

Metals and Engineering Sector: Machining and Fabrication

Legend (Text Font):	Done	Ongoing	Not yet Available
---------------------	------	---------	-------------------

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
- Trained personnel on Kibble balance system

R&D Technologies

- Robotics and mechatronics for shop automation
- Development of aluminum based aerospace products.
- Engine Manufacturing
- Design and Fabrication of Equipment/Machineries for Agri-industry Applications and for Metal Competitiveness
- Micro Machining Technology
- R&D for Mass Metrology
- Expansion of Capabilities of Physical Metrology

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)
- 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

R&D Solution

< P70M >

- Establishments of Regional Innovation Centers in Regions CAR, I, II, III, and X
- 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.)

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

< P82M >

- Establishments of Regional Innovation Centers in Regions CAR, I, II, and X
- 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

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

Milestones

< P160M >

- 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 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

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 2 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
 2 facilities for Metal Testing
Patent: UM of the fabricated equipment

2022

< P331.9M >

- Establishments of Regional Innovation Centers in Regions CAR, I, II, 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 Development of Technology-Based Products for Aerospace Applications
- 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

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 2 skilled equipment designer
 at least 4 trained personnel for certification for Aerospace Standards
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.)
 Availability of at least 5 Metal Testing Services
 15 units of equipment & standards
Places: 5 Innovation Center for Fabrication of Agri and Industrial Equipment
 2 calibration rooms renovated
Patent: UM of the fabricated equipment
Partnership: at least 1 company/institution per region linkage on aerospace industry

2023

< P279.3M >

- 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
- 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
- R&D on Mass Metrology

People: at least 15 skilled personnel on fabrication and equipment maintenance
 at least 2 skilled personnel on aerospace product development
 at least 4 skilled micro machinist
 at least 2 skilled equipment designer
 at least 4 trained personnel for certification for Aerospace Standards
 6 trained NML staff
Product: at least 10 fabricated equipment
 at least 1 automated equipment for shop process application
 at least 2 products developed
 at least 1 micro parts/micro machine for various applications
 At least 2 Locally-fabricated equipment
 14 units equipment & standards
 Kibble balance System
 5 new calibration services
 4 PT schemes & 4 training courses
Patent: UM of the fabricated equipment
Partnership: linkage on aerospace industry
Places: 1 micro machining facility
 1 Kibble Balance Room

2024

< 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
- R&D on Mass Metrology

People: at least 4 skilled micro machinist
 at least 2 skilled equipment designer
 at least 4 trained personnel for certification for Aerospace Standards
 at least 6 NML staff trained
Product: at least 10 fabricated equipment
 at least 1 micro parts/micro machine for various applications
 At least 2 Locally-fabricated equipment
 15 units of calibration equipment and standards
 4 PT schemes & 4 training courses
 2 technical procedure services on Kibble balance
Patent: UM of the fabricated equipment
Partnership: at least 1 company/institution per region
Places: 1 micro machining facility
 1 calibration room renovated

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
- R&D on Mass Metrology

People: at least 4 skilled micro machinist
 at least 2 skilled equipment designer
 at least 4 trained personnel for certification for Aerospace Standards
 at least 6 NML staff trained
Product: at least 10 fabricated equipment
 at least 1 micro parts/micro machine for various applications
 At least 2 Locally-fabricated equipment
 15 units of calibration equipment and standards
 4 PT schemes & 4 training courses
 2 technical procedure services on Kibble balance
Patent: UM of the fabricated equipment
Partnership: at least 1 company/institution per region
Places: 1 micro machining facility
 1 calibration room renovated

Overall Outcomes

Human Recourse

- At least 50 personnel on fabrication and equipment maintenance
- at least 14 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
- 16 trained NML staff

R&D Technologies

- At least 46 locally fabricated equipment
- 4 products developed for aerospace
- 2 automated equipment
- Kibble Balance System
- Technical procedure system on Kibble balance

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

Overall Strategies

Human Recourse

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

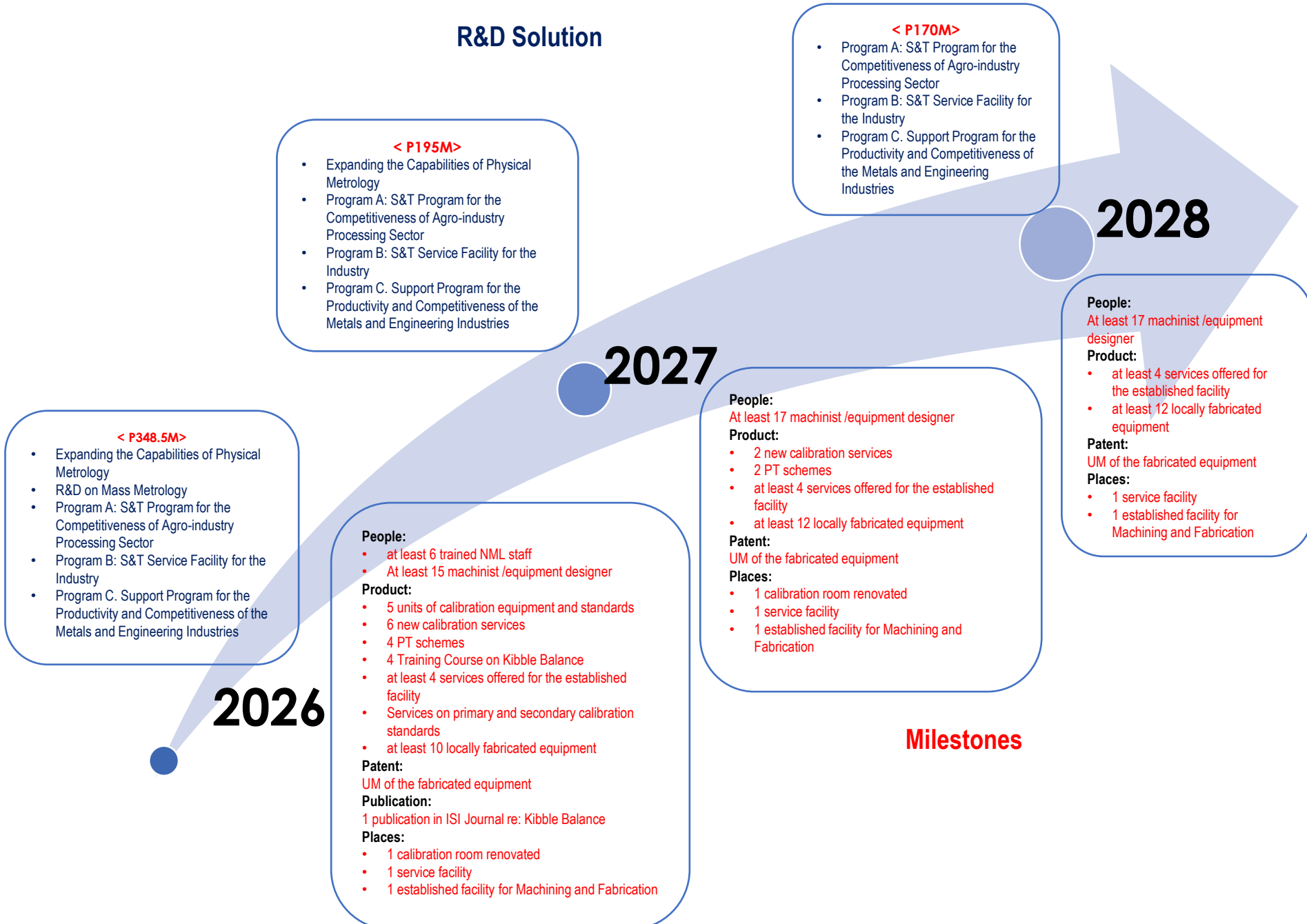
R&D Technologies

- S&T Program for the Competitiveness of Agro-industry Processing Sector
- Support Program for the Productivity and Competitiveness of the Metals and Engineering Industries

Facilities / Services

S&T Service Facility for the Industry

R&D Solution



< P348.5M >

- Expanding the Capabilities of Physical Metrology
- R&D on Mass Metrology
- Program A: S&T Program for the Competitiveness of Agro-industry Processing Sector
- Program B: S&T Service Facility for the Industry
- Program C. Support Program for the Productivity and Competitiveness of the Metals and Engineering Industries

< P195M >

- Expanding the Capabilities of Physical Metrology
- Program A: S&T Program for the Competitiveness of Agro-industry Processing Sector
- Program B: S&T Service Facility for the Industry
- Program C. Support Program for the Productivity and Competitiveness of the Metals and Engineering Industries

< P170M >

- Program A: S&T Program for the Competitiveness of Agro-industry Processing Sector
- Program B: S&T Service Facility for the Industry
- Program C. Support Program for the Productivity and Competitiveness of the Metals and Engineering Industries

2026

People:

- at least 6 trained NML staff
- At least 15 machinist /equipment designer

Product:

- 5 units of calibration equipment and standards
- 6 new calibration services
- 4 PT schemes
- 4 Training Course on Kibble Balance
- at least 4 services offered for the established facility
- Services on primary and secondary calibration standards
- at least 10 locally fabricated equipment

Patent:

UM of the fabricated equipment

Publication:

1 publication in ISI Journal re: Kibble Balance

Places:

- 1 calibration room renovated
- 1 service facility
- 1 established facility for Machining and Fabrication

2027

People:

At least 17 machinist /equipment designer

Product:

- 2 new calibration services
- 2 PT schemes
- at least 4 services offered for the established facility
- at least 12 locally fabricated equipment

Patent:

UM of the fabricated equipment

Places:

- 1 calibration room renovated
- 1 service facility
- 1 established facility for Machining and Fabrication

2028

People:

At least 17 machinist /equipment designer

Product:

- at least 4 services offered for the established facility
- at least 12 locally fabricated equipment

Patent:

UM of the fabricated equipment

Places:

- 1 service facility
- 1 established facility for Machining and Fabrication

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

Milestones

Metals and Engineering Sector: Metal Casting

Legend (Text Font):	Done	Ongoing	Not yet Available
---------------------	------	---------	-------------------

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

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

S&T Policies

- Standard requirement reference for a metal casting facility.
- Standardization and harmonization of foundry practice.

R&D Solution

< P15M >

- Establishment of Regional Innovation Center in Region III
- R&D on Advanced Metal casting and Metal Injection Technologies

< P35M >

- Establishments of Regional Innovation Centers in Region III
- R&D on Advanced Metal casting and Metal Injection Technologies for Various Applications
- R&D on Materials and Metallurgy Technologies for Various Applications

< P76M >

- Establishments of Regional Innovation Centers in Region III
- 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

< 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
- Development of Induction Furnace

< P65M >

- 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
- 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

Product: at least 2 developed casted products

Places: 1 Innovation Center for Metal Casting

Policy: Standard requirement reference for a metal casting facility.

2022

People:

- at least 5 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

2023

People:

- at least 4 skilled personnel on metal casting application
- at least 4 skilled metallurgist

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

2024

People:

- at least 2 skilled metallurgist
- at least 6 skilled personnel in metal casting
- at least 2 skilled personnel in induction furnace
- 2 skilled on heat treatment

Product/Services:

- Availability of Heat Treatment Services
- at least 4 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.

2025

People:

- at least 2 skilled personnel on cupola furnace
- at least 4 skilled personnel in metal casting
- at least 2 skilled personnel in induction furnace
- 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
- at least 1 developed induction furnace

People:

- at least 2 skilled personnel on cupola furnace
- at least 4 skilled personnel on metal casting 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

Overall Strategies

Human Recourse

Training related to latest updates on Metal Casting Applications

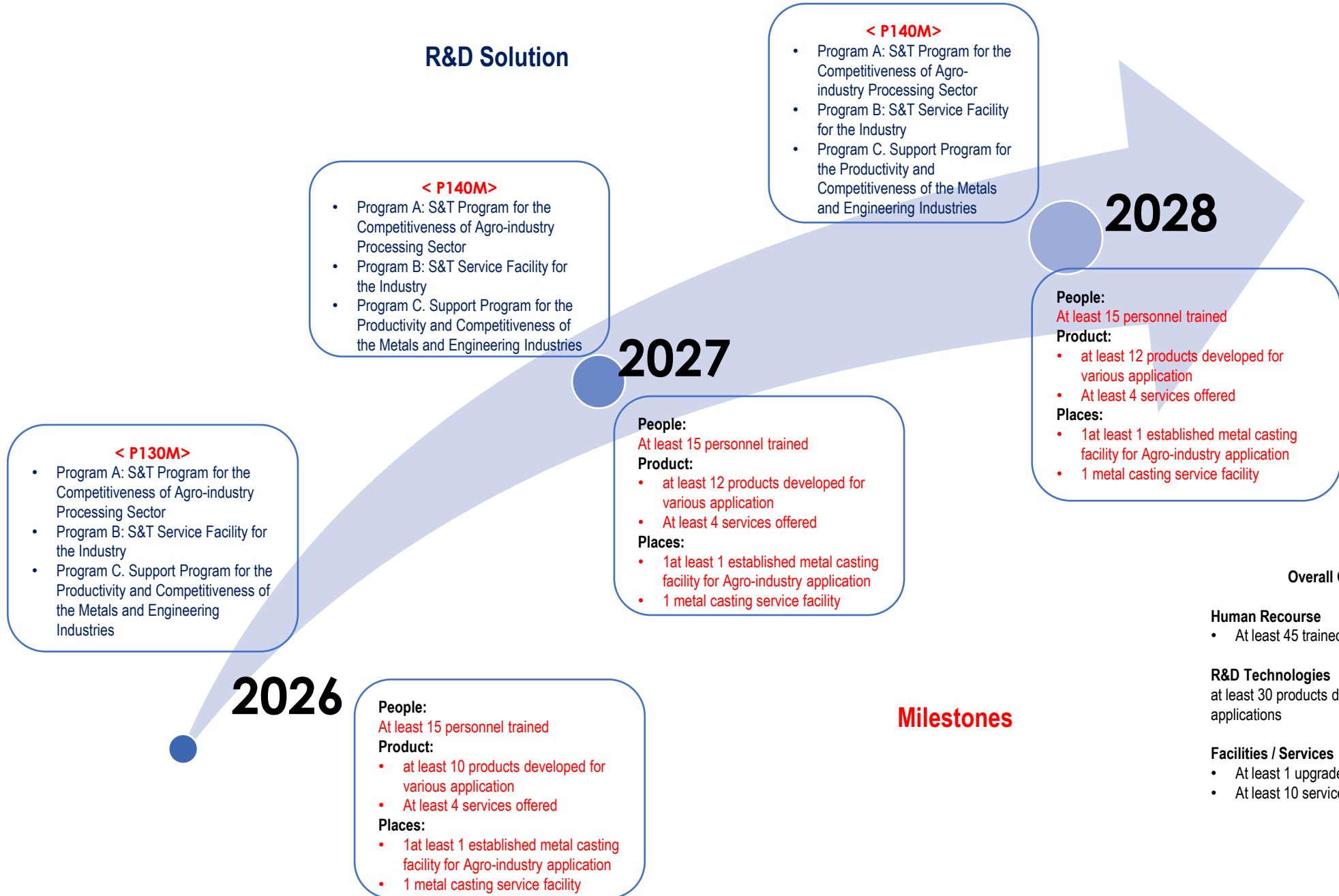
R&D Technologies

Latest technologies on metal casting products

Facilities / Services

Enhanced/upgraded Metal Casting facility

R&D Solution



< P130M >

- Program A: S&T Program for the Competitiveness of Agro-industry Processing Sector
- Program B: S&T Service Facility for the Industry
- Program C: Support Program for the Productivity and Competitiveness of the Metals and Engineering Industries

< P140M >

- Program A: S&T Program for the Competitiveness of Agro-industry Processing Sector
- Program B: S&T Service Facility for the Industry
- Program C: Support Program for the Productivity and Competitiveness of the Metals and Engineering Industries

< P140M >

- Program A: S&T Program for the Competitiveness of Agro-industry Processing Sector
- Program B: S&T Service Facility for the Industry
- Program C: Support Program for the Productivity and Competitiveness of the Metals and Engineering Industries

2026

People:
At least 15 personnel trained

Product:

- at least 10 products developed for various application
- At least 4 services offered

Places:

- 1at least 1 established metal casting facility for Agro-industry application
- 1 metal casting service facility

2027

People:
At least 15 personnel trained

Product:

- at least 12 products developed for various application
- At least 4 services offered

Places:

- 1at least 1 established metal casting facility for Agro-industry application
- 1 metal casting service facility

2028

People:
At least 15 personnel trained

Product:

- at least 12 products developed for various application
- At least 4 services offered

Places:

- 1at least 1 established metal casting facility for Agro-industry application
- 1 metal casting service facility

Milestones

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

Metals and Engineering Sector: Tool and Die

Overall Strategies

Human Recourse

- Progressive Molding Design Training
- Tooling Jobs in schools
- Die and Mold Designing
- Skilled die designers
- Autocad Technical Drawing
- Training on Mold Flow Simulation Software
- National Certification Program for Die and Mold Skilled Designers
- Chemical Etching Training
- Die Making Training

R&D Technologies

- Leap frog Program on Emerging technologies
- Aluminum Tooling for Rotational Molding of Plastic Products
- Development of Submarine Gating Technology
- Syringe Connector Technology

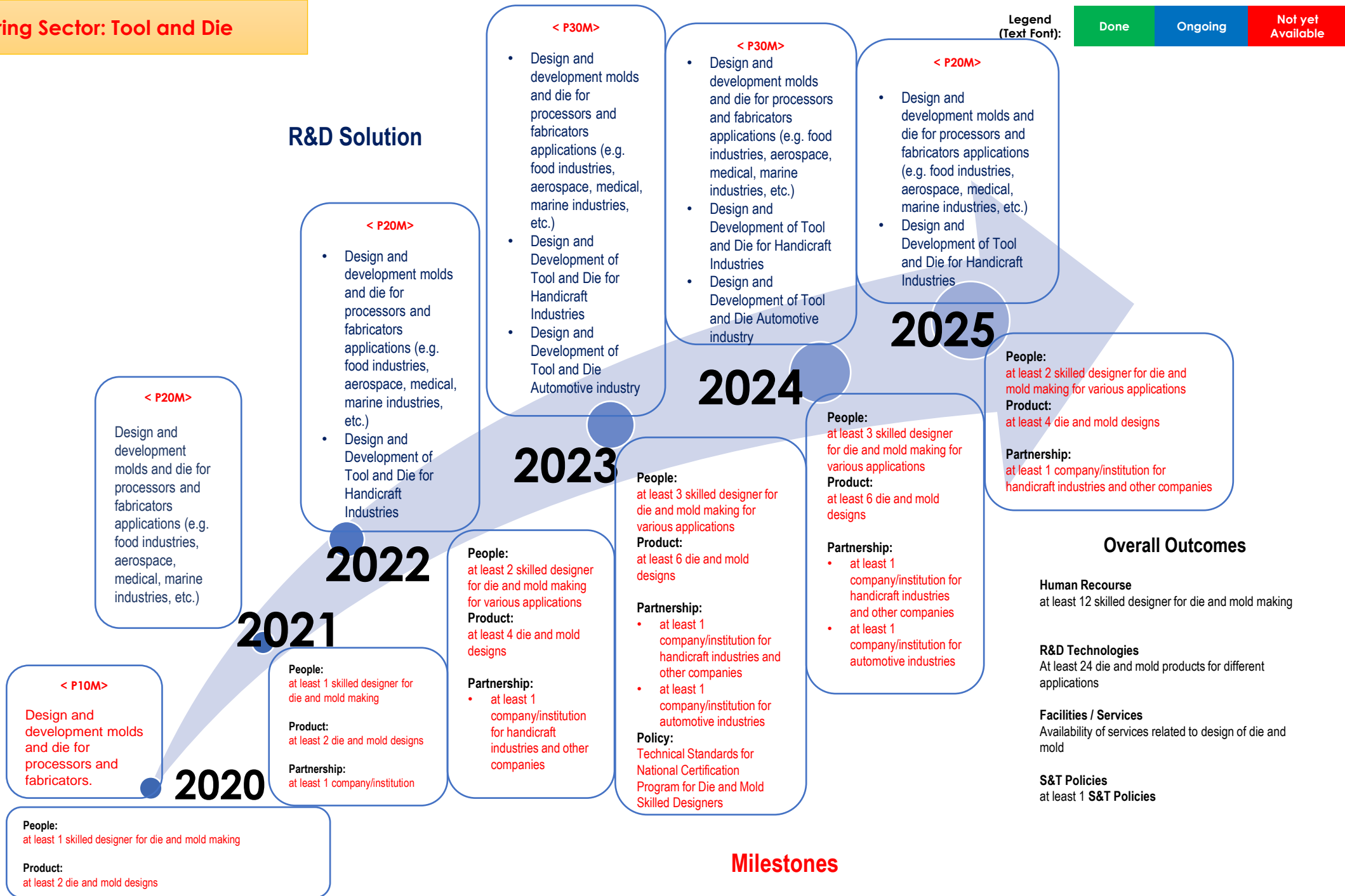
Facilities / Services

- Establishment of Die and Mold Academy
- Hot Runner Mold Technology
- Facility for forging, dies, tooling and molding
- Availability of Technical Standards
- Precision Measurement Technology at 2 microns accuracy
- Mold Flow Simulation software
- Heat Treatment of Die and Mold

S&T Policies

- Technical Standards for National Certification Program for Die and Mold Skilled Designers

R&D Solution



Overall Strategies

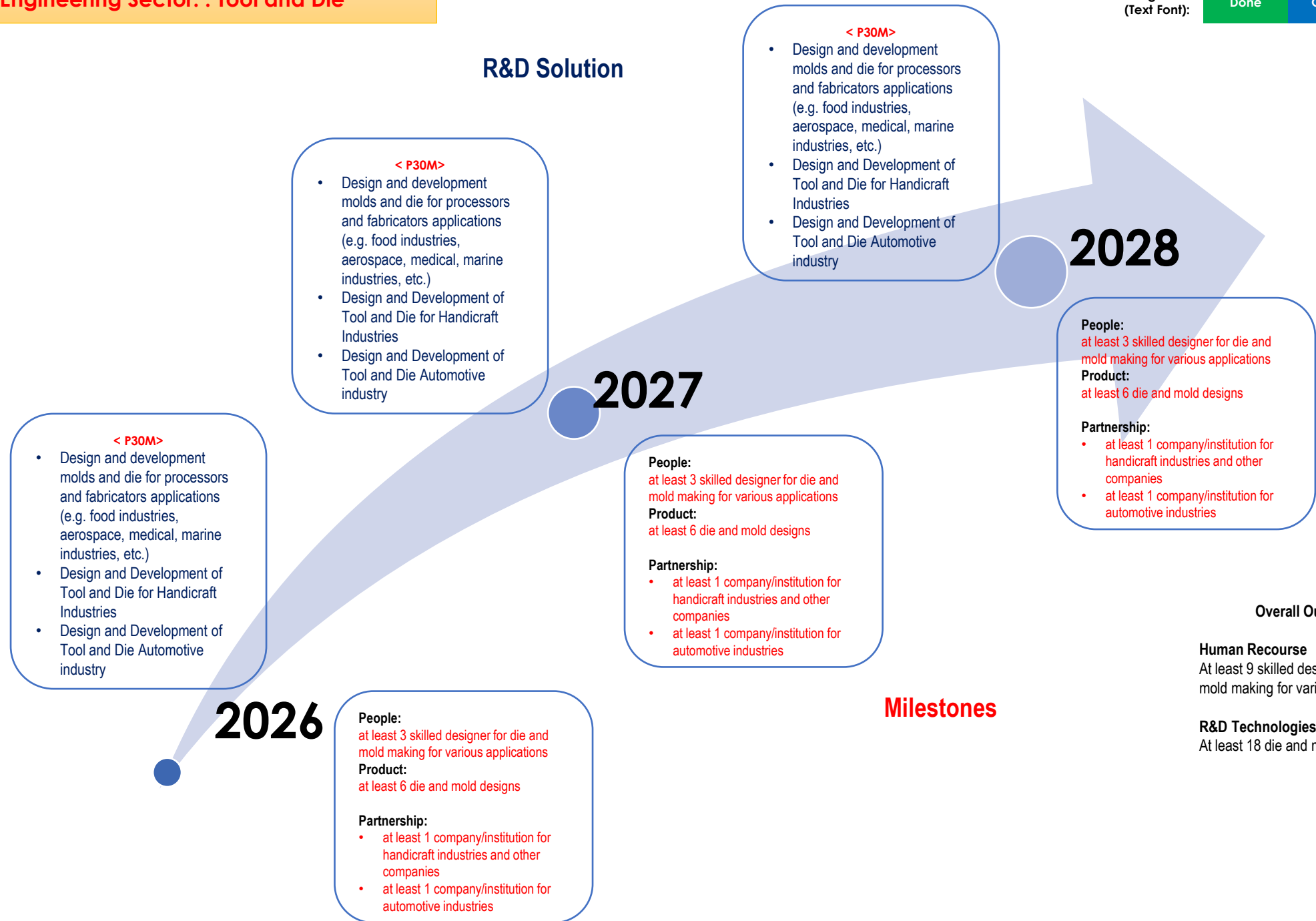
Human Recourse

Training on latest die and mold designs and applications

R&D Technologies

Latest technologies on die and mold for various applications

R&D Solution



Milestones

Overall Outcomes

Human Recourse

At least 9 skilled designer for die and mold making for various applications

R&D Technologies

At least 18 die and mold designs

Overall Strategies

Human Recourse

Surface Finishing Training on New Technologies

R&D Technologies

- Alternative for Chromic Solution Application
- New Surface Engineering Technology
- Mirror Finishing Technology
- Rubber Coating Process
- Alternative for Hot Chrome Plating
- Surface finishing of automotive parts
- Coating, Polishing, Metal Finishing Technologies
- Metal and composite etching or photo etching

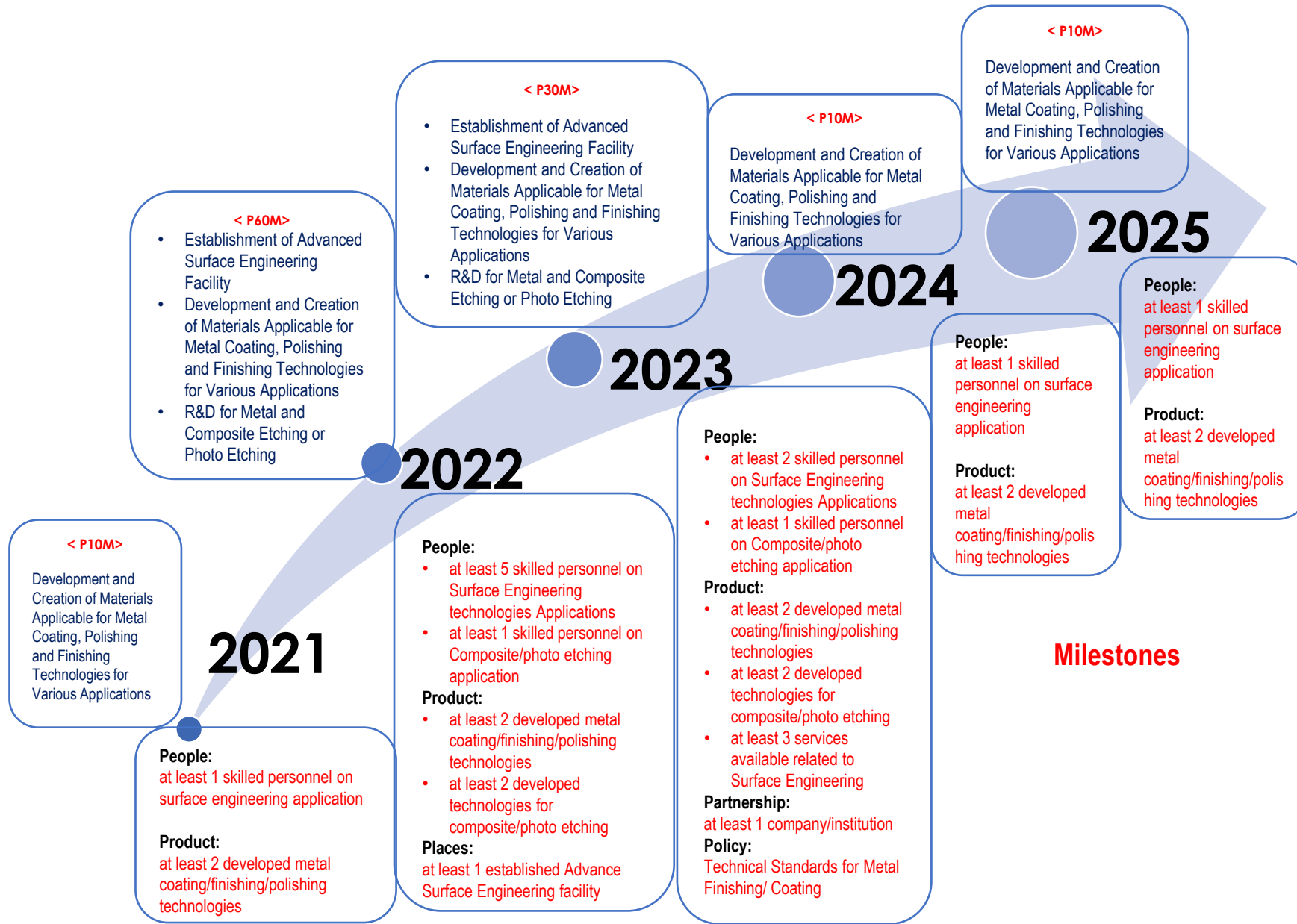
Facilities / Services

- Diamond Film Coating Technology
- Surface Finishing Facilities
- Advance Surface Engineering Facility

S&T Policies

Technical Standards for Metal Finishing/ Coating

R&D Solution



Milestones

Overall Outcomes

Human Recourse

- at least 10 skilled personnel on Surface Engineering technologies Applications
- at least 1 skilled personnel on Composite/photo etching application

R&D Technologies

- at least 10 developed metal coating/finishing/polishing technologies
- at least 4 developed technologies for composite/photo etching

Facilities / Services

- at least 3 services available related to Surface Engineering

S&T Policies

at least 1 S&T Policies

Overall Strategies

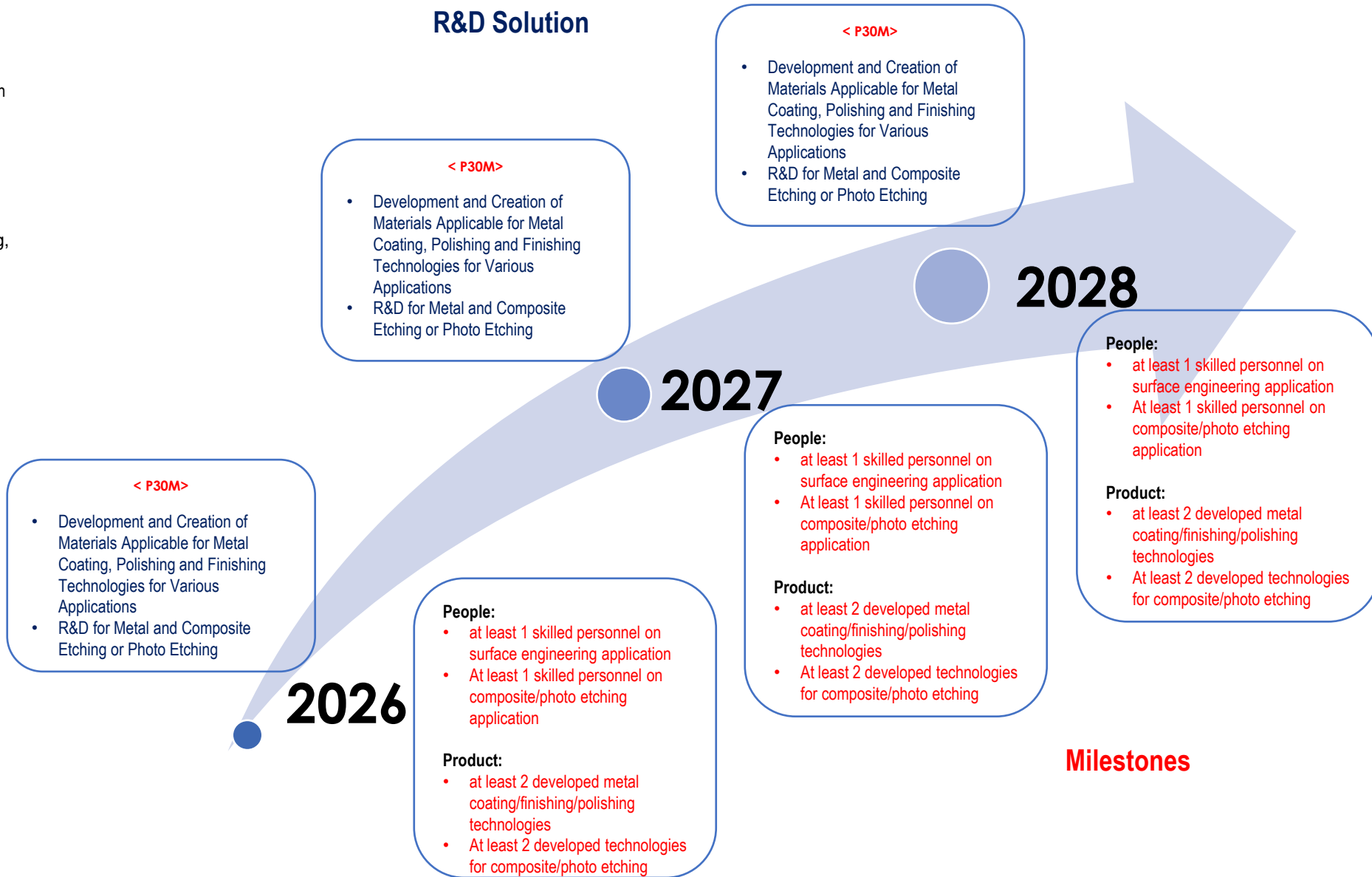
Human Recourse

Surface Finishing Training on New Technologies

R&D Technologies

- New Surface Engineering Technology
- Coating, Polishing, Metal Finishing Technologies

R&D Solution



< P30M >

- Development and Creation of Materials Applicable for Metal Coating, Polishing and Finishing Technologies for Various Applications
- R&D for Metal and Composite Etching or Photo Etching

2026

People:

- at least 1 skilled personnel on surface engineering application
- At least 1 skilled personnel on composite/photo etching application

Product:

- at least 2 developed metal coating/finishing/polishing technologies
- At least 2 developed technologies for composite/photo etching

< P30M >

- Development and Creation of Materials Applicable for Metal Coating, Polishing and Finishing Technologies for Various Applications
- R&D for Metal and Composite Etching or Photo Etching

2027

People:

- at least 1 skilled personnel on surface engineering application
- At least 1 skilled personnel on composite/photo etching application

Product:

- at least 2 developed metal coating/finishing/polishing technologies
- At least 2 developed technologies for composite/photo etching

< P30M >

- Development and Creation of Materials Applicable for Metal Coating, Polishing and Finishing Technologies for Various Applications
- R&D for Metal and Composite Etching or Photo Etching

2028

People:

- at least 1 skilled personnel on surface engineering application
- At least 1 skilled personnel on composite/photo etching application

Product:

- at least 2 developed metal coating/finishing/polishing technologies
- At least 2 developed technologies for composite/photo etching

Milestones

Overall Outcomes

Human Recourse

- at least 3 skilled personnel on Surface Engineering technologies Applications
- at least 3 skilled personnel on Composite/photo etching application

R&D Technologies

- at least 6 developed metal coating/finishing/polishing technologies
- at least 6 developed technologies for composite/photo etching