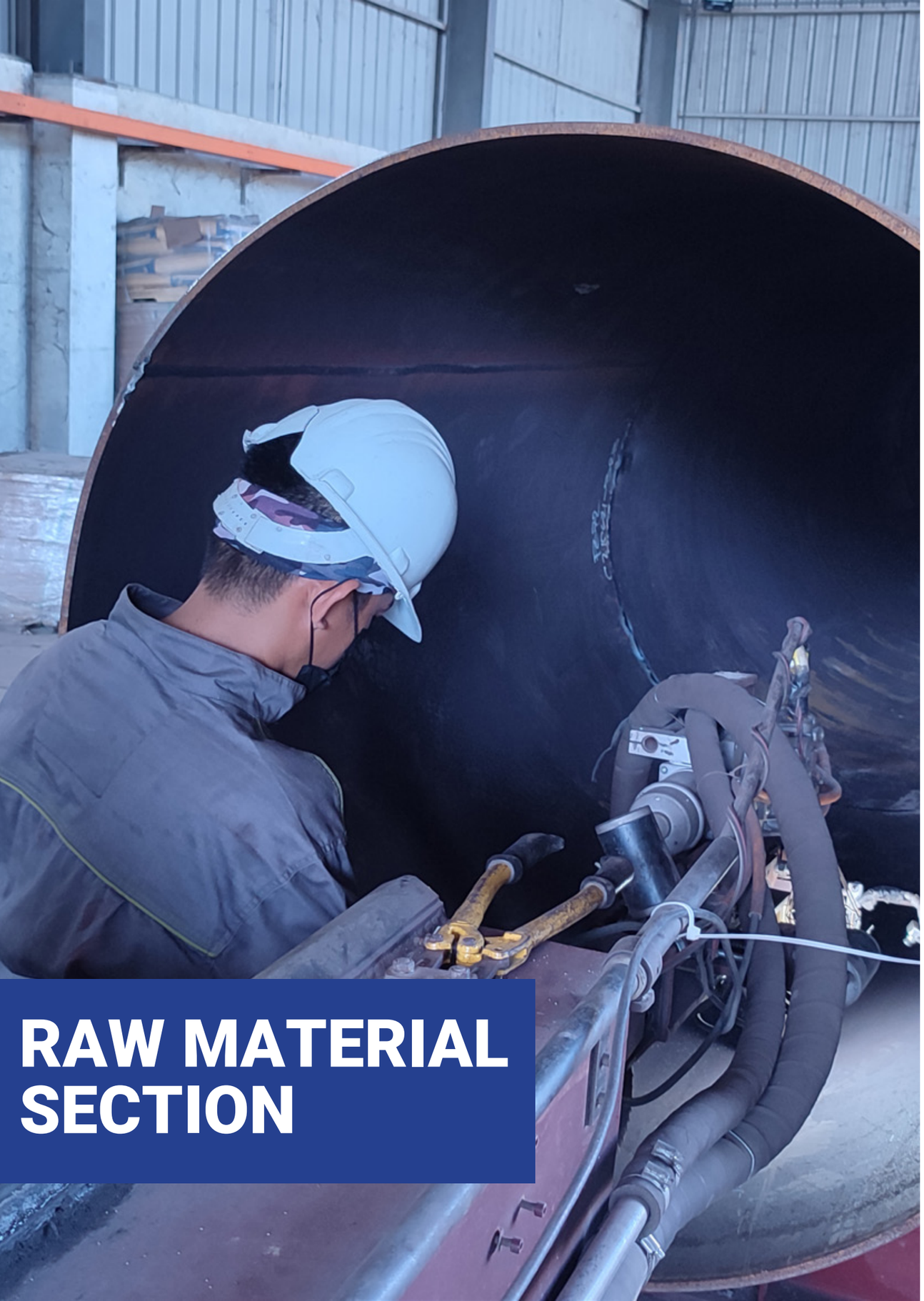
STANDARD PLATE SIZE:
- 6 x 20 ft; 8 x 40 ft

NON-STANDARD PLATE SIZE:
- 2 m x 40 ft

PLATE THICKNESS:
- 6 mm to 25 mm

PIPE SPECIFICATION

• PIPE DIAMETER	600 mm (thickness ≤ 6 mm) TO 3000 mm (Thickness ≥ 25 mm)
• PIPE THICKNESS	6 mm to 25 mm
• CAN/PLATE WIDTH	up to 2000 mm
• PIPE LENGTH	up to 12 m (max)
• PIPE WEIGTH	up to 15 t (max) (due to overhead crane capability)
• PIPE STANDARD	EN10219

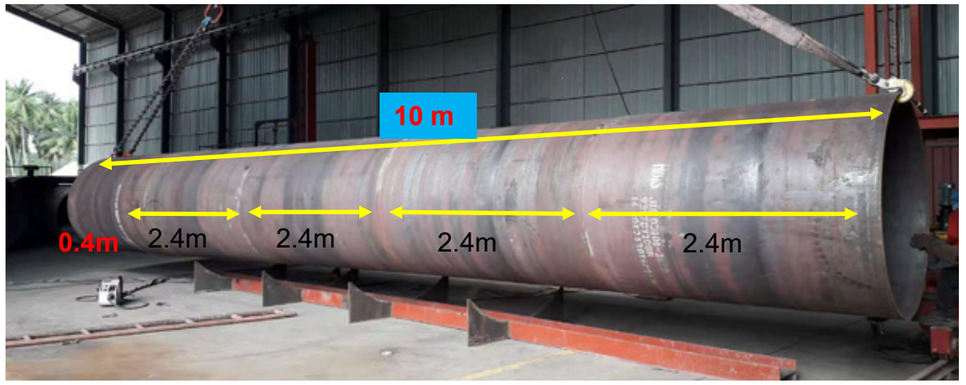


RAW MATERIAL SECTION

RAW MATERIAL SECTION

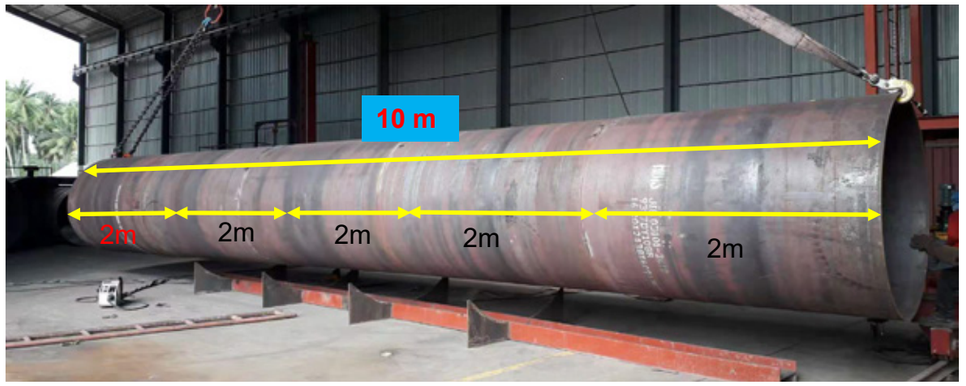
CASE STUDY:
For example, If 10m pipe length required:

METHOD 1:



(STANDARD PLATE SIZE: 8FT (2.4M) STRIP/PLATE WIDTH
(4 CANS X 2.4M) + (1 CAN X 0.4M)

METHOD 2:



(STANDARD PLATE SIZE: 8FT (2.4M) STRIP/PLATE WIDTH
(4 CANS X 2.4M) + (1 CAN X 2M)

Method 2 is less complicated and faster production compared to method 1.
Therefore, FRB No. 1 use size 2m plate/strip width.

PRODUCTION FLOW

FRB PLANT FLOW CHART

Plate Storage Area (Raw Material) (1)

Edge Preparation (by Gas Cutting) (2)

5%

WASTE DISPOSAL TANK (15)

REJECTED

Repair Station (8)

FAIL

Pipe Inspection

PASS

TAB REMOVAL

95%

Aft final bending

Four Roll Bending Machine (4)

REJECTED

Repair Station (8)

RETURN

Storage area after LS (7)

Send to final bending

Send to final bending

RETURN

FAIL

Storage area after 1st bend (5)

Pipe Inspection

PASS

TAB ON

LS Process (5MT Rotator x 2 sets) (6)

Send to final bending

UT Inspection

Storage area after 2nd bend (9)

Pipe Positioning (Tack Welding) (10)

CS Process (20MT rotator x 1 set) (11)

WASTE DISPOSAL RACK

REJECTED

Repair Station (12)

FAIL

Pipe Inspection

RETURN

PASS

Pipe Storage Yard (14)

Pipe Dispatch (13)

FOR REFERENCE ONLY

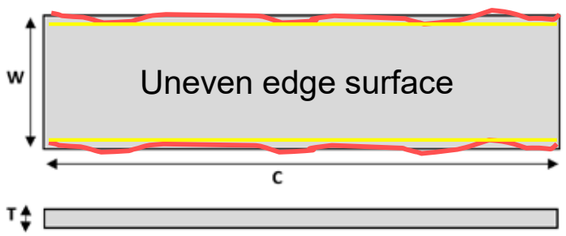
PLATE PREPARATION

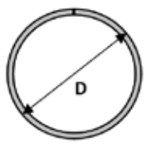
PLATE MARKING

Identify pipe sizes and numbering for each plate.

OXY-GAS CUTTING

for edge preparation & Cut to length process.

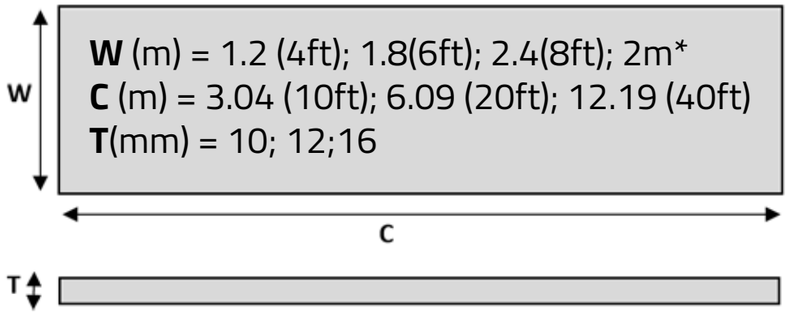




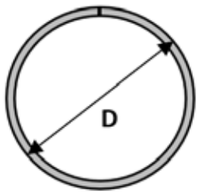
CIRCUMFERENCE, C = π X MD

W = PLATE WIDTH
T= PLATE THICKNESS

PLATE SELECTION

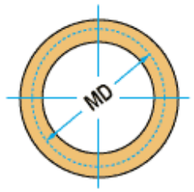


W (m) = 1.2 (4ft); 1.8(6ft); 2.4(8ft); 2m*
C (m) = 3.04 (10ft); 6.09 (20ft); 12.19 (40ft)
T(mm) = 10; 12;16



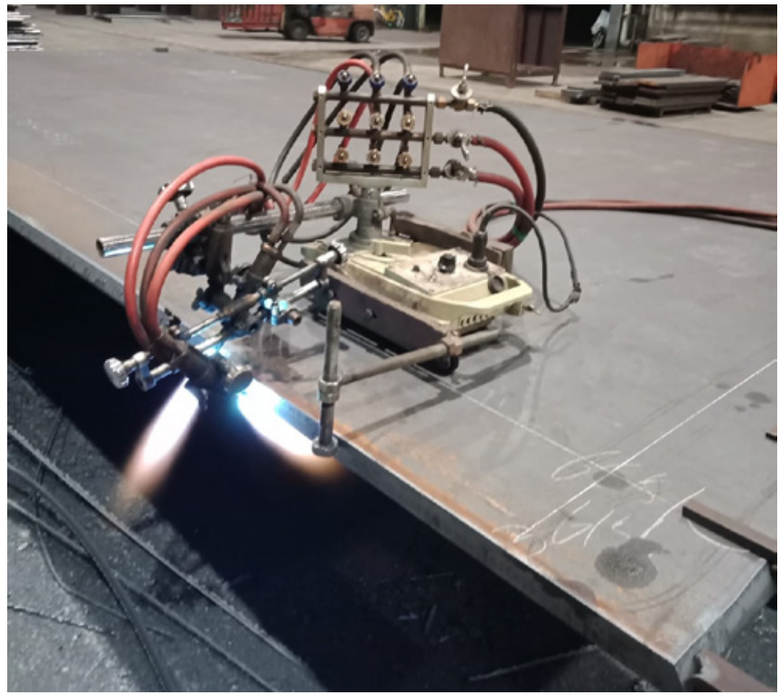
Example
OD1,200 x 12mm, What is figure C?
MD = 1,200mm -12mm = 1,188mm
Hence, C = 1,188 x 3.142 = 3,732mm

ID1000 x 10mm, what is figure C?
MD = 1,000mm + 10mm = 1,010mm
Hence, C = 1,010 x 3.142 = 3,173mm



We choose C as circumstance of pipe because it have a longer length compare to W
W is limited to length of 2.4m (Dia 760mm)

MD X π = C
WHERE π = 3.142



FRB GENSET

FOUR ROLL BENDING MACHINE

- Powered by Electric PLC System and hydraulic system.
- Consists of 2 X Side Rolls, 1 X Bottom Roll and 1 X Top Roll (driver)

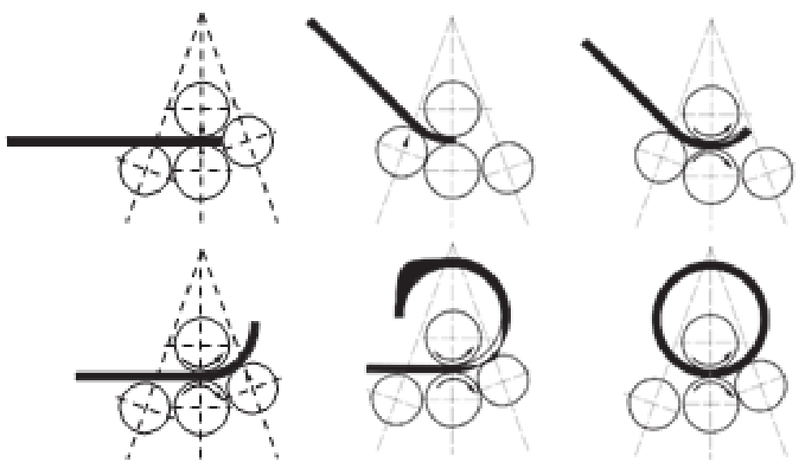
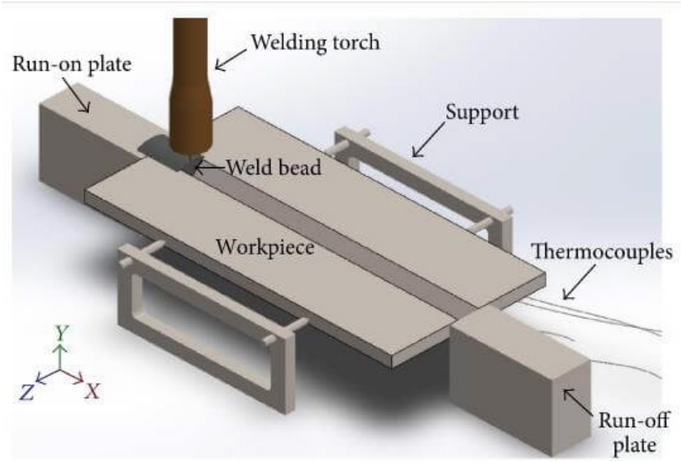


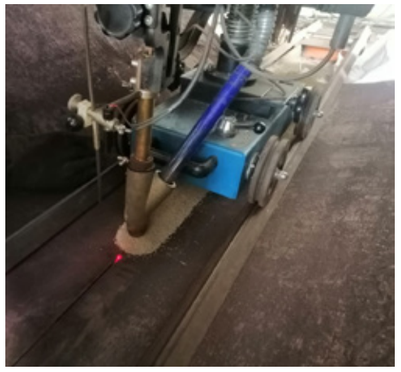
PLATE PREPARATION - TAB ON

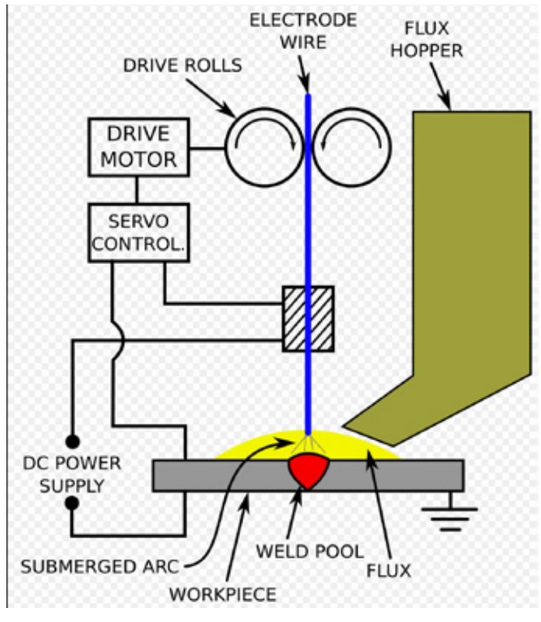
Tab-On Plate: To weld on edge of the plate/pipe Minimize the welding effect at the beginning and end of each seam welding.



LONGITUDINAL SEAM WELDING (LS)

- Welding Longitudinal: Pipe External and Internal
- By Saw Tractor Unit - Flux & Wire
- High Productivity, Fast Travel Speed (adjustable), High Repeatability and Better Quality Results





FEED-UP STATION

- Position of 2 Cans and more to form 1 Single Pipe
- By Manual MIG/Arc Welding to tack weld all Positioned Cans

WELDING MANIPULATOR

- Semi Automation Welding Machine
  - Saw Welding Machine
  - Flux Recovery System
  - Welding Camera
  - Circumference Seam Welding (CS)

CHECKING AND PREPARING

- Inspection Checking on the finishing pipe before dispatch
- Dimension Tolerance follow according to EN10219 standard.

FINISHED PIPE DISPATCHED

PIPE STORAGE YARD