
Metals & engineering SECTOR

World-class Engineered Metal Products and Services, a Pillar to Manufacturing Industries' Progress and Competitiveness

Pandaigdigang Pamantayan ng De-kalidad na Serbisyo at Produktong Metal: Sandalan ng Progresibo at Mahusay na Industriya ng Paggawa



Metals and Engineering Sector: Machining and Fabrication

Updated as of 26 February 2024

Overall Strategies

Human Recourse

- Training on CNC Machine programming, mechanical design, fabrication (e.g.gear)
- Training Centers for Metal Stamping and hydraulic press
- Basic TIG Welding and Advance Welding, SMAW, MIG and other Welding
- PLC Applications, Material Selection
- Training in automation and controls/electronics (e.g. multi-purpose grinder machine)
- Basic Metrology and 3D Modeling Software
- Repair and Maintenance of Equipment
- QMS for Fabrication of Machines
- Certification of machine shop for aerospace industry

R&D Technologies

- Design and Development of innovative, cost-effective equipment
- Integrated R&D Centers
- Establishment/Development of Primary/Secondary Traceability Standards in Support to Metals Industry
- Support technologies to Aerospace Industries
- R&D Application on robotics and mechatronics for shop automation

Facilities / Services

- Regional Innovation Centers in Regions CAR, I, II, III, IVA, IVB, V, VI, VII, VIII, IX, X, XI, XII
- Training Center for Automation and Controls
- Metal Testing Center (e.g. Tensile, Compression, Hardness)

Facilities / Services

- Upgraded Facility for Machining and Fabrication
- Upgraded 3D Printing Technology Facility for Aerospace, jigs and fixtures
- Testing Facility/Services:
 - Chemical Testing for Metals
 - NDT, Toxicity and Flammability
 - Coil testing and Aging Test
 - Material testing and quality
 - Infrared Spectrum Test
 - Elemental Analysis: e.g EDX
 - Failure/ endurance analysis test

S&T Policies

- Standard reference on mechanical design and fabrication of different machineries intended for Agri-industry and other metal related equipment
- Standard reference on material selection

< P25.6M >

- Establishments of Regional Innovation Centers in Regions CAR, I, II, III, and X
- Design and Prototyping of Salt Harvesting Equipment
- Design & Development of a Mechanical Garlic & Cashew Chipper
- Development of De-Oiling Equipment for Deep Fired Peanuts & Garlic Chips

People:
at least 2 skilled equipment designer
Product:
2 Locally-fabricated equipment
Places:
2 Innovation Center for fabrication of Agri and Industrial Equipment

2020

R&D Solution

< P38.01M >

- Establishments of Regional Innovation Centers in Regions CAR, I, II, and X
- Design and Prototyping of Salt Harvesting Equipment
- Capability Building for Certification for Aerospace Standards
- Design & Development of a Mechanical Garlic & Cashew Chipper
- Development of a Liner-Enhanced Curing Vessel for Salted Egg Production of Eggciting Traditions
- Development of De-Oiling Equipment for Deep Fired Peanuts & Garlic Chips

People:

- at least 10 trained personnel on fabrication and equipment maintenance
- at least 4 skilled equipment designer
- at least 4 trained personnel for certification for Aerospace Standards

Product:

At least 4 Locally- fabricated equipment

Places:

2 Innovation Center for fabrication of Agri and Industrial Equipment

Patent:

UM of fabricated equipment

< P18.4M >

- Establishments of Regional Innovation Centers in Regions CAR, I, II, III, and X
- Establishments of Regional Innovation Centers in Regions IVA, IVB, V, VI, VII, IX, X, XI, XII and CARAGA
- Establishment of Upgraded Metal Testing Center Applicable to the Needs of the Metal Industry
- R&D Application on Robotics and Mechatronics for shop automation
- Design and Prototyping of Salt Harvesting Equipment
- Development of a Liner-Enhanced Curing Vessel for Salted Egg Production of Eggciting Traditions
- Design Improvement & Sea testing of a Remote Controlled Weapon System
- Capability Building for Certification for Aerospace Standards

2021

People:

- at least 10 skilled personnel on fabrication and equipment maintenance
- at least 1 skilled personnel on PLC Applications, automation and controls/electronics, mechatronics, CNC Programmers
- at least 4 skilled equipment designer
- at least 4 trained personnel for certification for Aerospace Standards

Product:

- at least 6 fabricated equipment
- At least 2 Locally-fabricated equipment (e.g. food processing industry, Agri-industry, essential oils and fragrances, aerospace, etc.)
- at least 1 automated equipment for shop process application

Places:

5 Innovation Center for Fabrication of Agri and Industrial Equipment

Patent:

2 facilities for Metal Testing

2022

< P858.72M >

- Establishments of Regional Innovation Centers in Regions CAR, I, II, and X
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- Design and Development of Technology-Based Products for Aerospace Applications
- Recovery & Reuse of Abrasive Grains
- Project COBRA
- SILT Project
- Capability Building for Certification for Aerospace Standards
- Legal Metrology
- Subsonic Wind Tunnel Project
- ASIN Project 1
- ASIN Project 2
- OneLab for TED

People:

- at least 15 skilled personnel on fabrication and equipment maintenance
- at least 1 skilled personnel on PLC Applications, automation and controls/electronics, mechatronics, CNC Programmers
- at least 6 personnel trained on metal testing equipment
- at least 2 skilled personnel on aerospace product development
- at least 4 skilled equipment designer
- at least 4 trained personnel for certification for Aerospace Standards
- 4 NML staff trainees

Product:

- at least 6 fabricated equipment
- at least 1 automated equipment for shop process application
- at least 2 products developed
- At least 2 Locally-fabricated equipment (e.g. food processing industry, Agri-industry, essential oils and fragrances, aerospace, etc.)
- 15 units equipment & standards

Places:

5 Innovation Center for Fabrication of 2 calibration rooms renAgri and Industrial Equipment

Patent:

UM of the fabricated equipment

Partnership:

- at least 1 company/institution per region
- linkage on aerospace industry

2023

< P236.92M >

- Establishments of Regional Innovation Centers in Regions IVA, IVB, V, VI, VII, IX, X, XI, XII and CARAGA
- R&D Application on Robotics and Mechatronics for shop automation
- Design and Development of Technology-Based Products for Aerospace Applications
- Establishment of Micro Machining Facility
- Capability Building for Certification for Aerospace Standards
- Expanding the Capability of Physical Metrology
- Legal Metrology
- Subsonic Wind Tunnel Project
- ASIN Project 1
- ASIN Project 2
- Project COBRA
- Subsonic Wind Tunnel Project
- OneLab for TED

People:

- 20 skilled faculty staff on design and fabrication of equipment
- At least 118 trained personnel on different areas in metrology
- 5 personnel from the partner industry
- 2-3 graduate/undergraduate involvement for grinding wheel processing
- At least 5 personnel employed with ASIN Project researcher
- 234 personnel trained (OneLab services)
- 67 subject matter experts
- 157 approved/recognized signatories (OneLab services)
- 1 training program granting CPD units
- 11 R&D services conducted

Products:

- 2 fabricated Coffee Drip Machine
- 1 fabricated Wind Tunnel
- 1 fabricated Spinning Disc
- 1 Fabricated Gun-Mount
- 2 fabricated recovered grinding wheel

- 1 Municipal and Provincial Suitability map of Saltern Farms
- 1 training resource material for Calibration of Anemometers
- 1 interlaboratory comparison for Calibration of Anemometers Calibration service for Anemometers

2024

Legend (Text Font):

New/Ongoing	Completed	Target
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People:

- 26 approved/recognized signatories (OneLab services)
- At least 2 trained personnel/researchers on salt production technologies
- At least 1 salt producer association
- Conducted at least 2 seminars to salt farmers, region1 LGUs, and academe related to salt.
- At least 1 employed staff personnel in the laboratory.
- At least 20 processors trained on salt production and maintenance, post production and handling.
- At least 5 MS students engaged in the project
- At least 50 students and 20 LGU staff trained in GIS suitability mapping, saltern design and establishment
- At least 5 personnel employed employment
- 20 trained personnel on Equipment design and fabrication

Milestones

2025

< P271.3M >

- Establishments of Regional Innovation Centers in Regions IVA, IVB, V, VI, VII, IX, X, XI, XII and CARAGA
- Establishment of Micro Machining Facility
- Design and Development of innovative, cost effective and appropriate Machinery, Parts and Engineered Products (MPEPs) (e.g. food processing industry, Agri-industry, essential oils and fragrances, aerospace, etc.)
- Capability Building for Certification for Aerospace Standards
- Expanding the Capabilities of Physical Metrology

Overall Outcomes

Human Recourse

- At least 50 personnel on fabrication and equipment maintenance
- at least 18 skilled equipment designer
- at least 20 trained personnel for certification for Aerospace Standards
- at least 2 skilled personnel on PLC Applications, automation and controls/electronics, mechatronics, CNC Programmers
- at least 4 skilled personnel on aerospace product development
- at least 6 trained on metal testing
- At least 8 skilled micro machinist

R&D Technologies

- At least 46 locally fabricated equipment
- 4 products developed for aerospace
- 2 automated equipment

Facilities / Services

- 14 established Innovation Center
- 2 Metal Testing Facilities
- at least 10 established services
- 2 micro-machining facilities

S&T Policies

2 S&T policies



Metals and Engineering Sector: Machining and Fabrication

Updated as of 26 February 2024

Legend (Text Font):	New/ Ongoing	Completed	Target
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Overall Strategies

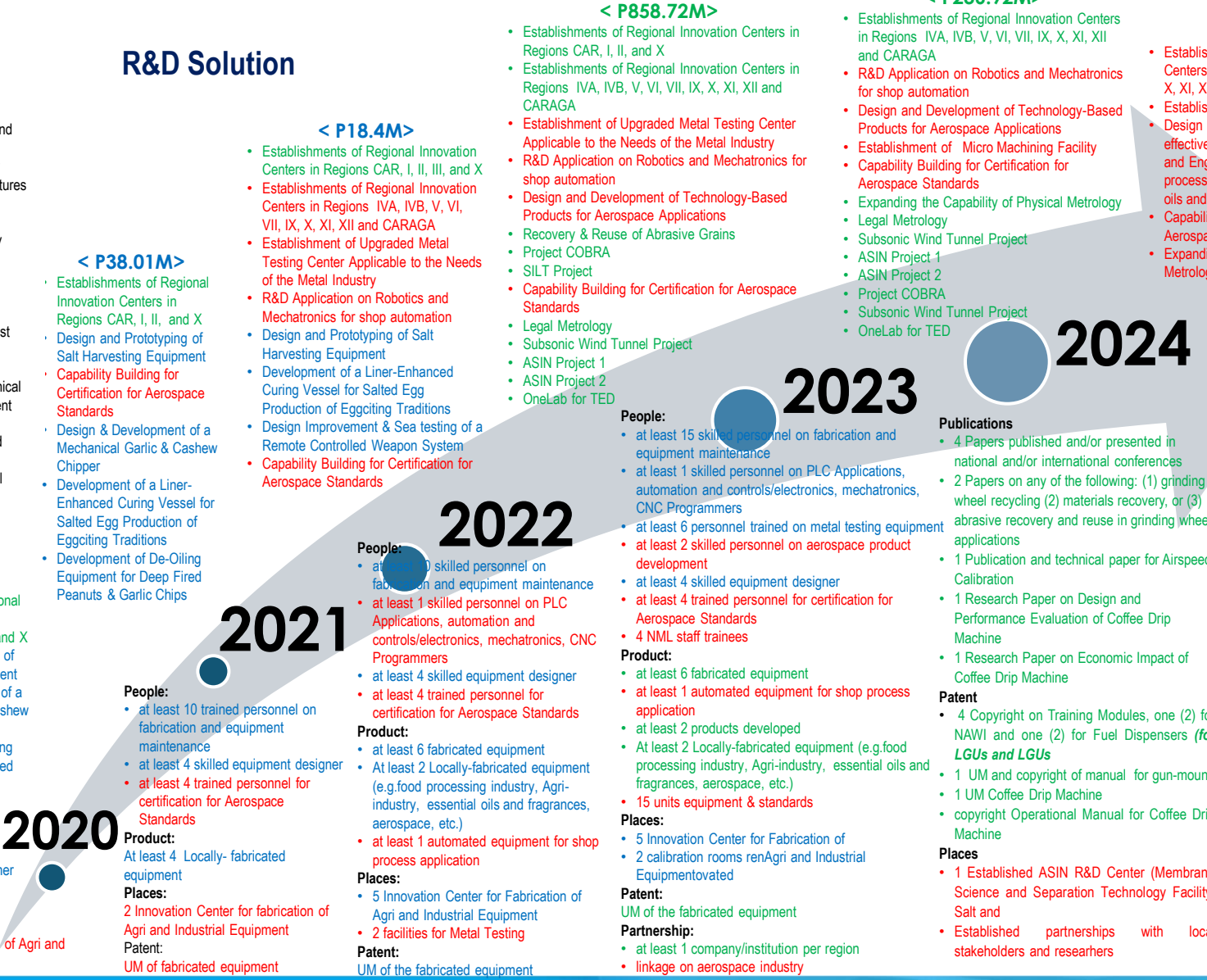
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R&D Solution



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- Establishments of Regional Innovation Centers in Regions IVA, IVB, V, VI, VII, IX, X, XI, XII and CARAGA
 - Establishment of Micro Machining Facility
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 - Capability Building for Certification for Aerospace Standards
 - Expanding the Capabilities of Physical Metrology

Overall Outcomes

- Human Recourse**
- At least 50 personnel on fabrication and equipment maintenance
 - at least 18 skilled equipment designer
 - at least 20 trained personnel for certification for Aerospace Standards
 - at least 2 skilled personnel on PLC Applications, automation and controls/electronics, mechatronics, CNC Programmers
 - at least 4 skilled personnel on aerospace product development
 - at least 6 trained on metal testing
 - At least 8 skilled micro machinist
- R&D Technologies**
- At least 46 locally fabricated equipment
 - 4 products developed for aerospace
 - 2 automated equipment
- Facilities / Services**
- 14 established Innovation Center
 - 2 Metal Testing Facilities
 - at least 10 established services
 - 2 micro-machining facilities
- S&T Policies**
- 2 S&T policies



Metals and Engineering Sector: Machining and Fabrication

Updated as of 26 February 2024

R&D Solution

Overall Strategies

Human Recourse

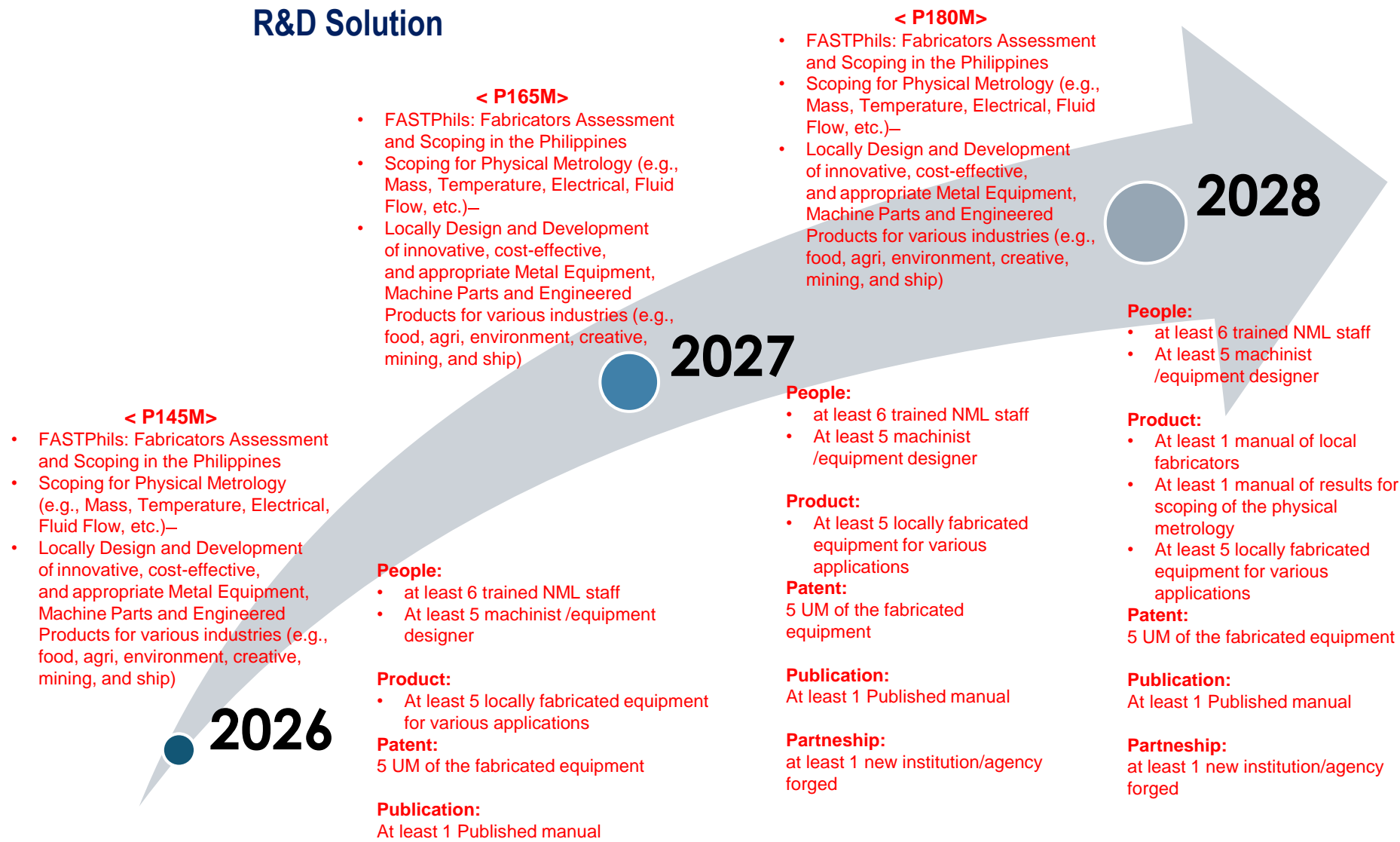
- Training on CNC Machine programming, mechanical design, fabrication (e.g.gear)
- Metrology Trainings

R&D Technologies

- Design and Development of innovative, cost-effective equipment
- Integrated R&D Centers
- Establishment/Development of Primary/Secondary Traceability Standards in Support to Metals Industry
- Support technologies to Aerospace Industries
- R&D Application on robotics and mechatronics for shop automation

Facilities / Services

S&T Service Facility for the Industry



- < P145M >**
- FASTPhils: Fabricators Assessment and Scoping in the Philippines
 - Scoping for Physical Metrology (e.g., Mass, Temperature, Electrical, Fluid Flow, etc.)—
 - Locally Design and Development of innovative, cost-effective, and appropriate Metal Equipment, Machine Parts and Engineered Products for various industries (e.g., food, agri, environment, creative, mining, and ship)

- < P165M >**
- FASTPhils: Fabricators Assessment and Scoping in the Philippines
 - Scoping for Physical Metrology (e.g., Mass, Temperature, Electrical, Fluid Flow, etc.)—
 - Locally Design and Development of innovative, cost-effective, and appropriate Metal Equipment, Machine Parts and Engineered Products for various industries (e.g., food, agri, environment, creative, mining, and ship)

- < P180M >**
- FASTPhils: Fabricators Assessment and Scoping in the Philippines
 - Scoping for Physical Metrology (e.g., Mass, Temperature, Electrical, Fluid Flow, etc.)—
 - Locally Design and Development of innovative, cost-effective, and appropriate Metal Equipment, Machine Parts and Engineered Products for various industries (e.g., food, agri, environment, creative, mining, and ship)

2026

People:

- at least 6 trained NML staff
- At least 5 machinist /equipment designer

Product:

- At least 5 locally fabricated equipment for various applications

Patent:

5 UM of the fabricated equipment

Publication:

At least 1 Published manual

Partnership:

at least 1 new institution/agency forged

2027

People:

- at least 6 trained NML staff
- At least 5 machinist /equipment designer

Product:

- At least 5 locally fabricated equipment for various applications

Patent:

5 UM of the fabricated equipment

Publication:

At least 1 Published manual

Partnership:

at least 1 new institution/agency forged

2028

People:

- at least 6 trained NML staff
- At least 5 machinist /equipment designer

Product:

- At least 5 locally fabricated equipment for various applications

Patent:

5 UM of the fabricated equipment

Publication:

At least 1 Published manual

Partnership:

at least 1 new institution/agency forged

Overall Outcomes

Human Recourse

- At least 6 trained NML staff
- At least 49 machinist/equipment designer

R&D Technologies

- 5 units calibration equipment and standards
- 8 new calibration services
- 6 PT schemes
- 4 training course on Kibble Balance

Facilities / Services

- At least 12 services offered for the established facility
- Services on primary and secondary calibration standards
- 2 calibration rooms renovated
- At least 2 facilities for machining and fabrication

List of Projects

Sub-sector 1: Machining and Fabrication									
R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
1. Design and Development of innovative, cost effective and appropriate Machinery, Parts and Engineered Products (MPEPs) (e.g. food processing industry, Agri-industry, essential oils and fragrances, aerospace, etc.) Budget: 2022 (Php 70M) 2023 (Php 30M)	1. Design Improvement & Sea Testing of a Remote Controlled Weapon System	4,070.25	-	-	-	-	-	-	
	2. Recovery and Reuse of Abrasive Grains from Waste Grinding Wheel	-	3,715.67	928.92	-	-	-	-	ongoing
	3. 'Project COBRA (Controller Operated Battle Ready Armament)	-	18,038.35	6,248.35	-	-	-	-	on-going
	4. Conversion of Quarry Wastes (Silt) Into High Temperature Refractory Bricks	-	4,150.88	1,037.72	1,318.49	-	-	-	ongoing (returned to Envi)
	5. Project 1. Development of sustainable and climate-resilient salterns: Best practicees, standardization, site mapping, and pilot establishment of saltern technology	-	-	17,226.80	9,616.64	-	-	-	to be implemented on 2024
	6. Project 2. Establishment of Asin R&D Center	-	-	30,533.58	8,472.92	-	-	-	to be implemented on 2024

List of Projects

Sub-sector 1: Machining and Fabrication									
R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2. Integrated R&D Centers Budget: 2022 (Php 110M) 2023 (Php 90M)	1. Establishment of Metals and Engineering Innovation Center in CAR, Regions, I,II, III and X	14,419.29	13,435.30	-	-	-	-	-	extended until July 2024
	2. Establishment of Metals and Engineering Innovation Center for Regions IV-A, IV-B, V, VI, VII, VIII, IX, XI, XII and CARAGA	-	128,587.14	30,520.00	16,929.50	-	-	-	ongoing
3. Establishment/ Development of Primary/Secondary Traceability Standards in Support to Metals Industry Budget: 2023 (Php 166.9M)	1. Aligning the Capabilities of Metro Manila's Local Legal Metrology Authorities to the ASEAN Guidelines for Non-Automatic Weighing Instruments (NAWI) and Fuel Dispensers	-	4,875.78	835.27	-	-	-	-	ongoing
	2. Design and development of a subsonic wind tunnel system for airspeed realization and calibration	574.29	17,828.29	6,164.29	-	-	-	-	on-going
4. Capability Building for Certification for Aerospace Standards Budget: 2022 (Php 10M) 2023 (Php 10M)	no proposal received	-	-	-	-	-	-	-	for validation in FGD



List of Projects

Sub-sector 1: Machining and Fabrication									
R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
5. Design and Development of Technology-Based Products for Aerospace Applications (Php 20M)	no proposal received	-	-	-	-	-	-	-	no accomplishment for this area
6. R&D Application on Robotics and Mechatronics for shop automation Budget: 2022 (Php 20M)	no proposal received	-	-	-	-	-	-	-	no accomplishment for this area
7. Others (not identified in the roadmap)	Smarter OneLab for Industry 4.0 through Testing and Calibration, Education, and Discovery (OneLab for TED)	-	668,628.04	143,426.88	145,831.88	-	-	-	on-going



Roadmap Assessment: Machining and Fabrication

The Metals and Engineering Sector conducted a series of Industry Dialogue from 2020 to 2023 to update its roadmap. Through the conducted activities, the sector have its new priority programs and projects that any researchers can proposed on. However, only 12 projects were approved out of the targeted 28 projects and implemented from 2020 to 2023 with an actual budget of Php941.24M. Still, there were targeted topics that were not accomplished due to the following reasons:

- a. Most of the submitted proposals does not qualify under the priority areas based on the roadmap
- b. the proposals were not practical
- d. the proposals have no identified needs/demand
- e. No proposals received for specific calls in the roadmap

Major Accomplishments

Established 5 Innovation Center for Fabrication of Agri and Industrial Equipment (CAR, I, II, III and X), fabricated 37 equipment, 4 equipment applied for UM, Trained 49 personnel on equipment fabrication and design, 25 partners

Challenges	Recommendations
1. Project that is dependent to season was not considered during its implementation which resulted to project extension	Identify the project/s that is/are dependent to season and possibly adjust its implementation to avoid extensions and other events that may defer its deliverables.
2. The cooperator has different specs of the equipment from initial consultations and agreed Collaborative Research Agreement.	Advise the implementing agency to coordinate with its cooperating agency and outline clearly the Collaborative Research Agreement of the project to avoid future problems.
3. Undelivered major project's output because of unforeseen and unmanaged risk (e.g., no fabricator for specialized equipment).	Advise implementing agency to clearly outline all possible risks of the project especially for equipment fabrication and procurement.
4. No proposals received in some of the identified priority areas in the past 3 years.	Validate with concerned industries the identified priority areas in the roadmap and be more specific with the call.
5. Low number of proposals received based on the priority areas due to dwindling pool of experts despite initial engagement.	Look for new linkages/partners/possible implementors of a project.
6. Low number of approved projects due to these reasons due to unmet criteria.	Advise in advance our linkages/partners/proponent about the Council's criteria of evaluation for them to be prepared of the documents needed prior to proposal submission.

Way Forward

1. Conduct pre-engagement activities/meeting with the sector's partners/implementors/proponent.
2. Widen sector's linkages by engaging to new industries.
3. Direct call and identify/match possible proponent and cooperating agency/industry that will do the identified area/s.
4. Conduct of site visits to various metals industries to update the sector of the latest trends and novel technologies.



Metals and Engineering Sector: Metal Casting

Overall Strategies

- Human Recourse**
- Training of company personnel on foundry PNS (patter design)-metal casting
 - Training on Heat treatment processes, anodizing and plating
 - Metal Casting for Foundry Practice
 - Certification for anodizing and electroplating

- S&T Policies**
- Standard requirement reference for a metal casting facility.
 - Standardization and harmonization of foundry practice.

- R&D Technologies**
- Reduction power cost in foundries, recycling of foundry sand
 - Development of natural resource e.g. ferrous alloys and good quality pig iron
 - Develop blind binderies molding system
 - Standardization of Cupola Furnace
 - High version of locally cast products
 - Improved efficiency for melting due to high power cost.
 - Tech transfer for the use of Pig Iron
 - Utilization of local materials
 - Metal Injection molding Technology
 - Development of Innovative Casting Techniques (molding, melting, casting design)
 - Development of Induction Furnace foundry equipment casted products

- Facilities / Services**
- Metal Casting Innovation Center Foundry for Casting of Large Aluminum Molds
 - Heat Treatment Program (facility and trainings)- Quenching and Tempering
 - Pilot foundries in the Universities/
 - Metal Injection Technology
 - Training Center for Induction Casting Facility for Metals Parts and Components
 - Metal Waste treatment facility
 - Upgraded Heat Treatment Facility
 - Chemical Analysis for non-ferrous with Certification 1807025
 - Promotion of the use of local facilities and laboratories
 - Upgraded Melting Facility/Induction Furnace
 - Foundry for Cast Iron materials

- < P35M>**
- Establishments of Regional Innovation Centers in Region III (reflected in Machining)
 - R&D on Advanced Metal casting and Metal Injection Technologies for Various Applications

- < P15M>**
- Establishment of Regional Innovation Center in Region III (reflected in Machining)
 - R&D on Advanced Metal casting and Metal Injection Technologies

Product: at least 2 developed casted products
Places: 2 established facilities for metals casting
Policy: Standard requirement reference for a metal casting facility

R&D Solutions

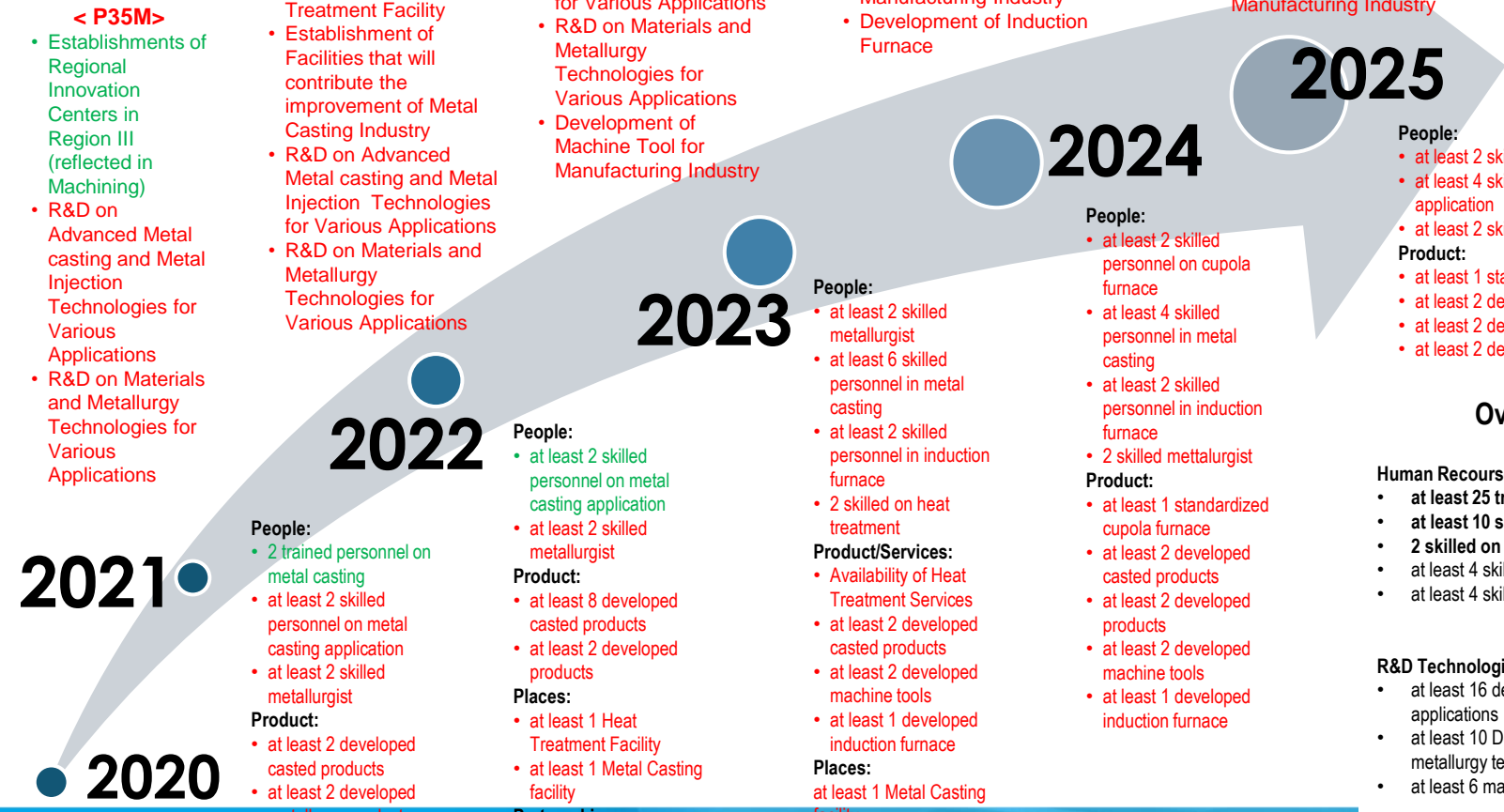
- < P76M>**
- Establishments of Regional Innovation Centers in Region III (reflected in Machining)
 - Establishment of Upgraded Heat Treatment Facility
 - Establishment of Facilities that will contribute the improvement of Metal Casting Industry
 - R&D on Advanced Metal casting and Metal Injection Technologies for Various Applications
 - R&D on Materials and Metallurgy Technologies for Various Applications

- People:**
- 2 trained personnel on metal casting
 - at least 2 skilled personnel on metal casting application
 - at least 2 skilled metallurgist
- Product:**
- at least 2 developed casted products
 - at least 2 developed metallurgy products

- < P90M>**
- Establishment of Facilities that will contribute the improvement of Metal Casting Industry
 - Establishment of Upgraded Heat Treatment Facility
 - R&D on Advanced Metal casting and Metal Injection Technologies for Various Applications
 - R&D on Materials and Metallurgy Technologies for Various Applications
 - Development of Machine Tool for Manufacturing Industry

- < P65M>**
- Standardization of Cupola Furnace
 - R&D on Advanced Metal casting and Metal Injection Technologies for Various Applications
 - Development of Machine Tool for Manufacturing Industry
 - Development of Induction Furnace

- < P55M>**
- Standardization of Cupola Furnace
 - R&D on Advanced Metal casting and Metal Injection Technologies for Various Applications
 - R&D on Materials and Metallurgy Technologies for Various Applications
 - Development of Machine Tool for Manufacturing Industry



- 2020**
- People:**
- at least 2 skilled metallurgist
- Product/Services:**
- Availability of Heat Treatment Services
 - at least 2 developed casted products
 - at least 2 developed machine tools
 - at least 1 developed induction furnace
- Places:**
- at least 1 Metal Casting facility
- Policy:**
- Standardization and harmonization of foundry practice.

- 2021**
- People:**
- at least 2 skilled metallurgist
 - at least 6 skilled personnel in metal casting
 - at least 2 skilled personnel in induction furnace
- Product:**
- at least 8 developed casted products
 - at least 2 developed products
- Places:**
- at least 1 Heat Treatment Facility
 - at least 1 Metal Casting facility
- Partnership:**
- at least 1 company/institution per region

- 2022**
- People:**
- at least 2 skilled metallurgist
 - at least 2 skilled personnel on metal casting application
 - at least 2 skilled metallurgist
- Product:**
- at least 2 developed casted products
 - at least 2 developed products
- Places:**
- at least 2 skilled metallurgist

- 2023**
- People:**
- at least 2 skilled metallurgist
 - at least 4 skilled personnel in metal casting
 - at least 2 skilled personnel in induction furnace
- Product:**
- at least 1 standardized cupola furnace
 - at least 2 developed casted products
 - at least 2 developed products
 - at least 2 developed machine tools
 - at least 1 developed induction furnace

- 2024**
- People:**
- at least 2 skilled personnel on cupola furnace
 - at least 4 skilled personnel in metal casting
 - at least 2 skilled metallurgist
- Product:**
- at least 1 standardized cupola furnace
 - at least 2 developed casted products
 - at least 2 developed products
 - at least 2 developed machine tools

- 2025**
- People:**
- at least 2 skilled personnel on cupola furnace application
 - at least 2 skilled metallurgist
- Product:**
- at least 1 standardized cupola furnace
 - at least 2 developed casted products
 - at least 2 developed products
 - at least 2 developed machine tools

Overall Outcomes

- Human Recourse**
- at least 25 trained personnel on metal casting
 - at least 10 skilled metallurgist
 - 2 skilled on heat treatment
 - at least 4 skilled personnel in induction furnace
 - at least 4 skilled personnel on cupola furnace

- R&D Technologies**
- at least 16 developed casted products for different applications
 - at least 10 Developed metal casting, materials and metallurgy technologies
 - at least 6 machine tool products

- Facilities / Services**
- 2 established facilities for metals casting
 - 1 heat treatment facility
 - 1 innovation center for metals casting
- S&T Policies**
- 2 S&T policies

Milestones

Metals and Engineering Sector: Metal Casting

Overall Strategies

Human Recourse

Training related to latest updates on Metal Casting Applications

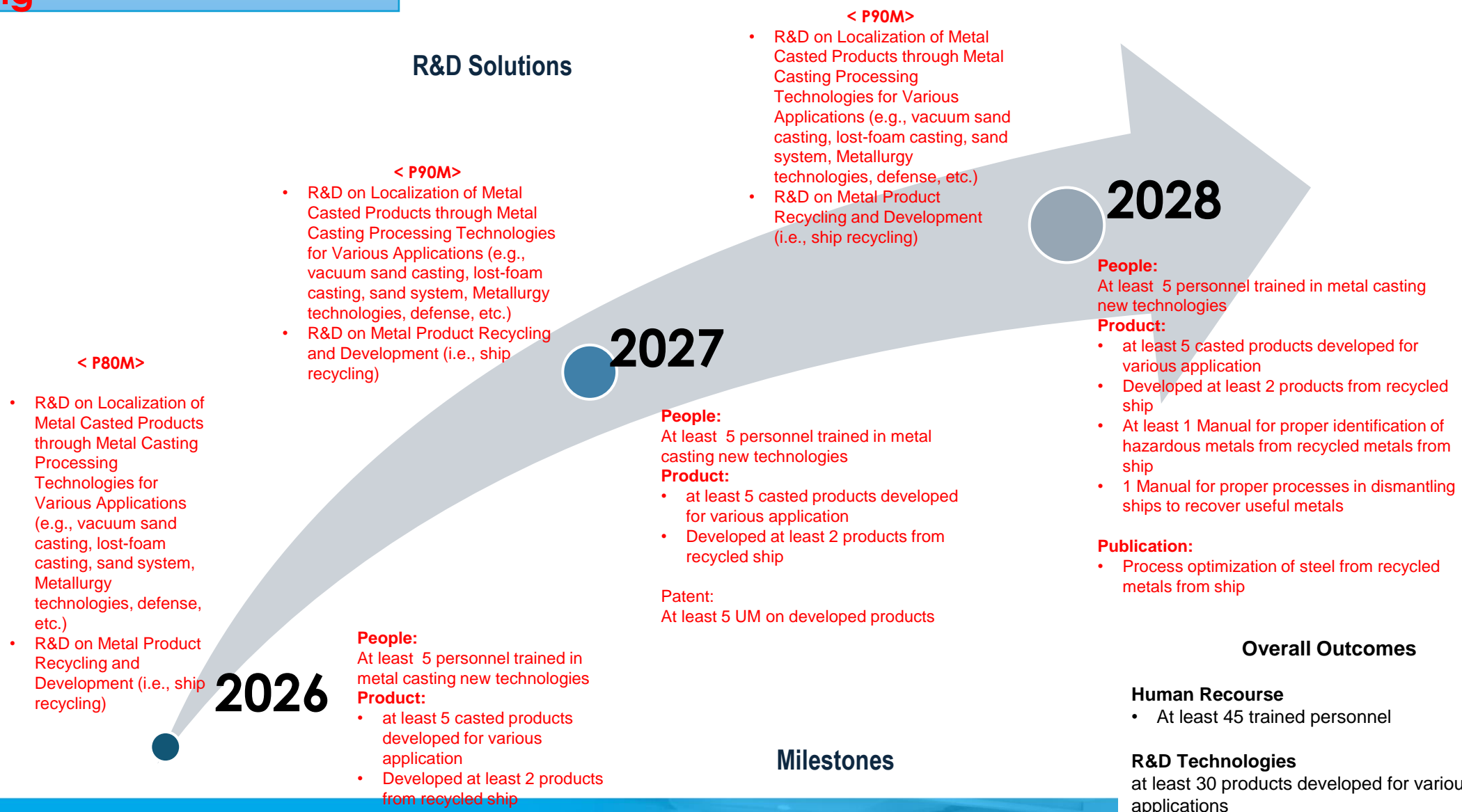
R&D Technologies

- Latest technologies on ship recycling
- metal casted products for various applications made from latest processes of casting
- Technologies on metal product development from recycled metals from ship

Facilities / Services

Enhanced/upgraded Metal Casting facility for ship recycling

R&D Solutions



- < P80M >**
- R&D on Localization of Metal Casted Products through Metal Casting Processing Technologies for Various Applications (e.g., vacuum sand casting, lost-foam casting, sand system, Metallurgy technologies, defense, etc.)
 - R&D on Metal Product Recycling and Development (i.e., ship recycling)

2026

- People:**
At least 5 personnel trained in metal casting new technologies
- Product:**
- at least 5 casted products developed for various application
 - Developed at least 2 products from recycled ship

2027

- < P90M >**
- R&D on Localization of Metal Casted Products through Metal Casting Processing Technologies for Various Applications (e.g., vacuum sand casting, lost-foam casting, sand system, Metallurgy technologies, defense, etc.)
 - R&D on Metal Product Recycling and Development (i.e., ship recycling)

- People:**
At least 5 personnel trained in metal casting new technologies
- Product:**
- at least 5 casted products developed for various application
 - Developed at least 2 products from recycled ship
- Patent:**
At least 5 UM on developed products

Milestones

2028

- < P90M >**
- R&D on Localization of Metal Casted Products through Metal Casting Processing Technologies for Various Applications (e.g., vacuum sand casting, lost-foam casting, sand system, Metallurgy technologies, defense, etc.)
 - R&D on Metal Product Recycling and Development (i.e., ship recycling)

- People:**
At least 5 personnel trained in metal casting new technologies
- Product:**
- at least 5 casted products developed for various application
 - Developed at least 2 products from recycled ship
 - At least 1 Manual for proper identification of hazardous metals from recycled metals from ship
 - 1 Manual for proper processes in dismantling ships to recover useful metals
- Publication:**
- Process optimization of steel from recycled metals from ship

Overall Outcomes

- Human Recourse**
- At least 45 trained personnel
- R&D Technologies**
- at least 30 products developed for various applications
- Facilities / Services**
- At least 1 upgraded metal casting facility
 - At least 10 services offered

Roadmap Assessment: Metal Casting

Conducted an industry consultation last November and December 2022 to assess if the metal casting industry still needs R&D intervention or assistance from the Council. However, no proposals received for this sector since 2020.

Major Accomplishments

Established 1 Innovation Center for Metal Casting in Region III.

Challenges	Recommendations
1. Local metal casting industries do not want to adapt new technologies that would help their production to become easier, instead they preferred to maintain their traditional casting method/s.	Identify new projects/technologies that will improve their existing methods/processes and will reduce their energy and operational cost.
2. Casting of local products entails high energy costs for manufacturers; thus, majority of the metal casting companies are shifting from manufacturer to trader of imported metal casted products.	
3. No available raw materials locally. Thus, the Philippines is still importing raw materials (i.e., steel, sand, machines) which entails logistics and container costs that adds-up to the local product prices	Look for alternative/ develop a program about R&D on metal recycling to possibly address the shortage of raw materials.
4. The adaptation of the locally-produced metal casted products are hindered by the issue of importation; this results for the companies to become uncompetitive and incapable of supplying the market demand because imported casted products from China are cheaper compared to local products	Advise the Metal Casting Industry to: <ul style="list-style-type: none"> ➤ outline/identify the standards required by the metals industry and create possible program that will address the identified need. ➤ Establish new linkages ➤ create a strong TWG that will provide technical support and participate in the series of FGDs, consultation meetings, and policy development activities
5. Limited experts in the field to undertake R&D.	
6. The government has no policy to support the local metal casting industry to limit the importation issue.	

Way Forward

1. Create and align new programs for the metal Casting Sector.
2. Solicit R&D projects from MEIC metal casting facility researcher
3. Matching of researchers with industry player for possible collaborative R&D projects
4. Encourage the metal casting companies who participated in FGDs sessions to consider collaborative proposal development with identified partner institution through proposal shepherding (proposal writeshop and development) which is industry-based in order to come-up with project proposals fitting/matching the priorities of the M&E Roadmap.

