MIRDC 2019 ANNUAL REPORT

M&E Convergence Towards Industry 4.0

TABLE of CONTENTS

MESSAGE from the SECRETARY

What is common among us public servants is that we are all aspiring to make a relevant contribution to the country. For us at the Department of Science and Technology, the way to make this aspiration a reality is to make use of our science and technology efforts so people from all walks of life benefit from them.

The DOST commends the DOST-Metals Industry Research and Development Center for a success-filled 2019 that created an impact on the metals, engineering (M&E), and allied industries.

I admire DOST-MIRDC's tenacity. The Center's perseverance is reflected in all its accomplishments – technology transfer, research and development, and science and technology services. The country's metals, engineering, and allied industries are at the center of all these services. The MIRDC's activities are all intended to provide the industry an enabling environment, one that will allow and encourage growth, profitability, and a better quality of life.

To the industry that we serve, rest assured that we will continue to persevere. The DOST-MIRDC will carry on with its services and will keep on making improvements.

To the DOST-MIRDC, keep on being a relevant ally of the M&E and allied industries. Keep finding ways to be at the lead. Continue to make science work for the people. Stay focused and dedicated, and bring the industry to greater heights.

FORTUNATO T. DELA PEÑA
Secretary, DOST
and Chairperson, MIRDC
Governing Council

MESSAGE from the EXECUTIVE DIRECTOR

I am proud to present to you the 2019 MIRDC Annual Report. We aligned how we reported our accomplishments to the format required by the Program Expense Classification (PREXC) of the Department of Budget and Management (DBM). Inside the Annual Report, you will read about our achievements in three (3) categories: Research and Development; Technology Transfer; and Science and Technology Services.

We opted to present our technology transfer accomplishments first because we want to impress upon you, our valued industry partners and stakeholders, that we go beyond R&D – that we are committed to doing what it takes to make these R&D outputs beneficial for you. The R&D part of the Annual Report is a compilation of R&D projects we completed in 2019. We also included in the report the accomplishments of our Technical Solutions Services Section (TSSS), created for end-to-end processing of jobs, that ensured provision of improved services to both internal and external clients. The Science and Technology Services portion contains our analysis and testing, industrial training, technical consultancy, and technology information and promotion accomplishments. The last portion is a compilation of all other accomplishments based on internal targets.

We acknowledge that we are a work in progress. We are just as dynamic as the industry we serve. Where there are changes, we adapt. Where there are issues and challenges, we strategize. Where there are opportunities, we make sure that we can take advantage and be on the winning end. But all these accomplishments we reported, would never have happened if not for the unity and collaboration among the different divisions of the Center. As we carry on and continue to serve the metals, engineering, and allied industries, we will continue to become stronger and better.

We are TeamMIRDC. We are committed to serve.

ROBERT O. DIZON
Executive Director, MIRDC

MIRDC

VISION

Center of excellence in science, technology and innovation for a globally-competitive metals, engineering and allied industries by 2025.

MISSION

We are committed to provide both government and private sectors in the metals, engineering and allied industries with professional management and technical expertise on the training of engineers and technicians; information exchange; quality control and testing; research and development; technology transfer; and business economics and advisory services.

QUALITY, ENVIRONMENTAL, and INFORMATION SECURITY POLICY

We are committed to provide products and services to both the government and the private sectors in the metals and engineering and allied industries with the highest standards of quality and reliability within our capabilities and resources and aligned to our strategic direction, to comply with applicable statutory and regulatory requirements to plan and implement actions to address risks and opportunities and to continually improve the effectiveness of our Quality, Environmental and Information Security Management Systems in order to enhance customer satisfaction at all times.

We shall manage and control our activities in order to minimize adverse impacts on the environment, prevent pollution and safeguard the health and safety of all employees, stakeholders, customers, external providers, and the surrounding community.

CORE VALUES

Professionalism

We adhere to the highest ethical standards of performance.
We value our work and are committed to perform to the best of our ability.

Responsiveness

We spearhead implementation of projects that address the needs of the metals and engineering industries.
We find solutions to real-life problems through science, technology and innovation.

Integrity

We act responsibly, work honestly, and encourage transparency.

Dynamism

We perform our jobs with vigor and enthusiasm.
We welcome change as an opportunity for growth and continual improvement.

Excellence

We adhere to world-class performance and continuous improvement in all we do.
We always do our best in every task/endeavor.

2019 MIRDC ACCOMPLISHMENTS PER PREXC INDICATORS

Outcome 1: 36 partnerships with public and private stakeholders

Outcome 2: ₱617,394.00 revenue generated from partnerships

Output 1: 19 (R&D) projects completed

Output 2: 8 out of 11 ongoing R&D projects implemented on approved timeframe

Output 3: 80.58%
R&D projects in the last 5 years which are published in peer-reviewed journals presented in national/ international conferences or with IP filed or approved

A. METALS INDUSTRY RESEARCH PROGRAM

Outcome 1: 100% customer satisfaction on technology transfer services

Output 1: 28 technologies diffused

Output 2: 10 technologies transferred/ commercialized

Output 3: 100%
requests for technology transfer provided on-time

B. METALS INDUSTRY TECHNOLOGY TRANSFER PROGRAM

Outcome 1: 100% customer satisfaction on technical services

Output 1: 5,427 technical services rendered

Output 2: 5,071 requests for technical services that have been provided on time

Output 3: 1,793 clients served

C. METALS INDUSTRY SCIENCE AND TECHNOLOGY SERVICES PROGRAM

2019 AGENCY PERFORMANCE REPORT BY PROGRAM EXPENSE CLASSIFICATION (PREXC)

The Metals Industry Research and Development Center is a line agency of the Department of Science and Technology. We serve the metals, engineering, and allied industries. To deliver quality and relevant service, we have six divisions – each with unique and equally important responsibilities: the Prototyping Division (PD); the Materials and Process Research Division (MPRD); the Analysis and Testing Division (ATD); the Technology Diffusion Division (TDD); the Finance and Administrative Division (FAD); and the Planning and Management Division (PMD).

The 2019 MIRDC Annual Report is our tool for reporting our accomplishments. We aligned our accomplishment report to the format required by the Program Expense Classification (PREXC) of the Department of Budget and Management (DBM).

This year, the Center's allotment totaled to P266 million – intended to fuel our research and development (R&D) activities, technology diffusion activities, and scientific and technological services. As of the end of December 2019, our budget utilization rate in terms of obligation vs. allotment is at 98%. In terms of physical performance, we accomplished the full-year targets for nine (9) out of its thirteen (13) PREXC Key Performance Indicators (KPIs).

I. TECHNOLOGY TRANSFER

METALS INDUSTRY TECHNOLOGY TRANSFER PROGRAM
Budget: PhP 23.309 million or 9% of the total allotment

Our Technology Transfer Accomplishments in 2019 in a Nutshell

We engage in technology transfer through various activities such as conduct of training programs, technical consultancy, promotion of MIRDC-developed technologies, and information dissemination programs. We proudly report the following technology transfer accomplishments:

- Transfer of three (3) prototypes to end-users by Deed of Donation;
- Transfer of seven (7) technologies to five (5) adopters through licensing agreements;
- Diffusion of 28 MIRDC technologies through exhibits, technology promotion, technology fora and technology dissemination.
- Delivery of 100% of technology transfer requests based on the mutually agreed timeframe.
- Satisfactory delivery of services, as rated by the five (5) technology adopters who responded to our Customer Feedback Survey.

Our R&D efforts are driven by deep-seated aspirations to add to existing technological know-how and to lead to lives that are continuously getting better. As motivated as we are to perform significant R&D initiatives, we are equally motivated by the vision of having the local metals, engineering (M&E), and allied industries enjoy optimal benefits from our R&D outputs.

We took the R&D projects we completed in the last recent years on the road to technology transfer, and, as always, we feel truly fulfilled of our accomplishment – fulfilled because the technologies we transfer and continue to promote are useful in positively transforming business landscapes for the local M&E and allied industries.

Behind the Center's tech transfer accomplishments is the TDD, represented by the men and women of the Technical Advisory and Business Development Section (TABDS), the Industrial Training Section (ITS), and the Technology Information and Promotion Section (TIPS). With them doing an exceptional job, we more than gladly faced the challenge of transferring our technologies.

Below is a rundown of the DOST-MIRDC's shining technology transfer accomplishments for 2019.

A. We turned over the advanced transportation R&D project outputs to various end-users.

A.1. The Hybrid Electric Road Train (HERT) prototype is now with the city of Cauayan in Isabela.

We handed over the HERT to the city government of Cauayan in a ceremony held in Cauayan City, Isabela last January 25, 2019. The technology was adopted in a bid to control the number of smoke-belching public utility tricycles proliferating in the city's national highway and secondary roads.

The support did not cease after the turnover, as MIRDC accompanied the local government unit (LGU) of Cauayan and held activities like seminars, testing, and regular check-up and maintenance/repair of the vehicle among others.

(Left photo) The HERT travels all the way to Cauayan, Isabela for the turnover ceremonies. (Right photo) Cauayan City Mayor Bernard Faustino L. Dy (rightmost) receives the ceremonial key of the HERT from DOST Secretary Fortunato T. de la Peña (second from right), and DOST-MIRDC Executive Director Engr. Robert O. Dizon (center).

A.2. The Automated Guideway Transit (AGT) prototype is now with the Bataan Peninsula State University.

The AGT is also making its own story as we turned it over to the Bataan Peninsula State University (BPSU) last March 14, 2019. As it was not intended for transportation use, the AGT, which is a prototype elevated train system that can run at a speed of 60 kph and can carry 30 passengers, is going to play a crucial role in creating new educational programs, specifically a course in Railway Engineering that will expand research and higher education capabilities in science and technology for various key sectors.

(Left) The AGT finds a new home at the Bataan Peninsula State University as the DOST-MIRDC turns over the AGT prototype. (Right) The ribbon-cutting ceremony during the turnover of the AGT is graced by none other than DOST Secretary Fortunato T. de la Peña, DOST-MIRDC Executive Director Robert O. Dizon, and DOST Undersecretary for R&D Rowena Cristina L. Guevara.

A.3. The Hybrid Electric Train (HET) prototype now belongs to the Philippine National Railways (PNR).

After the development of the prototype set last 2016, we set to launch the HET for public use by turning it over to the PNR. Significant modifications and optimizations were carried out by the MIRDC Project Team as the result of the Gap Analysis and the Reliability, Availability, Maintainability, and Safety (RAMS) Certification Testing. The HET also underwent validation and verification, a series of independent procedures that were used to check if the train meets requirements and specifications and that it fulfills its intended purpose.

The HET aims to be the regular mass transportation system to serve commuters from Calamba to Alabang PNR stations and even longer routes in the coming years. A major milestone in the HET's R&D journey is its technology transfer. The turnover ceremony last June 20, 2019 attended by DOST-Central Office, DOST MIRDC, PNR, and Fil-Asia Automotive and Industries Corp. officials is the first run of a Filipino-made train in local soil.

(Left) The guests, led by DOST Secretary Fortunato T. de la Pena, in a ceremonial releasing of balloons at the Alabang Station of the PNR a few minutes before the demo run of the HET. (Right) The DOST, the PNR, and the industry all express support for the HET during its turnover ceremony on June 20, 2019.

Truly, technologies for mobility in the Philippines have come a long way. Our R&D and technology transfer efforts signify our commitment to champion novel technologies that will benefit the Filipino people.

B. We accredited five (5) fabricators to manufacture the technologies we developed.

Among the various MIRDC-developed technologies, those which got the attention of most of the Philippine local fabricators are on Food Processing Equipment, Rice Farm Equipment, and Advanced Mass Transportation Systems. A total of seven (7) technologies were adopted by new five (5) local fabricators from the National Capital Region (NCR), Regions VI and X. These are as follows:

NAME OF ADOPTER	LICENSED TECHNOLOGIES
1. GECAR Machine Solutions, Inc. NCR – Metro Manila	· Rice Harvester Attachments (RHA) for Hand Tractors · Rice Transplanter Attachment (RTA) for Hand Tractors · LPG-fired Spray Dryer · Vacuum Fryer · Modular Water Retort · Freeze Dryer
2. Mags Pipe Bending and Steel Works Region VI – Iloilo City	· LPG-fired Spray Dryer · Vacuum Fryer · Modular Water Retort
3. Samance Builder and Development Corp,	· LPG-fired Spray Dryer · Vacuum Fryer
4. Eunics Marketing Region X – Lanao del Norte	· CNC Plasma Cutter (Plasmanoy)
5. Kelfers Enterprises NCR – Metro Manila	· CNC Plasma Cutter (Plasmanoy)

The licensed technologies of the Metals Industry Research and Development Center (MIRDC) for the year 2019.

C. We turned over the Gong Making Facility to the local government unit of Bedbed in Mankayan, Benguet.

In June, we held the turnover ceremony of the Gong Making Facility to Bedbed, a barangay in the municipality of Mankayan, Benguet. The turnover of the facility to the care and utilization of the local gong makers in Bedbed aims to keep the gong making culture alive, and to promote technologies so that these will serve as source of jobs and income for their locals.

Dr. Rio S. Pagtalunan (third from right) gives the key to Mankayan Mayor Materno Luspian during the Turnover Ceremony of the Gong Making Facility held in Barangay Bedbed, Mankayan, Benguet on June 26, 2019.

D. We did not just find technology licensees; we helped our adopters begin a new chapter of their success stories.

We are very pleased to report that we helped our technology adopters create their own success stories. Among last year's licensees of the MIRDC's developed technologies, two (2) have already fabricated and delivered food processing equipment to their clients. The Ralds Trading Manpower & General Services Corp. in Cebu fabricated one (1) unit Vacuum Fryer and one (1) unit Modular Water Retort which were supplied to a farm owner, while VIRCAP Lightmetal Industries in Bohol, Cebu manufactured one (1) unit of Spray Dryer for the Department of Trade and Industry (DTI) – Samar, Leyte. The food processing equipment became the companies' new product and service offerings.

With DOST-MIRDC's continuous promotion of the Food Processing Equipment and other DOST-developed technologies, the said firms receive many queries with possible orders from companies and organizations both local and abroad.

E. We exerted determined efforts to diffuse knowledge and technologies.

E.1. We diffused knowledge through trainings, seminars, and techno-demos, among others.

The 52 knowledge diffused include seminars on the following major technologies employed by the M&E industry: CNC Milling Programming and Operation; Awareness on Reinforcing Steel Bars; Helical Gear Making; Heat Treatment of Steels; Rockwell Hardness Testing of Metallic Metals; CAD/CAM; 3-axis CNC Milling; CNC EDM Wire Cutting; and Oxy-acetylene Welding, to name a few. Aside from these, the Center also diffused quality management systems-related knowledge, such as: Productivity Improvement through 5S Practice; Establishment of Preventive Maintenance; Awareness on ISO 9001:2015; and Customer Satisfaction Measurement, among others.

Our engineers and key personnel serve as subject matter experts. Coming from different divisions such as the ATD, the PD, the MPRD, the FAD, and the TDD, our experts are tapped to conduct regular seminars and training.

Training on CNC Milling Programming & Operation conducted on March 11-15, 2019 at the MIRDC Platinum Building, conducted by Engr. Jenny C. Velasco and Mr. Augusto S. Atanacio, Jr.

E.2. We diffuse technologies through our participation in exhibits, accommodation of guests for plant visits, production and distribution of IEC materials, and conduct of technology forum, to name a few.

We diffused 28 technologies in 2019. Among these are the following: mass transportation technologies – the Hybrid Electric Road Train (HERT), the Hybrid Electric Train (HET), and the Automated Guideway Transit System (AGT); food processing equipment – Water Retort, Vacuum Fryer, Spray Dryer, and freeze Dryer; and agricultural equipment – Rice Transplanter Attachment, Rice Harvester Attachment, Sugarcane Leaf Stripper, Sugarcane Shredder, and Sugarcane Cutter Equipment. Also, the Center carried out strategic dissemination of information about its facilities and services, namely: Die and Mold Solution Center (DMSC), Gear Making and Assembly Facility, Auto-parts Testing Laboratory, and Finite Element Analysis Design Center, among others.

• Our exhibit booths served as avenues for interaction with the industry and stakeholders.

The Center features its facilities and services in exhibition such as the Philippine Suppliers and Manufacturers' Exhibition (PSMex) held at the World Trade Center Metro Manila on March 27-30, 2019.

The Center actively participated in both industry- and DOST-led exhibits as its promotions strategy.

In 2019, the Center joined the Air Force Research and Development Center (AFRDC) exhibit in Air Force City Officers' Clubhouse, Clark Air Base, Mabalacat City, Pampanga held on May 29, 2019.

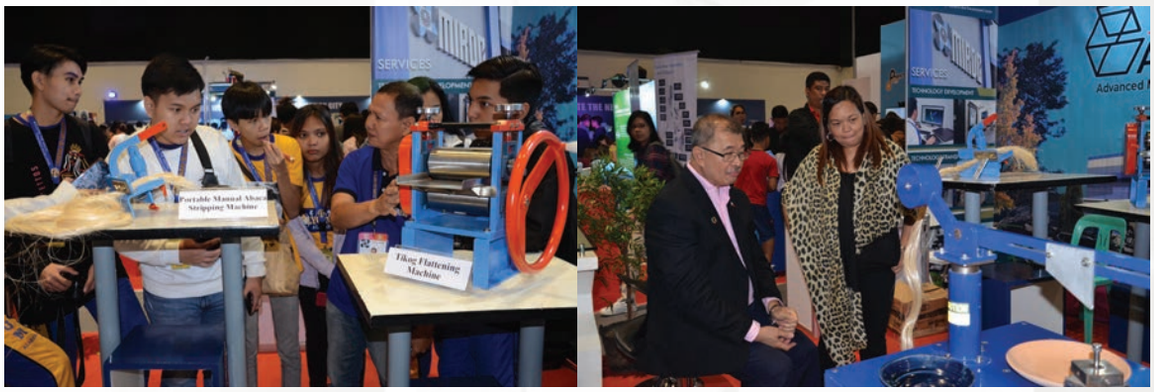
We also participated in the Philippine Suppliers and Manufacturers Exhibition (PSMEx), an exhibit of manufacturing suppliers organized by the Aerospace Industries Association of the Philippines (AIAP) in partnership with the MAI Events Management. This was held at the World Trade Center on March 27-30, 2019.

The 2019 National Science and Technology Week (NSTW) celebration held at the World Trade Center in July. In the succeeding months, the Center took the featured technologies to various destinations across the country for the Regional Science and Technology Week (RSTW). Our participation in

regional science fairs and exhibits allowed us to better reach the metalworking companies in the countryside. We not only aim to promote our technologies; we also intend to let our industry partners and stakeholders of the services available to them. In this way, we strike stronger and mutually beneficial relationships.

Our technologies and services highlighted the DOST-MIRDC's capability to boost the local M&E industry in the following regions during the 2019 RSTW celebration:

Venue	Dates
Balanga, Bataan	July 30-August 1, 2019
Tuguegarao City, Cagayan	August 27-30, 2019
Bayugan City, Agusan Del Sur	September 3-5, 2019
Laoag City. Ilocos Norte	September 17-19, 2019
Pasig City, Metro Manila	October 1-3, 2019
Naga City, Camarines Sur	October 8-10, 2019
Iloilo City, Iloilo	October 21-25, 2019
Puerto Princesa City, Palawan	November 27-29, 2019



Our participation in the 2019 NSTW allows us to reach out to more industry players and stakeholders.

- ***Our IEC materials helped promote the Center's technologies and services.***

We produced information, education, and communication (IEC) materials for effective promotions of the Center's technologies. The IEC materials we produced and distributed to the industry include the 2018 MIRDC Annual Report, the 2019 Metals and Engineering (M&E) Week Souvenir Program, the 2019 Philippine Metals, and the various brochures of MIRDC-developed technologies and facilities for the use of the industry. We also produced three (3) promotional videos featuring the following newly-completed technologies: the Tikog Flattening Machine; the Portable Manual Abaca Fiber Stripping Machine; and the Clay Molding Equipment. Copies of the IEC materials are available at the Center's official website and fb page.

The exhibit viewers keenly watching the technology videos and attentively listens while explaining the technologies being featured in different exhibitions that MIRDC participated in.

- ***Our diligent promotions helped make the home-made HET the talk of the town!***

The HET made big waves in almost all media platforms – traditional and new. It caught the attention of major TV news networks and online news sites. The word about this locally-developed mass transportation alternative created a community of happy and hopeful commuters.

Engr. Pablo Q. Acuin, leader of the HET project, is interviewed by major TV networks.

• Our facilities are eye-openers - there is so much that the industry can do to boost competitiveness.

Our doors are open to stakeholders who wish to see our facilities. Part of our commitment to serve the industry is to accommodate students, industry players, and fellow government institutions for plant visits. In 2019, we welcomed ambassadors from the Department of Foreign Affairs (DFA), from Ethiopia, from the Federation of Asian Die and Mould Associations (FADMA) and the PDMA, from Iran, from the Korea Association of Machinery Industry (KOAMI), from the United Nations Industrial Development Organization (UNIDO). Later during the year, we welcomed Mr. Bert Lina, a prominent and much admired personality in the logistics industry. Mr. Lina rode the AGT and saw its significance and market potentials. We intend to take advantage of these opportunities to showcase the Center's capabilities so that we may increase our engagements with the stakeholders.

DFA Ambassadors

Visitor's from Ethiopia

FADMA and PDMA Visitors

Iranian Visitors

KOAMI Visitors

UNIDO Visitors

Mr. Bert Lina, top man of the local logistics industry, rides on the AGT.

• Our participation in the Technology Transfer Day is an opportunity to pitch and discuss licensing procedures.

We joined the Technology Transfer Day organized by the DOST – Regional Office No. 1 headed by Regional Director Armando Ganal. It was held in Saint Louis College, Brgy. Carlatan, City of San Fernando, La Union last October 23 – 25, 2019.

There, we delivered a pitch to promote and encourage fabricators in the province to adopt the Food Processing Equipment, Rice Transplanter and Rice Harvester Attachments. We also discussed the licensing procedure and requirements of the Center.

Engr. Mervin B. Gorospe of the TDD-TABDS presents licensing procedure and arrangements during the Tech Transfer Day held at the Saint Louis College in La Union in October 2019.

• Our events serve to fortify our collaborations.

The Center engages in big events to promote its technologies and upcoming projects. Driven with the motivation to let our stakeholders know of how our technologies and services can serve the country, we aim to draw the local M&E industry closer to us, so that we can work in close cooperation and nurture strong partnerships.

Early in the year, we proudly turned over HERT to the city of Cauayan, Isabela as part of its transformation into a 'Smart City.' The HERT has been integrated into the city's public transportation since then. In March 2019, we turned over the Automated Guideway transit (AGT) System to the Bataan Peninsula State University (BPSU). Now that the University assumes ownership of the AGT, the BPSU will use the AGT to develop a railway engineering program and offer railway engineering courses, to add to their curriculum offerings to college students. The HET, another mass transportation project of the Center, gained wide public interest as it offered free rides to train-riding commuters from May 6-24, 2019. Passengers experienced the comfortable and safe train ride brought by the HET. In October, the Center held the groundbreaking of the Mold Technology Support Center (MTSC), a project with the Korea Institute for Advancement of Technology (KIAT) under the Official Development Assistance of the government of Korea to the Philippine government, particularly the die and mold industry. We invited key personalities from the industry with the aim of drum beating the MTSC facility. We are optimistic that the MTSC will be a very relevant training and service facility to boost the local die and mold businesses

The MIRDC holds the groundbreaking ceremony of the Mold Technology Support Center (MTSC) at the Cavite Economic Zone, Gen. Trias, Cavite on Oct. 30, 2019.

MOLD TECHNOLOGY SUPPORT CENTER (MTSC)

EPZA-Bacao Rd., Bgy. Bacao 2, Gen. Trias, Cavite

DOST MIRDC PDMA, Inc. PEZA boi PHILIPPINES BOARD OF INVESTMENTS Ministry of Trade, Industry and Energy beyond leading technology KIAT KOMI KOREA ASSOCIATION OF MACHINERY INDUSTRY MGF MACHINERY INDUSTRY SHARED GROWTH PROMOTING FOUNDATION

II. RESEARCH AND DEVELOPMENT

METALS INDUSTRY RESEARCH PROGRAM
Budget: PhP 51,763 million or 20% of the total allotment

Our Research and Development Accomplishments in 2019 in a Nutshell

Our R&D activities are focused on four aspects: (1) Machine Building; (2) Materials and Minerals Processing Program; (3) Defense and Security Interventions through R&D (DESIRED) Program; and (4) Advanced Transport Program. These are R&D programs envisioned to strategically provide reliable and long-term S&T solutions to the industries' rapidly changing issues and challenges. Our accomplishments are as follows:

- 36 partnerships with counterpart resources generated out of these partnerships reaching Php 617, 394.00.
- 18 new partnerships in the form of MOU/MOA/PPP/CRA forged with private stakeholders and with other government agencies outside of the DOST.
- 18 maintained partnerships, majority are linkages or collaborations with our partner industry associations.
- 19 R&D projects completed: nine (9) are internal projects; three (3) are Grants-in-Aid projects funded by the DOST; and seven (7) are contract research projects with private companies. Likewise, The Center implemented 11 new and on-going R&D projects with timeliness of implementation at 73%. Projects implemented within the approved timeframe refer to projects whose overall project duration is officially approved by the EXECOM/Governing Board/Approving Authority.

In the last five (5) years, we transferred 23 technologies to adopters, published 31 scientific papers in peer-reviewed publications, presented 11 scientific papers in national and international conferences, filed 14 intellectual property rights applications with five (5) approved/registered with the Intellectual Property Office of the Philippines.

Implementing R&D activities is a commitment that runs in our veins. We are passionate about seeking ways to improve, to find solutions, to innovate. 2019 was an exciting year. Our R&D journey for this year called for impeccable execution that only the very best engineering minds and project members can deliver.

Staff from the Product Development Section and the Design Section under the Prototyping Division; and our staff from the Materials Research Section and the Process Research Section under the Materials and Process Research Division, and the Technical Solutions Services Section (TSSS) make all the line-up of our R&D activities happen. They demonstrate the world-class quality of our R&D capabilities.

A. We have successfully completed R&D projects.

A.1. Prototyping of Waste Disposal Machine

Project duration: January to June 2019
Project leader: Engr. Jose B. Ferrer
Funding agency: DOST-Technology Application and Promotion Institute (DOST-TAPI)
Budget: P87,009.00

The Center, in partnership with the DOST-TAPI, fabricated the Prototype Waste Disposal Machine as an assistance to its inventor, Ms. Mary Ann Macaloi. Testing of the machine proved that it is able to shred PET bottles, plastic wrappers, wood, aluminum sheet, tin cans, cartons, rubber, and paper.

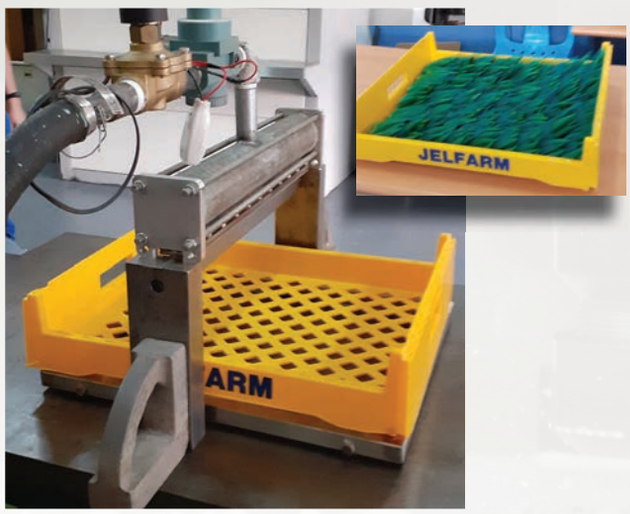
The objective of this project is to develop a waste volume reduction machine that can be demonstrated to fabricators for possible replication.

The Waste Disposal Machine during testing using various solid waste materials.

A.2. Design and Development of Air-blasting Nozzle for Okra Drying

Project duration: September to December 2019
Project leader: Engr. Jose B. Ferrer
R&D partner: JELFARM Fresh Product Enterprises
Budget: P20,000.00

The project covered the design, fabrication and testing, and adjustment of components of the air blasting nozzle. Test materials were provided by the cooperator while standard engineering components were sourced from unused equipment. Test results are promising for integration to a project having a wider scope, the 'Development of Conveyorized Okra Drying System,' which is eyed as a project proposal under DOST's Collaborative Research and Development to Leverage Philippine Economy (CRADLE) Program.



Test rig for drying; Pallet full of okra for drying (inset).

A.3. Design and Development of Medical Vial Crusher

Project duration: September to December 2019
Project leader: Dr. Dominic S. Guevarra
R&D partner: DECHLEM Enterprises, Inc.
Budget: P110,000.00

The project focused on the design and fabrication of a prototype medical vial crushing machine that features a conical crushing mechanism to facilitate safe handling and proper disposal of spent medical vials.

In this study, the project team designed, built, and tested a prototyped machine for crushing glass medical vials comprised of chute (feed hopper), crushing chamber, hammer blades, fixed/stationary blade, perforated screen, and machine base. Based on performance test results, the DOST-MIRDC successfully achieved its objective and the outcome proves that the machine can attain a capacity of 750 vials per hour which is more than the required capacity of 600 vials per eight hours of operation.

Medical Vial Crusher

Sample medical vials before and after crushing

The project outcome will benefit the small and medium enterprises (SMEs) engaged in the fabrication of solid waste recycling machines. With the adoption of new and business-appropriate technologies such as the Center's medical vial crusher, we envision capability-building that will lead to increased productivity and profitability of our fabricators.

A.4. Design and Development of Hand Tractor with Gear Transmission

Project duration: January 2018 to June 2019
Project leader: Engr. Emerito V. Banal
Funding agency: Internal Project
Budget: P1,500,000.00

This project aims to improve the design configuration of the hand tractor by means of replacing the chain and sprocket transmission with a gear transmission system, which will be contained in a transmission box together with shafts and bearings for smooth drive.

The project team manufactured the gear components of the transmission using the Center's newly-acquired CNC gear making machines and gear making design software such as KISSYS and KISSOFT.

Results showed that only minimal changes are employed in the structure of the walking-type hand tractor in order to suit the gear transmission system coming from a chain and sprocket transmission setup.

Though the gear transmission system prototype weighs 85 kgs and twice the weight of chain and sprocket transmission, it does not affect the configuration of the said walking-type hand tractor. As such, most of the requirements of PAES 109:2000 were followed, such as structure of tractor, noise, operator's safety requirements and shaft and tire.

Fabricators in the business of making farm implements will benefit through licensing this design because the parts are easy to fabricate and maintain. Fabrication of replacement parts can easily be done even in rural areas. With local fabricators, we minimize the need to import parts.

Hand Tractor with Gear Transmission

A.5. Investigation of Effects of Chemistry and Casting Parameters on the Performance of Austenitic Manganese Steel

Project Duration: May 2018 – May 2019
Project Leader: Mr. Lemuel N. Apusaga
Industry Partner: University of the Philippines - Diliman

The DOST MIRDC, in partnership with the University of the Philippines, Diliman, conducted a study to establish the relationship between a certain chemistry of the manganese steel to its structure, then to its mechanical properties. The 'Structure leads to properties' is a guiding principle in materials science. Structure, in turn, is the result of the design and manufacturing process. This project, then, aims to identify the relationship between a certain casting temperature to its structure and to its properties. Results showed that the pouring temperature had a negative effect on the grain size and positive effect on the yield strength. Lowering the pouring temperature resulted in smaller grain sizes and higher yield strength. Up to a certain level of titanium concentration, smaller grain sizes were observed. The grain size will then slowly increase in size. Titanium addition had a negative effect on the yield and tensile strengths of the specimens. Both mechanical properties continued to decline with increasing titanium content. Cerium had a marked effect on the grain size of the specimen, but only when poured at low temperatures. The grain sizes of samples at low pouring temperature are significantly smaller compared to those poured at high temperature. The tensile strength level, how-

ever, is higher in samples poured at higher temperature. Samples with cerium exhibited significantly small grain sizes and higher yield and tensile strengths compared to samples with titanium.

Benefitting no less than the metals and minerals sectors, these results significantly improved the way we understand the effects of different parameters in the performance of the Austenitic Manganese Steel (AMS). Results of this investigation may be used as a tool or reference for future exploratory research on AMS.

A.6. Processing of Cellulose Ink for Printing of Metallic Structures

Project duration: July 2019 to December 2019
Project Leader: Engr. Carla C. Nocheseda
Funding agency: DOST-PCIEERD

Additive manufacturing (AM) is increasingly popular among researchers and in many industries due to its many advantages: few restrictions on the geometry of fabricated structures; enable customizations; and reduced cost and time for prototyping, to name a few. Although AM of polymer-based materials is highly advanced to easily create complex 3D structures, metal is indispensable for many features such as thermal resistivity, electrical conductivity, and mechanical performance. Additive manufactured metallic structures has so much potential in diverse applications such as medical implants, batteries, electrodes, sensors, aerospace components and dental devices. Commercialized metal AM techniques such as selective laser melting and electron beam melting rely on a high-intensity laser and energy beam to fuse micro-sized metal particles. The laser and energy beam, however, require expensive equipment and causes residual stresses in the fabricated parts. Therefore, there is a need for environment friendly solutions for widespread adoption of 3D printing of metallic structures but without the use of laser beam or electron beam to locally fuse metallic particles in a powder bed.

This project developed a cellulose-based hydrogel ink for additive manufacturing of metallic structures. The metal 3D printing method is based on material extrusion mechanism that used solvent cast 3D printing (SC3DP) method that made use of a metallic ink at room temperature followed by thermal treatments on the as-printed structures that decompose the cellulose-based binder and sinter the steel powders, to achieve all-metal structures.

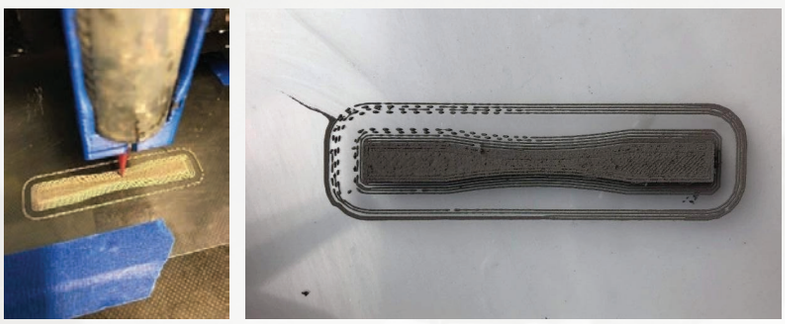


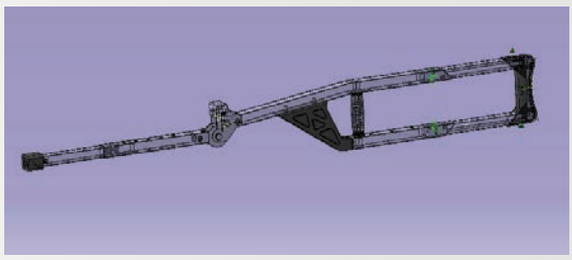
Image of as-printed tensile bar made from 77% metal/cellulose ink

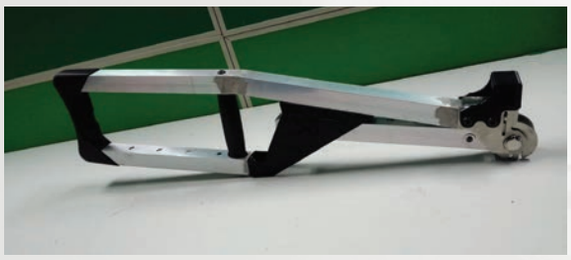
A.7. Prototype Development of Foldable Crutch System

Project duration: December 2018 to July 2019
Project leader: Engr. Denise Daryl A. Florante
R&D partner: Mr. James Bryan B. Camacho
Budget: P 127,024.35

The Center developed a contemporary travel-friendly crutch design that will cater to the needs of new generation of underarm crutch users. The developed foldable crutch system aims to create mobility aid device that adapts to different types of environment.

This project is in support of the persons with disabilities (PWDs) community, and implemented in close cooperation with Mr. James Bryan B. Camacho, using better materials, adding new functional and safety features. This foldable crutch prototype has improved much compared to the initial prototype made. In terms of the specification, the weight of the new foldable crutch reduced from 3 kg to 1kg, which is comparable to the commercially available foldable crutches. Meanwhile, the height of the new prototype is comparable with the previous unit with a height ranging from 0.94 to 1.24 meters, while the fully open and folded height is 0.65 meters. The new foldable crutch also provides versatility with the addition of several features, like quick release locking mechanism and height adjustment mechanism. The foldable crutches which will help the end-user adjust and cope easily with the demands of commuting or short-distance walks.





Foldable Crutch System

A.8. Development of Exothermic Sleeves

Project Duration: April – November 2019
Project Leader: Engr. Florentino J. Lafuente
Industry partner: Mesterv Enterprises

The use of exothermic sleeves during casting may help foundries decrease over-all cost of casting. Exothermic sleeves facilitate effective feeding of metal due to their design, which results to extended solidification time of riser used in casting. At present, most of the local foundries do not use exothermic sleeves because of their cost.

The DOST-MIRDC, with our R&D partner, the Metserv Enterprises, offers the use of exothermic sleeves, developed in-house, at lower cost. The exothermic sleeves are made from locally available materials such as burnt wood (insulating material), aluminum powders (exothermic material, fine silica sand (body), potassium nitrate (initial fire igniter), and fine steel mill rust scale (source

of oxygen) using CO_2 process. Based on the results of the experiments conducted, the use of newly developed exothermic sleeves significantly reduced the severity of the expected casting "shrinkage" defect. The price of formulated exothermic sleeves is P51.96 per piece (0.47 kg.) which is 13.4% cheaper than the ones available in the market, which are priced at P60/piece.

Table 1. Computation of the material cost of the formulated exothermic sleeve

Material	Unit Cost (Php)	Quantity Used	Total Cost
1.Burn Wood	Free	0.26 kg	-
2. Aluminum Powder	50.00 / 0.30 kilo	0.27 kg	45.00
3. Fused Silica Sand	3250.00 / 25 kilos	0.25 kg	32.50
4. Potassium Nitrate	539.00 / 1 kilo	0.140 kg	75.46
5. MS Rust Scale	Free	0.08 kg	-
6. Sodium Silicate	9200.00 / 230 kilo	0.50 kg	20.00
7. CO2 gas	1150.00 /15 kg	0.20 kg	15.33
Total		1.70 kg	188.29

A.9. Electroless Plating of High Tensile Steel with Treatments as Alternative to Chromium Coatings

Project duration: July 2019 to December 2019
Project Leader: Engr. Carla C. Nocheseda
Funding agency: MIRDC

This research focused on the application of electroless Ni-P plating with heat treatment on high tensile steels. Electroless nickel phosphate plating is nothing new to plating industries but its potential has not been fully utilized. One of the reasons is that many assume that it is a complicated and tedious process to do.

This project aims to conduct a step-by-step process to look at how chromium coatings with high wear and tear and hardness requirement can be replaced by straight forward electroless Ni-P plating using locally available plating solution. This without the serious health hazards associated with chromium coatings. It used a locally and commercially available lead-free electroless plating solution, Nimuden Kap. This, while looking at the various plating parameters that affect the thickness and quality of coating used. This includes pH4.6, plating temperature of 90°C, and varying plating time from 1 to 4 hours. This research is also meant to pave the way for the process to be applicable as replacement to chromium coatings in gun barrel. As such, it is applied simultaneously to a 45-calibre gun barrel that usually requires 25 to 51-microns thick chromium coatings. Experimental results show that the samples used increased electroless nickel coating as plating time is increased: 1-hour plating resulted in about 5 to 7 microns coating thickness while 4 hours plating resulted in about 50-microns thickness coating. All samples are then heat treated at 400°C for 2

hours. Based on hardness test results there is a significant increase in the hardness values of all plated samples compared to the base metal. There is also no significant change in the microstructure but for completeness it is investigated using medium carbon steel so that it is easier to see if there is any. It is also determined if the EN plating route with heat treatment can be done in a two-step process. This is to further ensure complete adhesion of the coating especially of the first coating that is closer to the base metal.

A.10. Development of Carbon Conductive Paint for Electroplating of Non-Conductive Materials

Project duration: June to November 2019
Project Leader: Engr. Keziah M. De la Rama
Funding agency: MIRDC

Different techniques are used to make materials conductive like using catalyst and applying conductive paints. However, the most conductive paints such as silver, copper, and other precious metals are expensive. Conductive carbon materials, particularly those derived from graphite and carbon black, have been used in the manufacture of inks and coatings for a range of printed electronic applications including batteries and supercapacitors. Carbon inks have a host of favorable characteristics that allow them to be used in these applications, including: chemical inertness; the ability to be modified or functionalized in the case of electrochemical sensors; the ability to act as intercalating materials in the case of energy storage; low cost; and disposability. Therefore, by mixing conductive powders/pigments or particles with paintable mediums, conductive paints can be made.

The DOST-MIRDC successfully formulated a carbon conductive paint as alternative to commercially available conductive paint and studied its application on electroplating of non-conductive materials. The conductive paint composition was optimized by various mix ratios of binder pigment, acrylic polymer and acetone as solvent. The optimized composition having the minimum resistivity in the range of 600 ohms was successfully electroplated with copper and nickel. The lower electrical resistivity of the conductive paint compositions of this invention resulted in the use of less material, i.e., thinner films than those required by conventional conductive paints for a particular application. Thus this paint enables significant cost-saving and alternative concepts in the decorative electroplating of non-conductive materials. Costs can be saved by replacing expensive raw materials by more economical ones and by a simplification of the production process.

Carbon conductive paint electroplated with copper (left) and nickel (right).

A.11. Rollmaster Casting Conversion Project

Project Duration: January – December 2019
Project Leader: Lemuel N. Apusaga
Industry Partner: Rollmaster Machinery and Industrial Services

Gearbox housing, a major component in a rice transplanter, is typically manufactured using cut and weld metal fabrication. Typically, this process takes about 4 days to finish using mild steel as per industry partner, Rollmaster Machinery and Industrial Services corporation's experience. This project therefore aims to use casting processing route instead to manufacture ten (10) pieces gearbox housing produced in five (5) days using ductile iron with improved mechanical properties. Through the new method, the new gearbox housing was produced at 20% lower cost per unit. In addition, the part has better appearance and as compared to the traditionally manufactured gearbox housing.

(Left) Wood patterns for the gearbox housing; (Right) As cast gearbox housing

Casting after fettling and sand blasting

A.12. Development of Hexavalent-Chromium Free Anodizing Solution by Using Tartaric-Sulfuric Acid

Project duration: June to November 2019
Project Leader: Engr. Keziah M. De la Rama
Funding agency: MIRDC

The use of hexavalent chromium or Chromic Acid Anodizing (CAA) in workplaces is regulated and prohibited by regulatory standards due to environmental and health-related issues associated with it. It is an electrochemical process used for both generating an aluminum oxide layer for corrosion protection and surface treatment prior to application of a corrosion-inhibiting primer. Alternatively, Tartaric-sulphuric acid (TSA) anodizing offers the same benefits, but offers an environment-friendly process of aluminum. It is a recent development for chromate-free anodizing. It is applied if strict requirements are imposed on corrosion resistance and sulfuric anodizing is not an option due to the negative effects on the fatigue strength. The TSA-process is mainly applied to aerospace components.

In the Philippines, TSA has not been adopted locally as a process. Platers do not have the luxury to conduct R&D to further tailor-fit this technology to Philippine settings. In view of this, the DOST-MIRDC conducted optimization experiments that aim for such technology to be easily adopted by the local industry.

During laboratory trials, numerous fine pores appear in the oxide layer of Aluminum metal, T6 during the treatment. Samples are not sealed after anodizing, as this is a common practice because most of the time

TSA is used as a pre-treatment before paint application. The results showed the anodizing time is proportional to the desired oxide thickness, i.e. for 10 microns oxidized thickness will require 50 mins anodizing time. The anodized samples show very satisfactory anti corrosion performances using salt spray test with 5% sodium chloride for 240 hours. TSA operation is simpler and more cost effective compared to CAA. TSA anodizing can not only provide direct corrosion protection but also form a paint base suitable for further protection treatments.

We inked partnerships with the industry and our stakeholders.

Our R&D initiatives spun-off to the forging of partnerships, and this is another remarkable accomplishment of the Center. Partnerships mean stronger and beneficial relationships, which will further allow us to explore growth and success opportunities with the industry that we serve.

We are very pleased to report that we entered into 18 new partnerships in 2019, and maintained 18 more – which are our existing partnerships with our industry association partners.

New partnerships of the Center include the following: partnership with the Metserv Enterprises through the exothermic sleeves project; partnership with the Rollmaster Machinery and Industrial Services Corp., for the Rollmaster Casting Conversion project; partnership with the University of the Philippines – Diliman, through the project on investigation of effects of chemistry and casting parameters on the performance of austenitic manganese steel; and a signed memorandum of agreement with the Transoil Corporation, through the metallurgical failure analysis of the crane gate valve project, to name a few.

We value our partnerships because it is through our collaborations that we are indeed able to create productive and innovative ecosystems that will yield long-term positive impact for the local M&E and allied industries.

We applied for Intellectual Property Rights (IPRs).

Conduct of R&D created intellectual properties (IP), and as researchers, we are aware of the importance of protecting the IPs we generate.

Below are some of the IP applications we filed in 2019:

IP applied	R&D component	R&D Project
Utility Model	'An Abaca fiber extractor'	Abaca Stripping Machine
Utility Model	'Hybrid-Powered Railway Vehicle' Registration Number: 12019000489	Validation and Turnover of the Hybrid Electric Train
Utility Model	'Hybrid Power System with Load-Sharing Mechanism for a Railway Vehicle' Registration Number: 12019000488	Validation and Turnover of the Hybrid Electric Train

We were granted Intellectual Property Rights (IPRs).

IP Type	IP approved	Description
Utility Model	Vacuum Packaging Machine Modular Water Retort	The present utility model is a water retort machine which sterilizes food in any retortable containers and extends its shelf life. The main element of the present utility model is the retort vessel itself with cover to cover a generally cylindrical main pressure vessel, the water retort body. Said water retort body generally contains removable mounted seals and instruments to lock and monitor the process respectively, and is configured to accommodate product basket which is perforated to allow steam to pass during the operation and sterilize the food in pouches, can and glass jars.
Utility Model	Vacuum Frying Machine	The present utility model relates to a vacuum frying machine that operates in deep-frying food at low temperature. It is comprised of a frying vessel and an oil pre-heating tank securely mounted to a base frame equipped with a ladder and a main control valve which facilitate vacuum for both the frying vessel and the oil pre-heating tank.
Utility Model	Vacuum Packaging Machine	The present vacuum packaging machine utility model extends the shelf life of products. It is comprised of a body, nitrogen flushing system, a vacuuming system, a sealing mechanism, and a control panel.
Utility Model	Reed plant (*Alisma sagittifolium Llanos)* Press Machine	This machine is manually operated to press and flatten reed plant (Alisma sagittifolium Llanos) leaf. The machine uses two cylindrical rollers for pressing the reed plant leaf. The pressure exerted to flatten the reed plant leaf can be controlled by the knobs.
Utility Model	Hand Tractor with Transplanter Attachment Apparatus	This utility model refers to a transplanter attachment apparatus, more particularly to a rice seedling transplanter attachment apparatus that allows a transplanter mechanism to be integrated to and removed from a hand tractor. This implement finds application in mechanized crop planting such that nursery-grown rice seedlings are pulled and transplanted into puddled and leveled fields. The transplanter mechanism is coupled to the hand tractor using a combination of hitching means of a floater assembly and transmission joint system of speed reducer mechanism.
Utility Model	Abaca Fiber Extractor	This utility model is an apparatus to extract abaca fiber from a strip of tuxy. The abaca fiber extractor is comprised of a body, a blade holder, a blade, a shaft housing, a pusher shaft, a spring, a lever, and a stooge.
Industrial Design	Hybrid Electric Train (HET)	The HET is composed of five 12-meter-length coaches which are powered by either generator set and/or batteries setting up the hybrid system. The coach assembly with anti-climbing mechanism and semi-permanent coupler underwent computer-aided designing and stress analysis to verify its compactness and credibility. The addition of load power sharing and regenerative braking technology furthers energy efficiency and eco-friendliness.

We presented our peer-reviewed technical paper in the 11th International Conference on Humanoid, Nanotechnology, Information, Communication and Control, Environment, and Management (IEEE HNICEM).

Title of Scientific Paper Published	Author	Date Presented	Name of Publications & Other Details (ISSN / ISBN / Country, website links as applicable)
Innovation on Advance Transportation System for Local Application	Arlene G. Estacio Rio S. Pagtalunan	November 28-30, 2019	Publisher: IEEE; Published in: TENCON 2018; INSPEC Accession No. : 18474580 ; DOI:10.1109/TENCON.2018.8650107
Design and Development of a Semi-Permanent Coupler of a Five-Coach Train	Glen D. Espeña Geoffrey L. Abulencia Rodnel O. Tamayo Jonathan Q. Puerto Pablo Q. Acuin Jayson P. Rogelio	November 28-30, 2019	Publisher: IEEE; Published in: TENCON 2018; INSPEC Accession No. : 18474580 ; DOI:10.1109/TENCON.2018.8650107
Development of a Functionally-Tested Hybrid Electric Train	Pablo Q. Acuin Jonathan Q. Puerto Rodnel O. Tamayo Geoffrey L. Abulencia Rolando F. Ibuig	November 28-30, 2019	Publisher: IEEE; Published in: TENCON 2018; INSPEC Accession No. : 18474580 ; DOI:10.1109/TENCON.2018.8650107

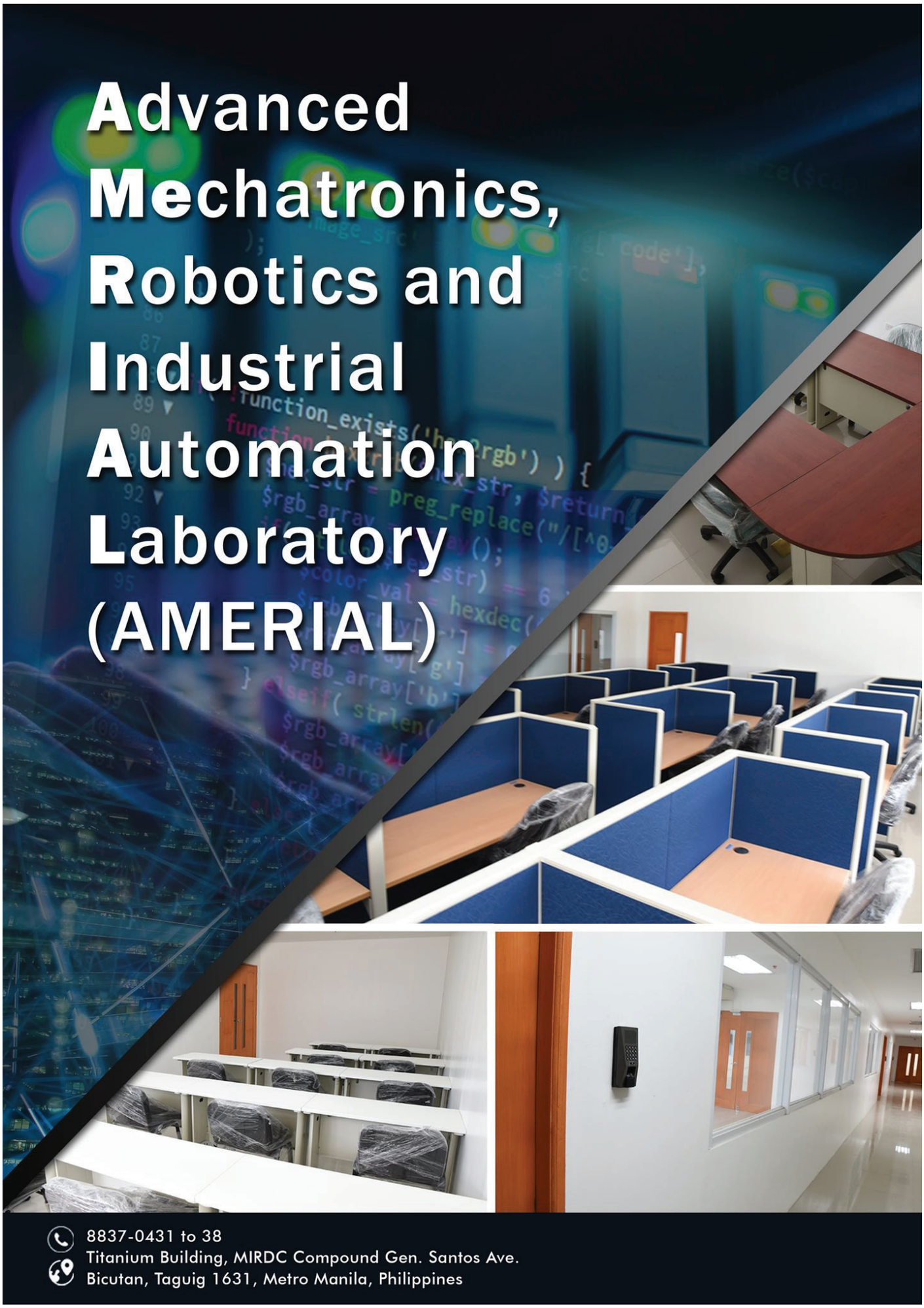
We published our peer-reviewed technical papers in ISI/refereed journals.

Title of Scientific Paper Published	Author	Date Published	Name of Publications & Other Details (ISSN /ISBN /Country, website links as applicable)
Design and Finite Element Analysis of Customized Local Vehicles (CLRV): The Case for the Tricycle and the Philippine Jeepney	Ryan C. Clavecillas Gharry M. Bathan Remartin S. Maglantay Jayson P. Rogelio Fred P. Liza Jonathan Q. Puerto	2/25/2019	Publisher: IEEE; Published in: TENCON 2018; INSPEC Accession No. : 18474580 ; DOI: 10.1109/TENCON.2018.8650107
Performance Evaluation of 12Hp 4-Stroke Single Cylinder Diesel Engine based on the Philippine Standards	Jonathan Q. Puerto Allan John Limson Fred P. Liza Cardel B. Nocos Jayson P. Rogelio Dr. Argel Bandala	3/14/2019	Publisher: IEEE; Published in: 2018 IEEE 10th International Conference on HNICEM; DOI: 10.1109/HNICEM.2018.8666318
Design of the Philippine Jeepney for Crashworthiness Analysis: A Finite Element Approach	Jayson P. Rogelio Ryan C. Clavecillas Remartin S. Maglantay Dr. Argel Bandala Francisco Emmanuel T. Munsayac Fred P. Liza Jonathan Q. Puerto	3/14/2019	Publisher: IEEE; Published in: 2018 IEEE 10th International Conference on HNICEM; DOI: 10.1109/HNICEM.2018.8666246

We presented our non-peer reviewed technical paper presented in the IMPC-EURASIA 2019.

As part of the conduct of the project entitled, ''Investigation of Effects of Chemistry and Casting Parameters in the Performance of Austenitic Manganese Steel (AMS), we came up with a technical paper on the 'Grain Refinement of As-Cast Hadfield Steel for Jaw Crusher Plates through Pouring Temperature Control and Micro-Alloying.' This paper was accepted as poster presentation at the IMPC-EURASIA 2019 held on 31 October – 2 November 2019 in Antalya, Turkey.

We are coming up with new facilities soon!



AMCen
Advanced Manufacturing Center
Beyond the Conventional.

Advanced Additive Manufacturing is arriving in the Philippines!

The Advanced Manufacturing Center (AMCen) is the Philippines' up-and-coming national hub of additive manufacturing.

AMCen can print your prototypes in a wide variety of materials, from standard polymers to even metals and ceramics. For polymers, you can dream big with us –3D print builds as high as two meters, and builds as large as a modest automobile.

We offer accompanying services to help you in your prototyping process such as consultations, 3D modeling and scanning, as well as warehousing and training sessions.

All of these and more soon to come with the rise of the AMCen building at the MIRDC Compound, Bicutan, Taguig City.
Here at the AMCen, we always go beyond the conventional!

MATERIALS

Metals
Titanium | Stainless Steel | Managing Steel
Aluminum | Cobalt Chrome

Ceramics
Hydroxyapatite | Zirconia | Alumina
Fused Silica | Cordieriet

Composites and Polymers
Carbon-Fiber Reinforced Nylon | PLA | ABS
CPE | PC | PP | TPU | PVA | Resins
Engineering Thermoplastics
PEEK | PEKK | ULTEM

SERVICES

3D Scanning
3D Printing
3D Modeling
Scale Modeling
Design Optimization
Virtual Warehousing
Remanufacturing
Trainings
Consultancy
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AMCen INNOVATION Grants | AMCen CONNECT3DMINDS | AMCen TECHTUBE | AMCen TECH BOX | AMCen Tech PartnerShape | AMCen TechFest WINNOVATION Awards

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Let's go beyond the conventional!

III. SCIENCE AND TECHNOLOGY SERVICES

METALS INDUSTRY SCIENCE AND TECHNOLOGY SERVICES PROGRAM
Budget: PhP 22.606 million or 9% of the total allotment

Our Science and Technology Services Accomplishment in 2019 in a Nutshell

We offer our Science and Technology (S&T) services programs to perform quality checks for companies belonging to the semiconductor, construction, manufacturing, machining and fabrication, welding, tool and die, forging, metal casting, heat treatment, and other industries. Our S&T services are also available to our clients so that they meet the requirements of various industries on verification of material composition. Summarized below are our S&T services accomplishments.

- 5,427 technical services rendered for the year by the different frontline services of the Center like analysis and testing, resource sharing (facility and actual time sharing), physical metallurgy, technical consultancy, and industrial training.
- 93.44% of the total 5,427 technical services provided on the required timeframe.
- 1,793 unique clients served in 2019: 770 new clients and 1,023 returning clients served by the frontline delivery units.

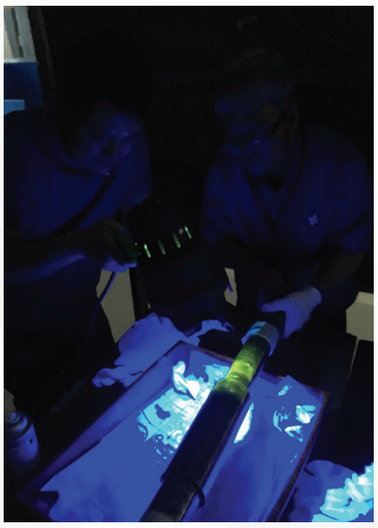
The more than 5,000 technical services that the Center was able to provide the M&E and allied industries were remarkable results of the collective efforts of our various laboratories under the Analysis and Testing Division (ATD), the Materials and Process Research Division (MPRD). The Technical Solutions Services Section (TSSS) was instrumental in making our services convenient for the clients, as it ensures a smooth end-to-end processing of job orders. Moreover, the Technology Diffusion Division (TDD) performed remarkably in the delivery of technical consultancy and industrial training activities.

Enabling the ATD to surpass all its targets, which has become its trademark for many years now, are its workforce from the Physical Laboratories Section, Chemical Laboratories Section, and the Instrumentation and Metrology Section. Together, the ATD, the MPRD, the TSSS, and the TDD's accomplishments reflect our commitment to serve and make a difference.

A. We rendered technical services that have significant impact on the M&E and allied industries.

A.1. Our analysis and testing services remain as the industry's top-of-mind choice

The Non-Destructive Testing (NDT) Laboratory conducted Ultrasonic and Particle Testing of different tanks from a manufacturing company in Cavite and did the same tests for the electric motor shafting of a rewinding company.



NDT team conducts Thickness Gauge Testing of an air receiving tank (left) and Magnetic Particle testing of a shaft from a rewinding company (right).

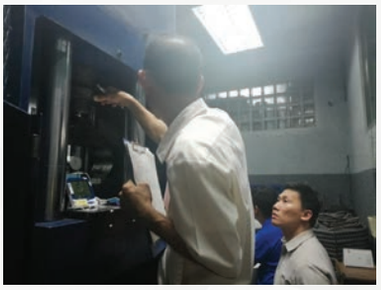
We tested samples like femoral knee implant for surface roughness. We also tested a Solar pavement Leveled Marer/Stud for compression and manifold parts of plane engine for hardness, among others. These were made possible with the capabilities of our Mechanical Laboratory.

The Mechanical Metallurgy Laboratory conducted compression testing of a solar pavement, a road safety device usually embedded and installed on highways (left); manifolds (upper right), parts of a plane engine, were subjected to hardness testing; femoral knee implant (lower right) was subjected to roughness testing.

Our Physico-Chemical Laboratory (PCL), on the other hand, consistently addressed the chemical requirement of BPS-regulated products using the Optical Emission Spectrometer (OES). The PCL's services are famous for on-site testing using handheld X-ray Fluorescence (XRF) Spectrometer. This year, the XRF Spectrometer was used for samples like machine parts of a popular consumer goods company, dump trucks, and gate valves for treatment plants. The highlight for its linked unit, the Corrosion Laboratory, was Salt Spray testing of seatbelts, a BPS-regulated product and is now heavily monitored.

The Physico-Chemical Laboratory conducts an onsite testing using a handheld XRF, an instrument that scans and determines the elemental composition of a sample (left). The Corrosion Laboratory conducts salt spray test to a three-point automatic seatbelt.

The Center was able to provide valuable and critical services not only to government agencies, but also to aviation and automotive industries and semiconductor manufacturers through the Instrumentation and Metrology Laboratories.



The Metrology Laboratory staff conduct onsite calibration of granite plate (left) and UTM (right).

Further, the Metrology Laboratory supported the big-named firms in the metal industries, such as: Steel Asia, Pag-asa Steel, Somico Steel, Unicorn, Nippon, Sonico Steel, and Supreme Steel, to name a few. We extended our services also to companies in the aviation and the automotive sector: Lufthansa Technik, Mitsubishi, Honda, Isuzu, Bridgestone, Ramcar, Yokohama, and Laguna Auto parts. We also served Fairchild/On-Semiconductor, one of the leading manufacturers of semiconductors by providing traceability using our laboratory's laser interferometer system.

And in 2019, we were able to offer a new testing service. Because we keep improving, and we want our services to keep up with the dynamic needs of the industry.

We added another testing service – the Body Dimension Measurement of Modern Public Utility Vehicles (PUV). For the delivery of these services, there were a couple of very large-sized modern PUVs inside the MIRDC compound. The temporary lack of parking spaces may have caused a bit of inconvenience to our visitors, but from a different perspective, we took this as a good sign. This indicated testing activities. This meant that we are truly serving the industry.

The ATL conducts measurement services to a modern PUV vehicle sample as part of the DoTr requirements.

The Department of Transportation (DoTr) acquired the assistance of the Auto-Parts Testing Laboratory (ATL) to provide the measurement services for the Class 1, 2, and 3 modern PUV's samples. The results coming from ATL will then be assessed by DoTr based on PNS 2126:2017 and PNS 2131:2018 requirements prior to certification.

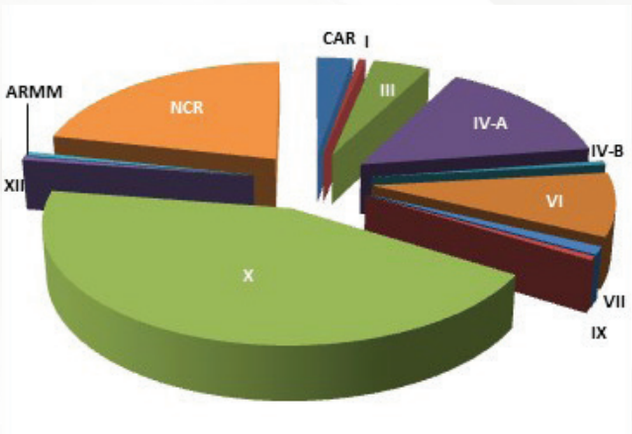
It was in 2018 that DoTr adopted the "Guidelines in Implementation of PUV Modernization Program" pursuant to the requirement set by "Omnibus Franchising Group", but it was only this year that the organization enforced the regulation where ATL plays a vital role and was able to test 43 PUV samples for 2019.

A.2. Our technical consultancy services paved the way for stronger and more meaningful relationships with the industry.

We rendered a total of one hundred eighty-one (181) technology assistance in the fields of Materials Identification & Selection, Metalcasting, Basic Machining processes, Heat Treatment, Surface Finishing, Food Processing Equipment, Productivity Programs and other processes. Our team from the TDD-TABDS made the achievement possible.

Table 2. Total Number of Technology Assistance Rendered Per Region

REGION	TOTAL
CAR	5
I	1
III	8
IV-A	27
IV-B	1
VI	16
VII	2
IX	1
X	79
XII	1
ARMM	1
CR	39
TOTAL –	**181**



- ***We went the extra mile to deliver the most effective consultancy services.***

We actively participate in Technology Forum events to reach out to industry players across the country. The Center joined the invitation of the Provincial Science and Technology Center (PSTC) in Tabuk City, Kalinga to a technology forum on August 15, 2019, through the TDD-TABDS who delivered a talk about 'DOST-MIRDC: Facilities, Services, and Technology Output.' After the presentation, we conducted a technical consultancy with the fabricators of bolo and jewelries who are interested to mechanize their existing processes in order to increase their productivity, quality, and delivery time.

Engr. Mervin B. Gorospe (center), a Senior Science Research Specialist of the TDD-TABDS, takes a look at the necklace pendant shown by Mr. Benson Padcayan (left), owner of a metal fabrication shop, as Mr. Winston Awing, producer of various beads for jewelries, looks on. Mr. Padcayan and Mr. Awing asked for recommendations on the processing equipment that could help them process other stones to be turned into fashion jewelries and accessories.

Figure 2. Mr. Jomar Dawagan (left), a bolo maker, shares with Engr. Gorospe how tedious the process for making handmade bolo is.

And that extra mile is always the most fulfilling part of our journey!

• Technical Consultancy on the Establishment and Maintenance of the Organization's Quality Management System (QMS) according to ISO 9001:2015 Standard

As consultants on ISO 9001, we extended our efforts to provide technical guidance and coaching in the maintenance of the Quality Management System (QMS) of the R.U. Foundry and Machine Shop Corporation in Bacolody City Negros Occidental, and the Science Education Institute (SEI) in Bicutan, Taguig City to maintain their certification to ISO 9001:2015 standard.

Likewise, we were instrumental in the establishment of the various requirements of ISO 9001:2015 (i.e. documented procedures, guidelines, etc.) to prepare the Ideatechs Packaging Corporation in Malabon City and National Academy of Science and Technology (NAST) in Bicutan, Taguig City to attain their goals to get certified to the said standard by the first quarter of 2020.

The assistance to private companies on ISO 9001 resulted in an increase in income by more than 100%, increase in productivity, continuous improvement of facilities, and increase in morale of employees. On the other hand, for the government agency we assisted such as the SEI, the result of maintaining the certification to ISO 9001 was the immediate release of the institute's additional incentives.

Figure 4. The assessment of the QMS by MIRDC experts and 2nd Surveillance Audit of R.U. Foundry and Machine Shop Corp. by TUV-Rheinland on April 8-10, 2019 and April 11, 2019, respectively; The Science Education Institute of the Department of Science and Technology during the Coaching on Internal Audit based on ISO 19011:2018 standard in Tagaytay City on August 19 & 20,2019; The conduct of Internal Audit on October 28 & 29, 2019 to check the readiness of National Academy of Science & Technology to be certified to ISO 9001:2015; and the ISO 9001:2015 Awareness training of Ideatechs Packaging Corp. on October 8, 2019.

• ***We conducted Technology Needs Assessment (TNA) as part of our technical consultancy efforts.***

TNA in Gong Fabricator at Mallango, Tingalayan, Kalinga

The industry taps the services of the Centers experts, and we are more than glad to accommodate them. Engr. Mervin B. Gorospe, our expert in materials identification and selection, and the DOST – PSTC officers in Tabuk City, Kalinga visited the Gong Fabricator on August 14, 2019. Mr. Robert Andomang, co-owner of the company, welcomed the team and explained the manual process in making of gong using several hammers of various sizes. The manual pounding of gongs requires skills to control and apply constant pressure. The group considered the mechanization of the production of "kangsa" (gong), and training on the heat treatment, hardening processes, and identification of the grade of material used for the production of gongs.

TNA in Eighty-Five (AT5) Machine Shop at Mallango, Tingalayan, Kalinga

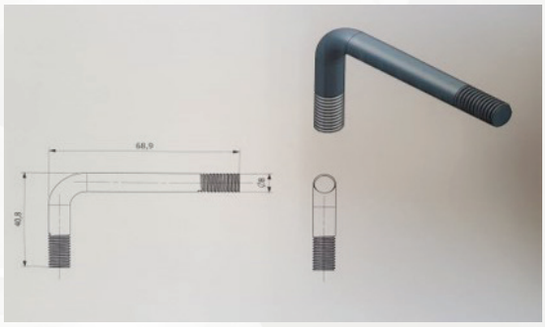
During the TNA visit in AT5 Machine Shop, a repair service provider for mechanical machines such as automotive engine and related agricultural equipment, on August 14, 2019, the team recommended to (a) acquire an engine rebuilding machine to accommodate the increasing demand for repair services of engines; (b) establish a heat treatment facility, a very crucial process during machining of parts; (c) acquire a portable XRF for material or metal identification; and, (d) put-up a hard-chrome electroplating facility to enhance the quality of parts.

Figure 5. Mr. Andomang (L) showcases the one (1) set of "kangsa" (local name of gong)during the technical needs assessment in Mallango, Tinglayan, Kalinga.

Figure 6. Mr. Chan (R) explains the process of his business on repair and maintenance of machines, engines and others that may need metal components for replacements.

B. We formed the Technical Solutions Services Section (TSSS) to better offer seamless end-to-end processing of job orders. .

As the frontline, the TSSS is responsible for receiving inquiries of clients and processing the job order. Along this line, the TSSS also serves to deliver S&T services to address technical aspects concerning designs and measurement, specifications of materials, and processes involved to produce the product items.



Re-threading of pressurized tube to fit the new locknut

Consultancy services provided to the DOST-Industrial Technology Development Institute (DOST-ITDI). Our meeting was about the re-threading of imported pressurized tubes to fit the new locknut. The tube has no local fabricator because the bend and thickness of the tube are critical. Also, we discussed the specifications of test weights that the DOST-ITDI has to produce for the DOST Regional Testing Centers.

Engr. Wilfredo R. Lim, along with TSSS staff accommodates Ms. Ana Rica B. Palconit of the Vega Industries who brings in grinding ball specimen (R) for hardness and metallographic tests.

Consultancy service extended to the Vega Industries (Middle East) FZC. The company requested hardness and metallographic tests for its grinding ball specimen. The TSSS prepared the workpiece for testing.

We also had the privilege of extending consultancy services, in various capacities, to the DOST-Philippine Textile Research Institute (DOST-PTRI), the DOST-Philippine Nuclear Research Institute (DOST-PNRI), the Association of Nambaran Rattan Bamboo Basketry Weaving in Tabuk City, Kalinga, and to the Castilla Advanced Metal Casting Enterprise, to name a few. Our consultancy services involved the following, among others: measurement and design of stainless steel material; localizing the 316 stainless steel closed capsule container and producing 20 pieces of the capsule with variation and adjustment on the cap design; acquiring a rattan and bamboo processing equipment through assistance from the DOST's Small Enterprise Technology Upgrading Program (DOST-SETUP); and

(L) The TSSS staff discusses the actual time job order service for the use of machines based on the per hour machine and labor rates as well as conducts consultation meeting with clients (R).

Actual Time Job Order service arrangements to utilize the Centers crucible and manpower for manganese and aluminum bronze casting of gear blank patterns.

We are better able to deliver services that cover end-to-end processes - from job acceptance, work scheduling, job processing, quality assurance/control, and releasing of jobs. In its second year of creation, the TSSS has recorded and accomplished a total of 8447 machine-hour utilization with total external income of PhP 6.3 M. Also considered as a major accomplishment of the Center along with the creation of the TSSS is the improvement of machine utilization.

C. We are proud to make significant impact on the industry through our industrial training services.

The Center has made a name for itself as a training provider among industry players. For many years, we kept on building our training capabilities with the aim of serving the industry the best way we know how. Like the previous years, we again surpassed our targets for 2019:

We conducted a total of 135 training programs, compared to only a target of 130. This translates to 104% in accomplishments. We also surpassed the targets set on the Center's clients served, industry people trained and income generated. A total of 546 (105%) out of 522 target clients (both individual and firm) which include new and returning customers. Likewise, a total of 2,581 (124%) from a target of 2,160 were trained, so that we were able to raise an income of Php 3,677,660 for the year 2019.

We conduct training programs according to the different areas of specialization in the field of metals and engineering, and related programs. Regular training programs are held at the MIRDC, while the packaged and regional training programs are normally conducted based on the client's request and availability of training tools and facilities.

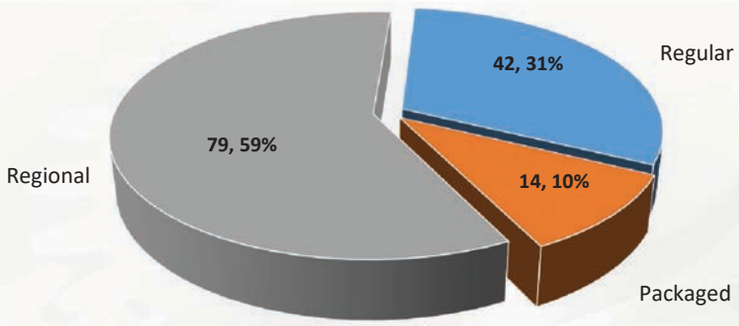


Figure 1. Distribution of Training Programs Conducted

Table 3 shows the frequency distribution of the different fields of training programs and venue of training.

Table 3. Distribution of Training Programs Conducted According to Area of Expertise and Region

Areas of Expertise/Region	NCR	I	III	IV	VI	VIII	X	CARAGA	TOTAL
Analysis & Testing	44		1	1			1		47
Engineering, Production & Planning	11			3	1				15
Management/Productivity Improvement	10	1			1			2	14
Metal Casting Technology	1								1
Metalworking Technology	34	1		3				2	40
Trainer's Training	1			1					2
Others	15	1		2		3		2	23
TOTAL	**116**	**3**	**1**	**10**	**2**	**3**	**1**	**6**	**142**

How significant was our impact? Let us count the ways...

To measure the effectiveness of the training programs implemented by the Center, we conduct an impact assessment six (6) months after the implementation. A structured survey questionnaire was designed indicating identified variables as measure on the benefits gained by the training participants, with the trainee's supervisor as the respondents. Figure 2 shows the impacts gained by the trainees for the period January to December 2019. Based on the data, the majority (490) or 33.98% of the respondents enhanced their knowledge, skills, and attitude (KSA) after attending the training.

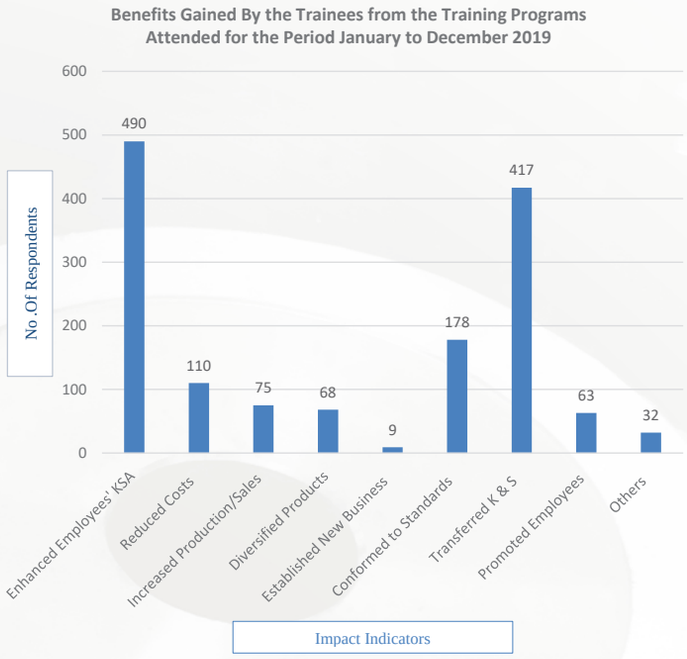


Figure 2. Assessed Impact of Training Programs

C.1. We took our capabilities as training providers one step further through the implementation of the DiMo Guru Phase 2 Project

The ongoing BOI-funded project entitled "Capability Building for Enhancing the Competitiveness of Die and Mold Industry Through the Engagement of Local Experts (DiMo Guru) – Phase" is in support of the Die and Mold Solution Center (DMSC), a DOST-MIRDC facility. Through the DiMO Guru project, we aim to boost the metalworking industry workforce particularly in the field of die and mold design and die and mold making. We have bridging programs and advanced programs as strategies to achieve this objective. Table 1 shows the training programs conducted in the months of October and December 2019 which were attended primarily by the manpower of the PDMA-member companies.

Table 1. DiMo Guru – Phase 2 Project Training Programs Conducted

Title of Training	No. of Participants
Die and Mold Making (Bridging Programs)	
Technical Drawing	10
Milling (Conventional)	10
Turning (Conventional)	10
Electro Discharge Machine (EDM) Sinking	7
Electro Discharge Machine (EDM) Cutting	10
Die and Mold Making (Advanced Programs)	
3-Axis CNC Milling	9
Die and Mold Design (Bridging Program)	
CAD CAM (2 batches)	17
Conventional (Turning, Milling, Grinding, EDM) with Introduction to CNC Machining (2 batches)	14
Die and Mold Design (Advanced Program)	
Mold Design	7
Total	**94**

We have eight (8) more training programs lined-up for the year 2020. Faculty members of state universities and colleges (SUCs) engaged in engineering, and individuals, employed or unemployed, may avail of the training.

C.2. We implemented training programs in line with the activities of the Project BUHAWI

In addition to the Center's initiative to implement the project entitled, 'Building a Universal Mount for Heavy Barrel Automated Weapon Integration (BUHAWI),' we conducted various technical training programs to personnel of the Philippine Naval Sea System to familiarize them in areas related to metals and metal processes. We implemented 10 training programs with a total of 135 participants from July to November 2019 as shown in Table 2.

Table 2. Project BUHAWI Training Programs Conducted

Title of Training	No. of Participants
Metal Fabrication	18
Establishment of Preventive Maintenance System	20
Dimensional Metrology 1: Basic Measurement	15
Industrial Calibration	19
GMAW/MIG-MAG Welding	14
Metals Identification and Selection	13
Nondestructive Testing	7
Machine Shop Operations	7
Product Costing	11
Production Planning and Control	11
Total	**135**

C.3. We implemented new training programs

In addition to the current training programs, we offered three (3) new training programs in 2019: 1) Awareness on Environmental Management System; 2) Awareness on Business Continuity Management System; and 3) Effective Implementation of Control of Documented Information.

C.4. We supported the industry's capability enhancement through the conduct of the Skills Competition.

With the strong support and cooperation of Philippine Die and Mold Industry Association (PDMA), the Metalworking Industries Association of the Philippines (MIAP), and the Philippine Welding Society (PWS), we were able to conduct the 4th Skills Competition in June 2019. The entries were Shielded Metal Arc Welding (SMAW), Carbon Steel Plates 2G & 3G, Gas Tungsten Arc Welding (GTAW) Carbon Steel Pipe 6G, and Mechanical Drafting using CAD (Solidworks). For the SMAW, categories were student and professional levels; while for GTAW, qualified participants were from the professional level. In mecha-

nical drafting, professional level was the only identified category. Participants were mostly employees of private companies. The winners were motivated to enhance their skills as they received their cash and incentive awards sponsored by the PDMA and the PWS.

C.5. We participated in consultative meetings and dialogues.

We had a consultative meeting with the Metalworking Industries Association of the Philippines (MIAP)- Butuan Chapter, the DOST Caraga, and the Caraga State University in April 2019, and dialogues with various stakeholders, namely, the DOST, the Department of Trade and Industry (DTI), the Technical Education and Skills Development Authority (TESDA), the PDMA, Inc., and academic institutions like the Iloilo Science and Technology University and Technological University of the Philippines - Talisay City, on December 17-18, 2019.

It was during these interactions that the services of the Center were brought to the attention of partner organizations. We explored the opportunities where the Center can be of more relevant assistance, and we saw several. We can provide the manpower training needs of the industry. We can serve the academe through the conduct of training related to metalworking and engineering.

As possible outcome of the dialogues, we might have a lot of activities with Region VI. We may implement training programs related to die and mold, those relating to information technology and facility-related issues, and those aimed to enhance curriculum for materials engineering.

Bottomline is - we can plan for our next course of action because we are in close coordination with the industry and other stakeholders.

C.6. We have calibration and metrology experts involved in the project entitled, 'Strengthening the Regional Metrology Laboratory Services.'

The Center is seriously pursuing delivery of relevant training services in the field of calibration and metrology. The project entitled, 'Strengthening the Regional Metrology Laboratory Services,' is about raising awareness on the significance of maintaining proper metrology traceability on their products and ensuring their competitiveness on both national and international environments.

The following are some of equally notable trainings we conducted that manifests the incessant trust and confidence not only with our testing but also with our "teaching" skills:

Trainings	Speaker	Date	Provider/Venue
Methods of Metals Identification	Engr. Gina A. Catalan	July 31, 2019	QES/Valenzuela
PAB Assessor's and Expert's Forum- Measurement Uncertainties in Calibration	Engr. Rodnel O. Tamayo	Nov. 21-22, 2019	PAB/ Pampanga
Technical Consultancy- Set-up and Calibration of Horizontal Universal Testing Machine	Engr. Rommel N. Coroña	Dec. 17, 2019	Maccaferri Philippines/Laguna

Figure 14. Selected ATD personnel conduct seminars and trainings for various organizations.

IV. Other accomplishments equally important to the pursuit of our vision

A. We now have Information Security as part of our Management System.

We value the trust given to us by customers, business partners, employees, and the general public for protecting the confidentiality, integrity, and availability of the information that they provide us. Information security is one of our primary concerns. With the recognition of the significance of information security on our operations, we established an Information Security Management System (ISMS) that is aligned with ISO 27001:2013 as part of the Center's 'Integrated' Management System (IMS). Spearheading this activity was the PMD.

Below are the key personnel from the PMD involved in the establishment of the ISMS:

Name	Position	ISMS role/responsibility
Ms. Mercedita G. Abutal	Chief, PMD	Information Security Management Representative (ISMR)
Mr. Restituto Felipe R. Gabuya	Planning Officer IV	Assistant ISMR
Ms. Eunice A. Bautista	Administrative Officer IV	Assistant DCC - ISMS
Mr. Trinmar A. Boado	Computer Programmer III	Assistant Internal Audit Head - ISMS

In line with the initial implementation of ISMS in the Center, we attended the Awareness Sessions on ISMS and the Orientation on the Data Privacy conducted by ISMS Consultant Mr. Richard Eric Regalado and the Center's Data Privacy Officer, Mr. Eric B. Casila, respectively. We already drafted the policy guidelines and the required manuals. Also, we constituted the MIRDC Security Incident Response Team (SIRT) who serves as the core group tasked to assess information security breaches that may occur. Lastly, we conducted the ISMS Internal Quality Audit Training last 18-19 November 2019 at the Hotel Kimberly, Tagaytay City.

The PMD is targeting to have an external audit within CY2020 and, once successful, the Center may receive the distinction of being the first DOST agency to be granted ISO 27001 certification.

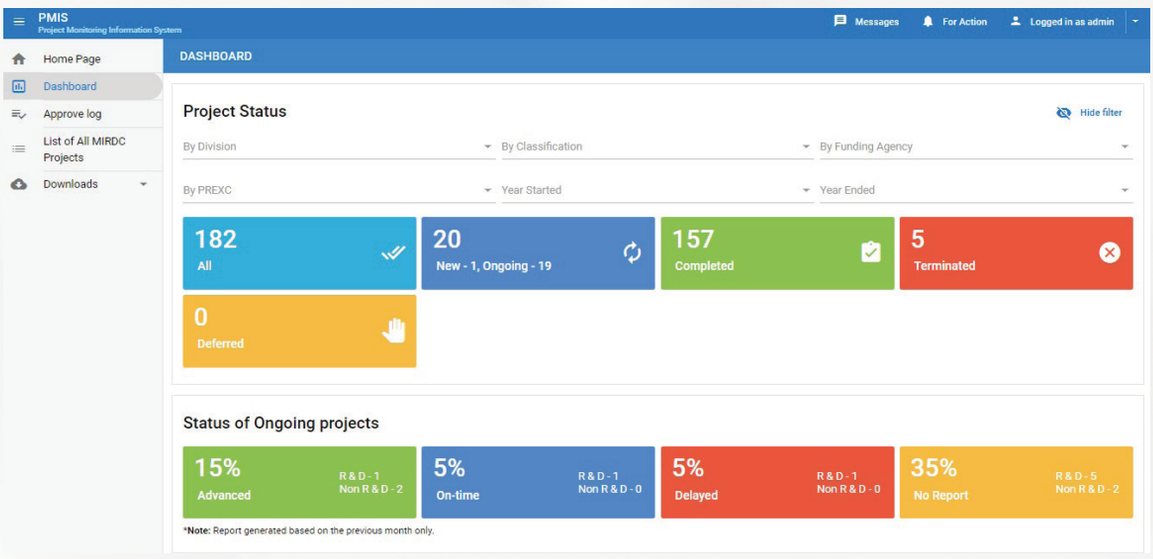
B. We are unstoppable with our efforts to improve Information and Communication Technology (ICT) requirements of internal and external clients.

The Center stays on track with our implementation of the Information Systems Strategic Plan (ISSP) 2018-2020. Our PMD-Management Information Service (PMD-MIS) carried out its tasks of enhancing the productivity and improving frontline service delivery through establishment and strengthening of Information and Communications Technology (ICT) which includes the enhancement and development of various critical systems, implementation of ICT capability training programs and improvement of network infrastructure.

The PMD-MIS tirelessly developed and implemented programs to optimize the use of the Center's IT resources.

B.1. We developed the Electronic Integrated Management Information System (e-IMIS) and the IT Helpdesk System

The e-IMIS is designed to be the official repository of ISMS and other Management Systems documents such as Quality Manual, Procedures Manual, Work Instructions and Audit Report, among others. The IT Helpdesk, on the other hand, serves as a ticketing system for IT-related technical assistance provided by the MIS. Both systems were intended to promote effortless and efficient customer support among internal delivery units.



Dashboard of the PMIS version 2.0. All developed systems of the Center display the same dashboard appearance for branding purposes.

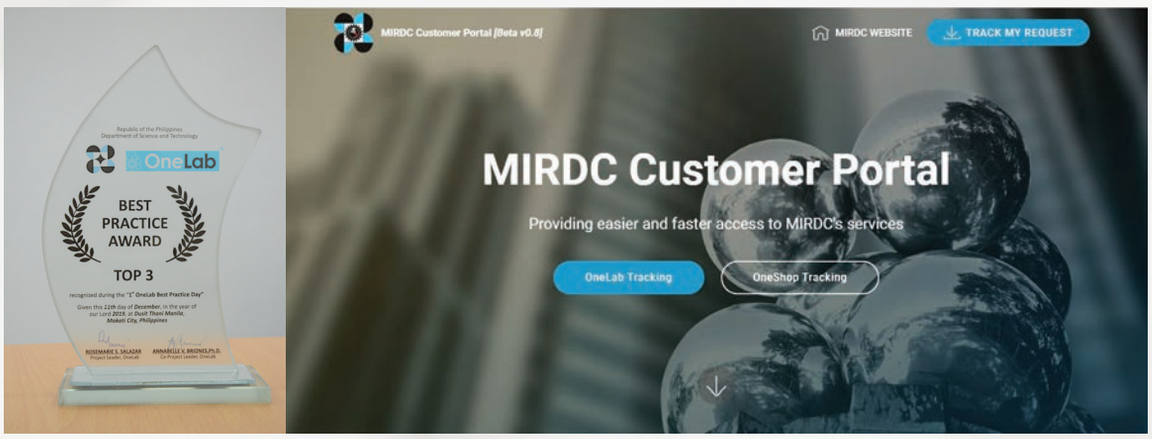
B.2. We are now using an enhanced web-based information system

The Center uses the PMIS 2.0, a web-based information system, that facilitates data collection, storage, analysis, and reporting of the physical and financial performance of projects including GIA, DGIA, GAA, locally, or foreign funded, contract, or joint research project. It serves to manage and monitor both R&D and non R&D projects. An enhanced version of the MIRDC PMIS developed in 2012, PMIS 2.0 has entry fields that are aligned to the requirements of the DOST for harmonization purposes. It has a dashboard that provides the overall summary of project monitoring activities and a facility to upload files such as project abstract, Gantt chart, line item budget (LIB), terminal reports and relevant photos and videos.

B.3. We launched and implemented the MIRDC Customer Portal

In 2019, we made the MIRDC Customer Portal available to all our external customers, for them to have easy and faster access to our frontline services. Through this portal, customers may track their Technical Service Requests (TSR) in real time, anywhere in the world. The system is fast and efficient in tracking the TSRs and progress can be viewed in any screen sizes - desktops, tablets, and mobile screens. This also features a Chat Bot for inquiries as a recent enhancement to the system.

The MIRDC Customer Portal was awarded as one of the Top 3 Best Practice Award during the 1st OneLab Best Practice Day held on December 11, 2019 in Dusit Thani Hotel, Makati City.



B.4. We received recognition for our untiring efforts

Modern technology forces us to adapt and do multitude of things at once, but our commitment says we need to embrace it just like how we implemented OneLab, a platform that provide a referral system for testing and calibration services at a single touch point. It aims to provide customers with convenient and easy access to the whole DOST laboratory testing and calibration services.

The consensus effort of ATD, PMD-MIS and FAD-FMS to incorporate the system and maintaining it for four and a half years and counting, was then recognized by DOST-OneLab granting MIRDC with "Best Practice Award" last December 11, 2019 at Dusit Thani Hotel, Manila. This recognition is a clear evidence of how serious we are in providing state-of-the-art service.

Figure 16. The team of MIRDC received the "Best Practice Award" during the 1st Best Practice Day.

C. We remain ISO 17025:2017 accredited.

For years, the ATD has maintained the ISO 17025:2005 accreditation of the Center's laboratories. The recent release of the 2017 version challenged us to implement the migration given a three-year grace period. The migration process consisted of attending training and forums, conducting document and management review, incorporating risk management, conducting awareness seminars on ISO 17025 to all lab personnel and support groups, and training of internal auditors, among others.

The internal audit, a basic requirement in the standard, was carried out last May 27-31, 2019, covering the management and technical requirements of all the laboratories and its support groups. This was succeeded by the PAB re-accreditation for Chemical and Physical Laboratories and a special surveillance for the Calibration and Metrology Laboratories last August 14-16, 2019.

We are glad to report that all the laboratories, additional parameters, and applicants for approved signatories were recommended for 17025:2017 accreditation. Hard work indeed pays off. This particular achievement is a clear manifestation of how teamwork, discipline, and effective implementation can bring us to remarkable success!

D. We continued to nurture relationships with other government agencies.

Having experts is the Center's pride. But having our experts supporting other government institutions makes us even more proud because our expertise becomes more meaningful. Our objective in nurturing our relationship with other government sectors is to aid them in improving their services to their target industries who rely on them.

Below are some of the engagements of our experts:

Activities/Memberships	Government Organization	Person-in-Charge/ Function
Technical Committee no. 6- Gas Cylinders	Bureau of Philippine Standards, DTI	Engr. Edward Malit Member
Technical Committee no. 86- Ship building	Bureau of Philippine Standards, DTI	Engr. Christian Glenn Ligon Member
Technical Committee no. 44- Road Vehicles	Bureau of Philippine Standards, DTI	Engr. Florante Catalan Member
Technical Committee no. 16- Rubber and Rubber Products	Bureau of Philippine Standards, DTI	Engr. Florante Catalan Member
Technical Committee no. 54- Jewellery	Bureau of Philippine Standards, DTI	Engr. Gina Catalan Vice-Chairman
Technical Committee no. 61- Ferrous Pipes and Fittings	Bureau of Philippine Standards, DTI	Engr. Gina Catalan Member
Laboratory Accreditation Technical Committee (LATC)	Philippine Accreditation Bureau -DTI	Engr. Rommel N. Corona Chairman
Technical Assessors	Philippine Accreditation Bureau, DTI	Engr. Rodnel Tamayo Engr. Florante Catalan Engr. Gina Catalan Engr. Rommel Coroña Engr. Arlene Estacio Engr. Christine Avelino

E. We attended to our Corporate Social Responsibility (CSR).

CSR training programs are seminars conducted for private, government entities or academic institutions that are not engaged in metals and engineering. We were able to carry out this activity through the ITS who implemented five (5) training programs implemented as CSR: (1) Effective Implementation of Control of Documented Information; (2) Internal Quality Audit; (3) Root Cause Analysis; (4) Awareness on Risk Management (Based on ISO 31000:2009); and (5) Verification of Common Laboratory Instruments. We served a total of four (4) firms, with 168 individuals trained.

F. We came up with the Machining and Stamping Industry Studies.

The Center's TDD-TIPs, particularly the TIPS-Industry Research and Studies Unit (TIPS-IRSU), was responsible for this accomplishment. We submitted the survey questionnaires for approval of the Philippine Statistics Authority (PSA). The Machining Industry survey questionnaire was granted the PSA Approval No. MIRDC-1801, while the Stamping Industry survey questionnaire was granted the PSA Approval No. MIRDC-1920.

We conducted the survey proper for the machining industry in 2018, data analysis and report writing continued on until 2019. On the other hand, the survey proper for the stamping industry was conducted in 2019. Through on-site interviews with the managers, we gathered relevant data using the Porter's Five Forces of Industry Competitiveness model and PESTLE analysis. We held a focus group discussion (FGD) on October 15, 2019 to verify and validate the survey outputs and gather additional inputs from the participants.

By the end of 2019, we released the 'The Philippine Machining Industry: Strategic Initiatives Rising against Global Strains' with ISBN 978-621-95807-5-5, and 'The Philippine Metal Stamping Industry: At the Crossroad of Tradition and Modernization' with ISBN 978-621-95807-6-2.

These studies will serve as bases for the industry players in making critical decisions; for government, in policymaking and for drafting short, medium and long-term plans, both on the company and national levels, including investment priorities. These are also used to formulate relevant programs that have great impact on local development and global competitiveness. The MIRDC industry studies serve as instrument for information exchange, to be used by business researchers, government, academe and the public.

One of the surveys conducted by the Industry Study Team to a company engaged in metal stamping industry.

G. We have a Human Resource department that attends to our workforce's needs.

We sustained and strengthened our operations with a total workforce of 215 or 94.30% based from our 228 approved plantilla positions by the end of 2019. During the year, we hired eight (8) new employees and promoted fourteen (14) personnel from existing pool of talents. However, a total of eleven (11) employees were separated from the government office after rendering an average of 36 years of public service.

The personnel movement as a result of new entrants and promotions is detailed as follows:

G.1. We hired new employees.

Andrew Mike I. Alfaro
Metals Technologist III
PD

Claudine R. Sinag
Training Specialist I
TDD

Beatre Mae C. Serrano
Administrative Officer I
FAD

Sharel Shyateza M. Abellar
Science Research Specialist II
PD

Marvin Louise B. Carpena
Metals Technologist II
MPRD

Geoffrey L. Abulencia
Science Research Specialist II
MPRD

Alvin M. Buison
Sr. Science Research Specialist
PD

Catherine S. Malila
Administrative Aide VI
FAD

G.2. We promoted employees.

Lina B. Afable
Chief SRS
TDD

Joey G. Pangilinan
Supervising SRS
MPRD

Carla Joyce C. Nocheseda
Sr. Science Research Specialist
MPRD

Ma. Alicia B. Cabral
Administrative Officer V
FAD

Ariane Mae M. Villanueva
Administrative Officer IV
FAD

Mary Grace B. Opon
Administrative Officer III
FAD

Diddier B. Sibal
Planning Officer II
PMD

Faith P. Macatangay
Administrative Officer II
TTD

Ronaldo L. Agustin
Sr. Administrative Assistant II
TTD

Mary Louise C. Alvarez
Administrative Officer I
FAD

Virgilio Y. Macanip, Jr.
Administrative Assistant III
PD

Francisco M. Marasigan
Metals Technologist IV
MPRD

Walter V. Bonggat
Metals Technologist IV
PD

Mary Joy R. Baroña
Metals Technologist IV
ATD

G.3. We held send-off programs for our retirees.

Danilo N. Pilar
Chief Science Research Specialist,
TDD
Effectivity date of retirement:
June 1, 2019
Years of service: 29

Marcela R. Cagalingan
Administrative Officer V
FAD
Effectivity date of retirement:
Jan. 16, 2019
Years of service: 39

Rolando Y. Clavio
Sr. Administrative Assistant I
FAD
Effectivity date of retirement:
November 4, 2019
Years of service: 41

Rosalinda M. Cruz
Sr. Administrative Assistant II
TDD
Effectivity date of retirement:
Feb. 25, 2019
Years of service: 42

Teresita C. Villoso
Administrative Officer II
TDD
Effectivity date of retirement:
March 15, 2019
Years of service: 31

Ronilo C. Sanchez
Metals Technologist IV
ATD
Effectivity date of retirement:
July 12, 2019
Years of service: 34

Tirso P. Entereso
Metals Technologist IV
PD
Effectivity date of retirement:
June 3, 2019
Years of service: 35

Sadly, we lost two of our MIRDC family members: former Executive Director Engr. Arthur Lucas D. Cruz, who passed away on February 25, 2019; and Mr. Galicano M. Enerlan, a staff under the FAD, who died on April 28, 2019. Mr. Enerlan has served the Center for 35 years.

H. We faced and coped up with major changes in 2019.

One of the biggest changes that took place at the MIRDC for the year 2019 was the change of directorate.

Under the direction of the Executive Director are the FAD and the PMD. Dr. Agustin M. Fudolig was assigned to head the Office of the Deputy Executive Director – R&D. He has under his directorate the PD, the MPRD, and TSSS. The TSSS workforce was also strengthened as engineers and metal technicians – 26 from the PD, and 15 from the MPRD - were transferred to this section. Engr. Jonathan Q. Puerto, on the other hand, was named the Deputy Executive Director for Technical Services. His directorate covers the ATD and the TDD.

Currently, we have a total of 144 technical and 71 non-technical personnel under the three (3) directorates of the Center. Our current manpower is broken down as follows:

		Research and Development			Technical Services		
	OED	MPRD	PD	PMD	ATD	TDD	FAD
Engineers	3	11	17	0	12	14	3
Non-Engineers (Technical)	1	21	28	13	21	0	0
Admin/Support/Non-Technical	2	2	3	4	3	17	40
TOTAL	6	34	48	17	36	31	43

I. We pursued and encouraged career and personal enrichment.

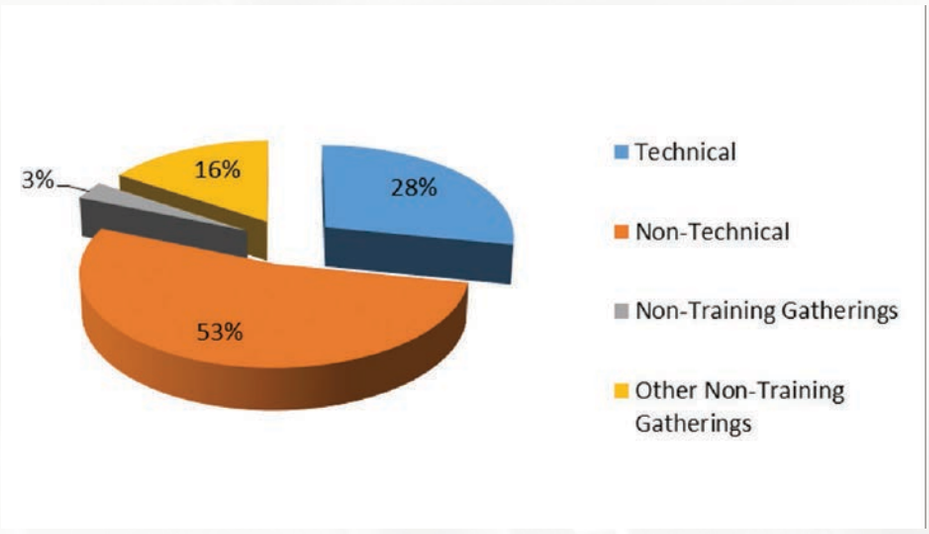
Over the years, the Center was able to enhance its personnel development initiatives through local and foreign trainings as well as scholarship programs. In this way, its human resource requirement is continuously upgraded. Thus, improving their professional and personal growth.

The Center, through our Administrative and General Services Section (AGSS), implemented a total of 32 programs for our personnel. This is equivalent to a 100% accomplishment of the AGSS's functional objective. This is exclusive of the three (3) additional programs and eighty-five (85) unplanned programs, consisting of seventy-one (71) unplanned local trainings and fourteen (14) unplanned foreign trainings, that were implemented by the Staff Development Unit.

As one of the major contributors in enriching the competence of our current workforce, the FAD-AGSS facilitated several training programs that were classified into four types, namely: (1) Technical (9 programs), (2) Non-Technical (17 programs), (3) Non-Training Gatherings (1 program), and (4) Other Non-Training Gatherings (5 programs).

The figure below shows the percentage distribution of the types of programs that were implemented from January – December 2019:

Percentage Distribution of SDU Programs per Classification



I.1. We attained the Annual Learning and Development Program (ALDP) targets.

- ***In-house training programs with our very own staff as Subject Matter Experts***

Date Conducted	Training Program/s Conducted	Subject Matter Expert/s
January 28, 2019	Verification of Effective Implementation of Control of Documented Information (Based on ISO 9001) Training	Dr. Danilo N. Pilar
February 6-7, 2019 February 12-13, 2019	Awareness Seminar on ISO/IEC 17025:2017	Engr. Rodnel O. Tamayo
February 14, 2019	Plastic Forming of Metals Seminar	Engr. Jeffrey C. Obregon
February 26, 2019 April 11, 2019	EMS-ISO 14001:2015	Dr. Danilo N. Pilar
March 4-5, 2019	Verification of Common Laboratory Instruments	Engr. Rodnel O. Tamayo
March 20-22, 2019	Verification of Aluminum Anodizing	Engr. Wilfredo R. Lim Engr. Keziah M. Dela Rama
April 1-5, 2019	GMAW/ MIG-MAG Welding on Carbon Steel Plates – Module I	Engr. Ronie S. Alamon
April 5, 2019	Gauge Block Calibration Using GB100A Comparator Seminar	Mr. Eduardo V. Diasanta Jr.

(continued)

Date Conducted	Training Program/s Conducted	Subject Matter Expert/s
April 8, 2019	Verification of Effective Skills for Audit Reporting	Dr. Danilo N. Pilar
April 11, 2019	EMS-ISO 14001:2015	Dr. Danilo N. Pilar
May 6-8, 2019	Supervisory Development Course	Dr. Danilo N. Pilar
May 14, 2019	ISO/IEC 17025:2017 Internal Audit	Engr. Rodnel O. Tamayo
May 29-31, 2019	Establishment of Preventive Maintenance Seminar/ Workshop	Engr. Melchor A. Gamilla Engr. Reynaldo O. Bayot Engr. Nestor Q. Colibao Jr.
July 10-12, 2019	Electroplating Processes	Engr. Wilfredo R. Lim
July 22, 2019	EMS Awareness Seminar	Engr. Gina A. Catalan
July 24-25, 2019	Customer Satisfaction Measurement	Dr. Danilo N. Pilar Engr. Osric Primo Bern A. Quibot
July 30-31, 2019	Root Cause Analysis	Dr. Danilo N. Pilar
August 7-9, 2019	Production Planning and Control	Engr. Linda G. Rivera
September 6, 2019	Re-Orientation Workshop on Quality Control for Chemical Analysis	Engr. Gina A. Catalan
September 26 - October 25, 2019	Basic Measuring Instruments and Coordinate Measuring Machine	Mr. Francisco M. Marasigan

- ***Customized training programs by outsourced training providers***

	Name of Scholar	Program/Course	Duration of Contract	School/ University	Type of Scholarship	Scholarship Status	Grantor
I. Doctorate Degree Program							
1	Estacio, Arlene G.	Doctor of Philosophy in Electronics Engineering	SY 2015, 2nd Qtr – 2018	Mapua Institute of Technology	Full Time / Local	On-going	DOST-HRDP
2	Rogelio, Jayson P.	Ph.D. in Electronics and Communications Engineering	3rd Term 2018-2019 to 2nd Term AY2020-2021	De La Salle University	Full Time / Local	On-going	DOST-HRDP
II. Master's Degree Program							
1	Asmando, Louren Joy G.	Master of Technology	Nov 2015 - Oct 2017	Technological University of the Philippines Manila	Full Time / Local	On-going	DOST-HRDP
2	Bautista, Mary Joy M.	Master of Science in Chemistry	1st Sem AY2016-2017 to 2nd Sem AY2019-2020	University of Santo Tomas	Part Time / Local	On-going	DOST-HRDP
3	Bedis, Sheena S.	Master of Arts in Economics	Jun 2015 - Aug. 2017	Polytechnic University of the Philippines Manila	Full Time / Local	On-going	DOST-HRDP
4	Boado, Trinmar A.	Master in Business Analytics (Off Campus)	Started Aug. 2019	Mapua University (Off Campus)	Full Time / Local	On-going	DOST-HRDP
5	Cabral, Maria Alicia B.	MPM/MPA (Off Campus)	Aug 2018-Jan 2020	Ateneo de Manila University	Full Time / Local	On-going	DOST-HRDP
6	Ibañez, Christian M.	Master of Science in Electrical Engineering	1st Sem 2016-2017 to 1st Sem 2017-2018	Technological University of the Philippines	Part Time / Local	On-going	DOST-HRDP
7	Luces, Joein L.	Master of Science in Mechanical Engineering	Jan 2016 - Dec 2020	Mapua Institute of Technology	Part Time / Local	On-going	DOST-HRDP
8	Marquez, Adonis T.	Master of Science in Engineering Management	1st Qtr AY2018-2019 to 4th Qtr AY2019-2020	Mapua University	Full Time / Local	On-going	DOST-HRDP
9	Viernes, Mildred V.	Master of Information Technology	SY 2nd Sem/Nov 2010 - Mar 2013 (2.5 yrs)	University of the Philippines Los Baños	Full Time / Local (Residential)	On extension	ASTHRDP (DOST-SEI)
III. Graduated Scholar							
1	Rafanan, Marlene R.	Master in Business Administration	2nd Sem 2017-2018 to 1st Sem 2019-2020	San Beda Alabang	Full Time / Local		DOST-HRDP
IV. Scholarship Nominations							
1	Gabuya, Restituto Felipe R.	MPM/MPA (Off Campus)		Ateneo de Manila University	Full Time / Local		DOST-HRDP
2	Llanto Katherine T.						

I.2. Some of our staff attended foreign training and non-training programs.

The Center facilitated a total of fourteen (14) foreign travels, with seven (7) technical programs, two (2) non-technical programs, and five (5) non-training gathering programs for the year 2019. These foreign programs were funded by various DOST-GIA projects and supported by either private or government sector counterpart. Through efforts of the FAD-AGSS, we deployed a total of 28 personnel in different parts of Asia, Europe, and the United States of America.

Table A-2 shows the detailed Summary of Foreign Training and Non-Training Programs from January-December 2019.

Table A-2. List of Foreign Training and Non-Training Programs CY 2019.

No.	Title of program	Participating MIRDC Staff	Duration of program	Venue	Sponsor	Classification	Nature
1	Training on Basic Operation and Maintenance of Spectro Maxx Arc Spark Emission Spectrometer (OES)	Agad, Jo Marie Venus T. Dioneda, Glenn R.	10/1/2019 to 12/1/2019	Malaysia and Singapore	QES Technology Phils., Inc.	Technical	Training
2	Leaders in Innovation Fellowship Programme	Libao, Franz Joseph D.	11/2/2019 to 02/22/2019	United Kingdom	The Royal Academy of Engineering, UK Govt.'s Newton Fund	Non-Tech - Managerial/ Supervisory	Training
3	Technical Visit and Benchmarking Activities for the Establishment of the Advance Manufacturing Center (AMCen)	Liza, Fred P. Garcia, Joseph Alfred V.	2/13/2019 to 02/24/2019	Singapore and USA	DOST-GIA Project 2 RAPPID-ADMATEC	Non-Training Gathering	Technical Visit and Bench-marking
4	MAGMA Asean User Group Meeting 2019	Apusaga, Lemuel N.	3/20/2019 to 03/22/2019	Singapore	MAGMA Engineering Asia-Pacific PTE Ltd. And Teknologix, Inc.	Non-training gathering	Meeting
5	Training Course on Radiographic Testing RT-D Level 2 for Personnel Certified to Radiograpic Testing RT-F Level	Ligon, Christian Glenn S.	6/10/2019 to 6/21/2019	Malaysia	International Atomic Energy Agency/ Regional Co-operative Agreement (IAEA/RCA)	Technical	Training
6	Pre-delivery Test and Inspection of the Long-Range Observation Camera	Puerto, Jonathan Q Maglantay, Remartin S.	6/25/2019 to 06/28/2019	Israel	ARMSCOR Global Defense, Inc. and DOST-GIA "Project BUHAWI (Building a Universal-Mount for Heavy Barrel Automated Weapon Integration)"	Non-training gathering	Pre-delivery and Inspection of Equipment
7	Workshop on Developing a Roadmap for Industry 4.0	Dizon, Robert O.	8/19/2019 to 08/23/2019	Chinese, Taipei	Asian Productivity Organization; China Productivity Center	Technical	Workshop
8	3D Printing and Additive Manufacturing: Research and Education	Nocheseda, Carla Joyce C.	7/22/2019 to 10/31/2019	USA	Case Western University; RAPPID-ADMATEC Project	Technical	Training
9	Technical and Management Training on Mold Technology Support	Afable, Lina B. Dime, Francisco C. Velasco, Jenny C. Coria, Arby F. Bonggat, Walter V. Alfaro, Andrew Mike I. Macanip, Virgilio Jr. Y.	7/10/2019 to 12/13/2019	Republic of Korea	Korean Government's Ministry of Trade, Industry and energy (MOTIE)	Technical	Training
10	Asia Innovates Summit	Libao, Franz Joseph D.	10/15/2019 to 10/18/2019	Malaysia	Royal Academy of Engineering, UK Newton Fund	Non-Tech - Managerial/ Supervisory	Summit
11	32nd Asian Welding Federation - Governing Council and Task Force's Meeting	Dela Cruz, Reynaldo Jr. L.	10/23/2019 to 10/25/2019	Republic of Korea	Asian Welding Federation and Philippine Welding Society	Non-training gathering	Meeting
12	3D Printing and Additive Manufacturing Research and Education	Buison, Alvin M. Florante, Denise Daryl A. Ante, Ulysses B.	11/13/2019 to 02/17/2020	USA	Case Western University; RAPPID-ADMATEC Project	Technical	Training
13	Daegu Global Robot Business Forum 2019	Alamon, Ronie S.	5/11/2019 to 8/11/2019	Republic of Korea	AMERIAL Project; Mechatronics and Robotics Society of the Phils.; Daegyeong Robot Enterprise Promotion Association (REPA)	Non-training gathering	Forum
14	Structure Design and Optimization Software Training (Phase II)	Garcia, Joseph Alfred V. Padaca, Jose Bernardo III L. Guevara, Eugene P. Tuazon, Catherine Ann M.	12/16/2019 to 12/20/19	Sngapore	MSC Software (S) Pte. Ltd.; RAPPID-ADMATEC Project	Technical	Training

J. We joined in the Gender and Development (GAD) Programs.

J.1. 2019 National Women's Month Celebration

The MIRDC was part of the celebration of the 2019 National Women's Month celebration on March 19, 2019 at Hotel Jen, Pasay City. We sent 20 representatives consisting of 14 female employees and six (6) male employees to the program, themed 'We Make Change Work for Women.'

Secretary Fortunato T. de la Peña gave an inspirational message encouraging more women to step-up, participate, and lead in the different sectors of the country. He gave recognition to the women administrators, scientists, and workers of the DOST.

To cap off the event, a contest among the different clusters of DOST was held. The first place award was won by the Bicutan Cluster which includes the MIRDC. Our very own talented performers, Ms. Jaquelin J. Agonoy and Dr. Anthony Greg F. Alonzo, were part of the winning team.

MIRDC representatives for the 2019 National Women's Month Celebration held last March 19, 2019 at Hotel Jen, Pasay City.

J.2. Vow to End VAW

The DOST-MIRDC was one with the rest of the DOST agencies in the Bicutan community in formally jump-starting the '18-day Campaign to End Violence Against Women (VAW)' at the DOST grounds on December 2, 2019. It was an activity organized by the DOST GAD Focal Point System to promote awareness among DOST employees on all forms of violence women and girls experience and to provide information on laws protecting them. All DOST personnel in the Bicutan community showed their unity and support to the said campaign as they wore the Philippine Commission on Women (PCW) prescribed 18-Day Campaign to End VAW shirt and orange shirts.

The highlight of the program was the presentation of every agency of their slogans and special numbers promoting awareness for their value and respect for women. The MIRDC, in the perspective of a boy/ man,

committed to 'respect women and girls and not to be an instrument in committing violence against women and children, to be a positive influence to other men and boys in building a community that is respectful of everyone's right to be free from abuse and violence.' This was also promoted as Ms. Jaquelin J. Agonoy sang her rendition of 'Because You Loved Me' by Celine Dion, inviting those present in the event to love the women in their families, workplace and community by showing respect for their rights and individualities.

K. We implemented Environmental Management System (EMS) Programs.

K.1. 2019 Fire Fighting Seminar

We conducted a Fire Fighting Drill on April 12, 2019 in compliance with the Environmental Management Plan. Adjunct to this activity was the conduct of the Fire Fighting Training Seminar lead by FO2 Kimberly Esmeña and FO2 Ma. Karen O. Escalora of the Taguig Fire Station - Bureau of Fire Protection through the assistance of the Urduja Security Agency.

Participants from the EMS Fire Brigade and a number of employees from each division attended the lecture which covered the classes of fire, chemistry of fire extinction, guidelines on the use of the different types of fire extinguisher and priorities during evacuation. Shortly after the lecture, a demonstration on fire-fighting was done by the fire-fighting trainers, giving some employees the opportunity to also have a return demonstration shall such incident arise.

K.2. 2019 Annual Earthquake Drill

We conducted earthquake drills twice in 201. The first drill was held on March 25, 2019, and the second drill was held on November 14, 2019. These activities were in support of the National Disaster Risk Reduction and Management Council's (NDRRMC) mandate to promote regular disaster preparedness response and recovery exercises by conducting a Nationwide Simultaneous Earthquake Drill (NSED).

K.3. 2019 Clean and Green Program

We held the Clean and Green Program on April 26, 2019 at the MIRDC Compound. All employees per division engaged in this advocacy to contribute to the cleanliness and orderliness of the Center. This activity was facilitated by the joint cooperation of FAD-AGSS and MIRDC Employees Labor Association (SALEM).

We give a big salute to all the employees who consistently support our advocacy of maintaining a cleaner and greener MIRDC. It is in doing the small and simple things, like throwing our trash in their corresponding classified bins, avoiding and minimizing the use of plastic, and recycling supplies, among others, that we can make the surroundings clean and green.

L. We gave importance to health and welfare programs.

L.1. NSTW Hataw Agham 5.0

We sent six (6) employees to represent the MIRDC to the #HatawAgham5 activity last July 20, 2019 at the main stage of the World Trade Center, Pasay City, during the celebration of the 2019 NSTW. This program was organized by the DOST-Philippine Council for Health Research and Development (DOST-PCHRD).

The program began with a lecture regarding benefits of dancing on physical and mental health by Dr. Ronald Del Castillo, associate professor of the Department of Health Policy and Administration, College of Public Health, University of the Philippines-Manila. Shortly after the informative lecture, everyone energetically participated in the highlight of the event, Dance School: Routine-Instructed Dance Fitness (demonstration session of various dance routines), spearheaded by Ms. Neenah Hilario of Dancehall Manila, Mr. Jerome Jacinto of School of GoodLock, and the UP Manila Indayog Dance Varsity.

L.2. 2019 Bloodletting Activity

As part of our social responsibility, a number of employees willingly shared their blood so that others may live as they took part in the bloodletting activity, in partnership with the Philippine Red Cross, dubbed "Your love, Your blood, His life 3.0" held last September 23, 2019 at the DOST-FNRI Training Room.

L.3. Orientation on Employees' Compensation Program (ECP)

The Center held the 'Orientation on Employees' Compensation Program,' another welfare program made possible through the cooperation of the FAD-AGSS and the SALEM. This was held on November 22, 2019.

Mr. Alvin C. Garcia, Public Relations Officer IV, of the Employees' Compensation Commission (ECC) - Department of Labor and Employment (DOLE) was the resource speaker. He discussed about (1) Employees' Compensation Commission, (2) Employees Compensation Program, (3) Compensable Contingencies, (4) Benefits and Services and (5) Availment Process. This program was organized to promote awareness regarding available government services that employees can access in cases of unforeseen incidents such as work-related illness, accident, injury, disability or death. A total of 106 MIRDC employees attended the orientation.

L.4. Seminar on HIV-AIDS Awareness Campaign

The seminar on HIV-AIDS Awareness Campaign focused on helping to develop socially responsible employees to become advocates of HIV testing. Testing for HIV encourages the reduction of the HIV-AIDS stigma.

Mr. Ico Rodulfo Johnson, Founder, President and CEO of The Project Red Ribbon Care Management Foundation Inc., conducted the awareness training on December 6,

2019, and shared his expertise and insights regarding (1) HIV Situation in the Philippines, (2) Knowledge about HIV and AIDS and (3) Salient Parts of the HIV Law (RA 11166). He encouraged all the participants to be tested so that they may be advocates of the foundation's endeavor to raise awareness of its impact, management, availability of support systems, the importance of early detection of HIV, and lifestyle changes that will help to reduce and prevent further infection.

All the 29 attendees of the event submitted themselves to testing and the Center was recognized for the 100% rate of responsibility and support shown to this good cause. This activity was held in line with the objectives of the GAD, through the cooperation of the FAD-AGSS and the SALEM. It was also in partnership with the Department of Social Hygiene of the City Health Office – Taguig which facilitated the testing of the participants.

M. We value the time we spend together, too. Our simple gatherings in 2019 united us, and made us see the beauty that is TeamMIRDC.

M.1. MIRDC 53rd Anniversary

We celebrated our 53rd anniversary on June 21, 2019. The program, themed, 'Embracing Diversity: Strengthening Capabilities for Infinite Possibilities,' was held at the Titanium Auditorium.

One of the main events was the 'Trash to Treasure Costume Contest.' All the employees and guests came in their costumes made of recycled materials. Each division picked one male and one female representative who showcased the recycled costumes. To complete the task, the representative pair with their respective divisions performed their presentation with relevance to the theme.

This year, it was a tie for the first place award for Mr. Joel B. Narvaez with Ms. Beatre Mae C. Serrano of the FAD, and Dr. Alexander P. Gonzales with Ms. Jaquelin J. Agonoy of the TDD who each modelled gracefully the crafted costumes that captured the judges' attention and left the audience in wondering awe. Second place was given to the PMD, while third place was awarded to the ATD.

M.2. MIRDC 2019 Thanksgiving Party

The best way to celebrate accomplishments is through a year-end get-together. We held our Thanksgiving Celebration on December 18, 2019 at the Titanium Auditorium.

Themed, 'Savoring the joys of giving: A Candyland Party,' everyone came in their colorful and catchy attire with their respective Christmas colored shirts/outfit – red, green, and yellow. Different lollipops, assorted candies and sweets adorned the yearly event, bringing out the light in everyone's heart and creating the sweet atmosphere of loving, giving, and sharing. Both the management and employee participated in the parlor games and intermission numbers. The highlight of the event was the exchange gift with a twist through a left and right story facilitated by Engr. Remartin S. Maglantay. Added to this were the charming and lovely carollers of the Alay sa May Kapansanan Association, Inc. who encouraged everyone to savor the joys of giving by attending to the needs of people with disability as they shared the music they have.

Sweet Captured Moments of MIRDC's 2019 Thanksgiving Party as employees savor the joys of giving.

M.3. DOST 2019 Year-end Party

MIRDC deployed a number of employees in the 2019 DOST Year End Sharing and Thanksgiving last December 20, 2019 at the DOST grounds where all DOST agencies came together to participate in this year's event themed as "Science-Sing Christmas: A Celebration of 2019 Milestones."

Topping the night's celebration was the musical performance of each cluster. MIRDC participated in the R&D Institutes' presentation with Engr. Robert O. Dizon, Mr. Ronaldo L. Agustin, Dr. Anthony Greg F. Alonzo, Mr. Paul John V. Luna and Ms. Trinicris D. Santos as representatives. Their performance highlighted the top three (3) accomplishments of the agency for the year 2019 namely the (1) Turnover of Gong-Making Facility to Bedbed, Mankayan, Benguet, (2) Turnover of Hybrid Electric Road Train (HERT) to Cauayan City, Isabela and (3) Turnover of the Hybrid Electric Train (HET) to the Philippine National Railway.

The RDI performers during DOST's 2019 Year-End Party held last December 20, 2019 at the DOST grounds

N. We foster a work culture that appreciates and recognizes achievements, because we want to keep every member of TeamMIRDC inspired and motivated.

Below are the awardees for CY 2019:

LOYALTY AWARD	Name of Awardees	Division
Fifteen (15) Years	Ivy Marie P. Espinoza	FAD
Twenty Five (25) Years	Isidro D. Millo	PD
	Wilfredo R. Lim	TDD
	Alfredo Z. Panganiban	PMD
	Arnold R. Habana	FAD
	Ma. Girlie M. Millo	TDD
	Eldina B. Pinca	TDD
	Ligaya M. Rubis	FAD
Thirty (30) Years	Jonifer Rose D. Bernaldez	FAD
	Corazon S. Caparros	PMD
	Agustin M. Fudolig	OED
	Ma. Elena G. Gurimbao	TDD
	Mildred J. Viernes	PMD
Thirty Five (35) Years	Serafin G. Aguilar	MPRD
	Reynaldo M. Loreto, Jr.	TDD
	Generoso V. Toque	PD
Forty (40) Years	Natalio D. Rodriguez	PD
PERFORMANCE EXCELLENCE	**Name of Awardees**	**Division**
For Year 2018	Lina B. Afable	TDD
2 Consecutive years (2017-2018)	Rosalinda M. Cruz	TDD
	Zalda R. Gayahan	TDD
	Marlyn U. Ramones	TDD
	Vilma A. Sia	TDD
	Teresita C. Villoso	TDD
	Noli P. Alvior	PD
	Ely C. Delos Reyes	PD
3 Consecutive years (2016-2018)	Francisco M. Marasigan	PD

(continued)

LOYALTY AWARD	Name of Awardees	Division
6 Consecutive years (2013-2018)	Ronaldo L. Agustin	TDD
7 Consecutive years (2012-2018)	Reynaldo M. Loreto, Jr.	TDD
Licensure Exam Passer (RA1080)		
Registered Electrical Engineer	Joel A. Eligue	ATD
Graduate Studies		
Master in Business Administration	Marlene R. Rafanan	FAD
Division Model Employee		
Level I	Samuel A. Ysit	ATD
	Alberto M. Oliva	FAD
	Pedrito A. Domingo, Jr.	MPRD
	Jan Michael E. Saludes	PD
	Alfredo Z. Panganiban	PMD
	Reynaldo M. Loreto, Jr.	TDD
Level II	Edward A. Malit	ATD
	Reynaldo O. Bayot	FAD
	Pablo Q. Acuin	MPRD
	Sheena S. Bedis	PMD
	Mervin B. Gorospe	TDD
MIRDC Model Employee		
Level I	Alfredo Z. Panganiban	PMD
Level II	Mervin B. Gorospe	TDD
Best MIRDC Section	Industrial Training Section	
2019 DOST Utility Model Registration Award		
Hand Tractor with Transplanter Attachment Apparatus	Isidro D. Millo	PD
	Ronie S. Alamon	PD
	Raymond S. De Ocampo	PD
	Laureano L. Dalay	PD
	Emerito V. Banal	PD

(continued)

LOYALTY AWARD	Name of Awardees	Division
Wrought Iron Forming Equipment	Isidro D. Millo	PD
	Ronie S. Alamon	PD
	Raymond S. De.Ocampo	PD
	Laureano L. Dalay	PD
Water Removal through A Freeze Drying Machine	Jose B. Ferrer	PD
	Isidro D. Millo	PD
	Ronie S. Alamon	PD
Scientific Paper		
Development of a Functionally-Tested Hybrid Electric Train	Pablo Q. Acuin	ATD
	Jonathan Q.Puerto	OED
	Rodnel O. Tamayo	ATD
	Geoffrey L. Abulencia	MPRD
	Rolando F. Ibuig	MPRD
Design and Development of a Semi-Permanent Coupler of Five Coach Train	Glen D. Espeña	PD
	Geoffrey L. Abulencia	MPRD
	Rodnel O. Tamayo	ATD
	Jonathan Q.Puerto	OED
	Pablo Q. Acuin	ATD
	Jayson P. Rogelio	PD
Design of the Philippine Jeepney for Crashworthiness Analysis: A Finite Element Approach	Jayson P. Rogelio	PD
	Remartin S. Maglantay	PD
	Fred P. Liza	PD
	Jonathan Q.Puerto	OED
Design and Finite Element Analysis of Customized Local Road Vehicles (CLRV): The Case for the Tricycle and the Philippine Jeepney	Jayson P. Rogelio	PD
	Remartin S. Maglantay	PD
	Fred P. Liza	PD
	Jonathan Q.Puerto	OED

(continued)

LOYALTY AWARD	Name of Awardees	Division
Manuel Cruel Award for Advanced Engineering Technology Application		
Development of the Torque Mode Configuration for Multiple Variable Frequency Drives (VFD) for the DOST's mass transportation projects.	Robert O. Dizon	OED
2019 Regional Invention Contest and Exhibits Awardees		
Hybrid Electric Train Outstanding Industrial Design Regional Winner	Pablo Q. Acuin	ATD
	Jonathan Q.Puerto	OED
	Rodnel O. Tamayo	ATD
	Glen D. Espeña	MPRD
	Rolando F. Ibuig	MPRD
Reed Plant Press Machine Utility Model 2nd Runner Up	Joein L. Luces	PD
	Fred P. Liza	MPRD
Hand Tractor with Transplanter Attachment Apparatus Outstanding Utility Model 1st Runner Up	Isidro D. Millo	PD
	Laureano L. Dalay	PD
	Emerito V. Banal	PD
	Raymond S. De.Ocampo	PD
	Ronie S. Alamon	PD
CORE VALUES		
Professionalism	Linda G. Rivera	TDD
Responsiveness	Osric Primo Bern A. Quibot	TDD
Integrity	Laila R.Porlucas	FAD
Dynamism	Raymond S. De Ocampo	PD
Excellence	Pablo Q. Acuin	ATD

O. The way we managed our financial resources was impressive. It was challenging, but we rose above the challenge.

O.1. Fund utilization rate

The Center experienced a major challenge at the onset of CY 2019: a 36% budget cut on our Maintenance and Other Operating Expenses (MOOE) under the Regular Fund, imposed by the Department of Budget and Management (DBM). To add to this, the approval of Republic Act (RA) No. 11260, known as the General Appropriations Act (GAA) of 2019, was delayed. To add further, the release of allotment was given a freeze order due to the mid-term election.

President Rodrigo R. Duterte approved the 2019 GAA only on April 15, 2019, which was four (4) months into the year. This posed a setback in the early procurement activities, and altered the original financial program of the Center.

These circumstances did not only affect the Regular Fund, but also, the Custodial Fund which covers the operational expenses of programs and projects, collaboratively, undertaken by the Center and its proponent-agencies.

In spite of these challenges, MIRDC has proven its resilience. Everything went well until the culmination of its operation in 2019. This, we owe to our Finance and Administrative Division (FAD), whose relentless efforts proved instrumental in giving the Center the motivation to keep going.

• Regular fund: source and utilization

ALLOTMENT AND OBLIGATION

The Center has a total approved budget of P 266,656,610.00 for the current year's appropriation. Of which, 63% or P 167,868,906.00 (inclusive of RLIP) was allotted for Personnel Services (PS), 14% or P 37,459,704.00 for Maintenance and Other Operating Expenses (MOOE), 2% or P 4,544,000.00 for Capital Outlay (CO) and 21% or P 56,784,000.00 for Locally Funded Projects (LFP) as shown in Figure 1.

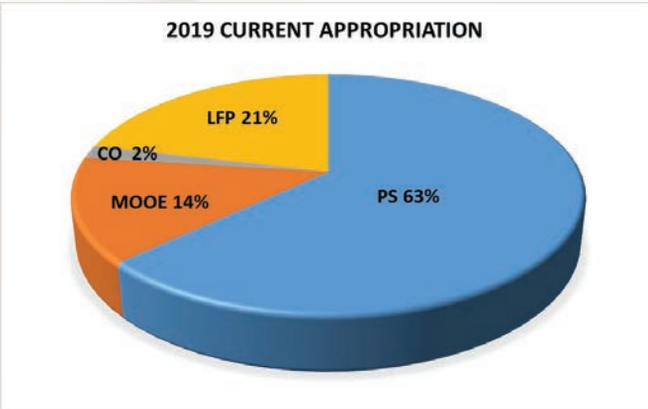


Figure 1. 2019 Current Appropriation

Source: MIRDC-FMS Budget Unit

Of the total allotment received, the Center obligated P 261,805,433.71 or posted 98% efficiency budget utilization rating for the year 2019 as detailed in Figure 2.

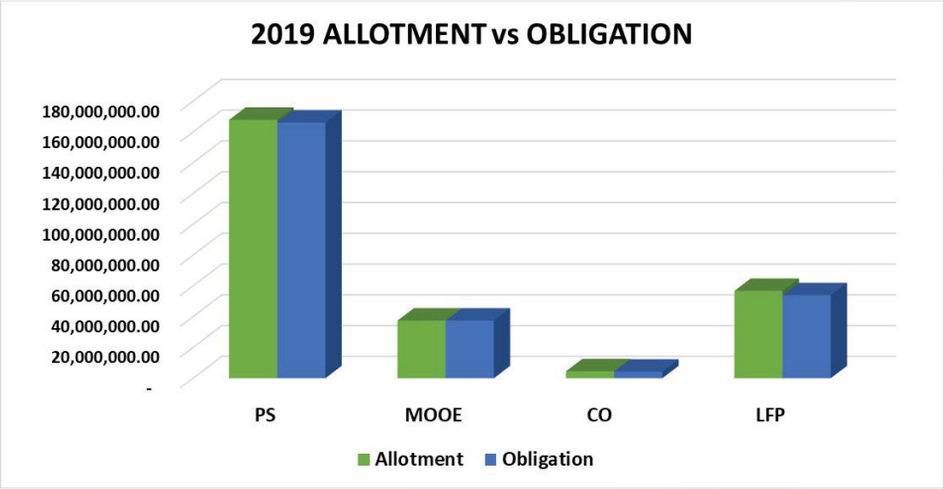


Figure 2 2019 Current Allotment Received vs Actual Obligation

Source: MIRDC-FMS Budget Unit

OBLIGATION AND DISBURSEMENT

Financial performance in terms of Obligation and Disbursement shows 92% as detailed in Figure 3.

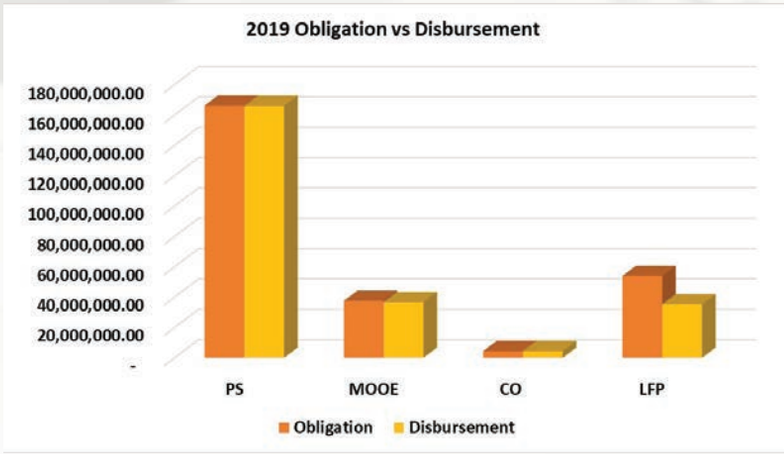


Figure 3 2019 Obligation vs Disbursement

Source: MIRDC-FMS Budget Unit and Accounting Unit

CASH ALLOCATION AND UTILIZATION

The total amount of cash released by the DBM for the year 2019 was P335,972,746.00 to the Center's Regular MDS Account which include regular operational requirements, payment of terminal leave benefits, accounts payable (prior and current) and one time grant Service Recognition Incentive.

Of the total cash allotment received for Regular Fund for the year 2019, P308,200,791.71 were disbursed or posting a 92% utilization rate as exhibited in Figure 4.

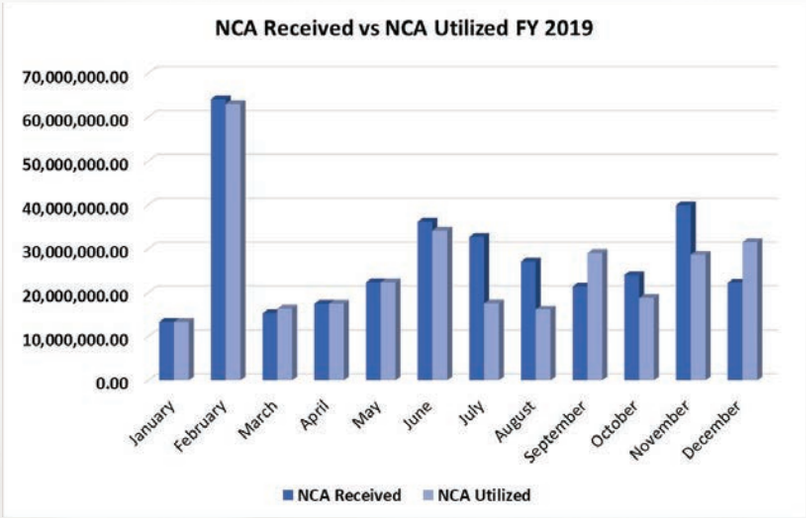


Figure 4 Cash Allocation vs Utilization

Source: MIRDC-FMS Accounting Unit

TRUST RECEIPTS: SOURCE AND UTILIZATION

We entered into collaborative projects with other agencies that respond to the needs and provide support to other industries. For these initiatives, we received a total amount of P 390,542,687.00 under our Custodial Fund from DBM. This amount represents funding support to manage programs and projects, develop models, fabricate parts and build equipment. It also includes additional funding support for the continuity of existing programs and projects, various refunds made by customers, performance bond and refunds of various projects.

Of this amount, the Center disbursed P 72,619,676.01 or 19% of the total cash allocation. The Custodial Fund has provided relief and leverage in the Center's operations. It absorbed a portion of operating costs and shared in the financial burden.

REVENUE GENERATED

We serve various companies and other government offices in the M&E industry, particularly those in metal fabrication, metal analysis, calibration, and testing. The Center also administers specialized trainings to individuals, and technical consultations and advisory services in the areas of M&E, quality standards, and intellectual property.

Out of these activities, we generated revenues that were subsequently deposited to the National Treasury.

The total amount collected from various sources of revenue during the year was P39,423,525.33. Included in the reported revenue were constructive income generated out of fines and penalties imposed against agency's suppliers.

GOVERNING COUNCIL MEMBERS

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Deputy Executive Director for Research and Development (August 2019 - present)

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(As of December 2019)

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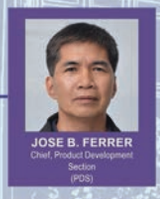

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June 28, 2018 - Present

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ZALDAR. GAYAHAN
OIC, Technology Information
and Promotion Section
(TIPS)

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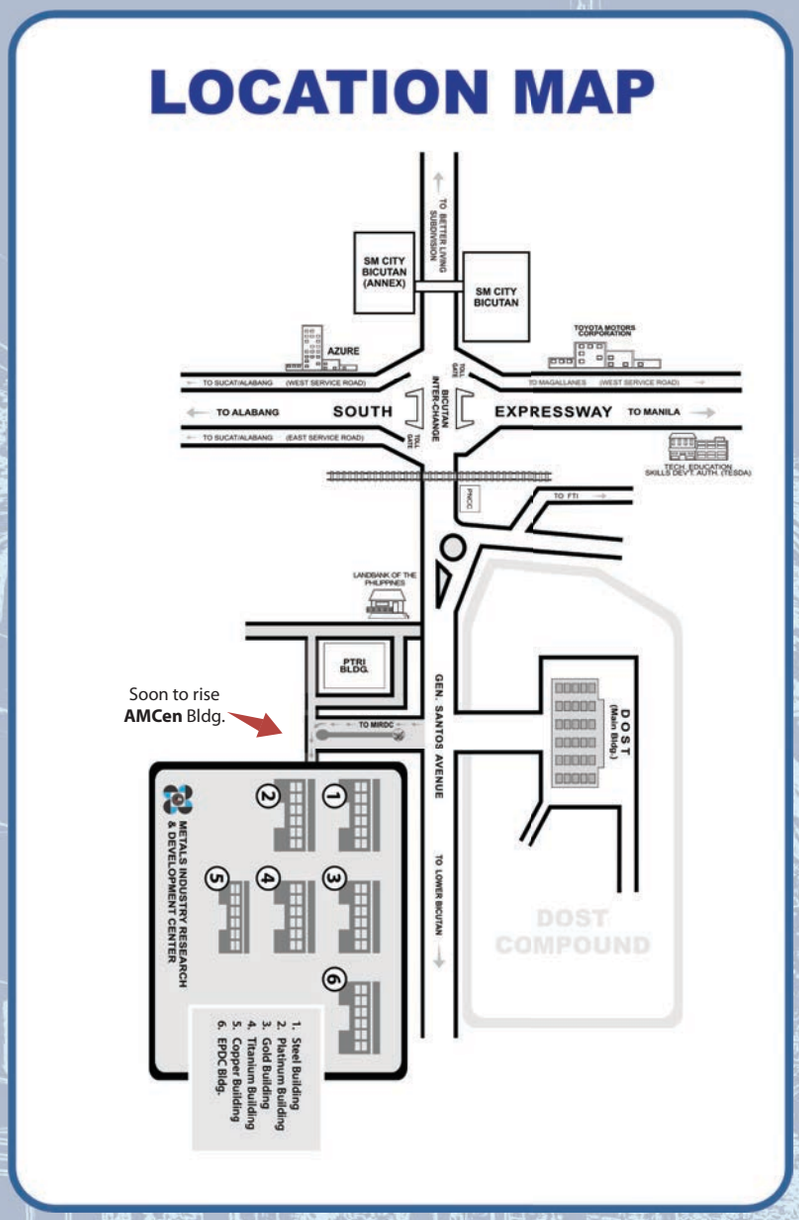
Research and Development Directorate

Technical Services Directorate

DOST-MIRDC LOCATION MAP



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(088) 858-3933 (Technical)
Contact Person: Engr. Roy C. Sagrado

MIRDC HYMN

Kaya Ko, Kaya Mo, Kaya Nating Lahat

Tungkulin mo't tungkulin ko
Paglingkuran lahat kayo
Buong husay, buong ingat
Sa lahat ng oras
Gamit ang Agham at Teknolohiya
Patuloy na manaliksik pa
Handog twina, bagong kaalaman
Industriyang metal mapayaman
Kung kaya ko, ay kaya mo
At kaya nating lahat
Lahat ng bagay na mabigat
Kung sama-sama'y mabubuhat
Ang pag-unlad matutupad
Kung matapat ang gaganap
Ikaw, ako, tayong lahat
Isusulong ang bukas

Koro 1
Kaya ko, kaya mo, kaya nating lahat
Industriya ay tutulungan, pribado o gobyerno man
MIRDC ang Sentro na magbubuklod nito
Ang tagumpay makakamit kung sama-sama tayo
Instrumental
Tungkulin ay gagampanan, kakayahan ilalaan
Tayo ay maglilingkod nang buong katapatan
Gagawin nang mabilis, lahat sa tamang paraan
At ating mararating tagumpay na inaasam
(Ulitin ang Koro 1)
Koro 2 (a capella)
Kaya ko, kaya mo, kaya nating lahat
Ating baya'y tutulungan, marating ang pag-unlad
Tayo ay magtulungan upang ating marating
Ang pag-unlad kung sama-sama'y kaya natin
(Ulitin ang Koro 1 at instrumental)
Kaya ko, kaya mo, kaya nating lahat

Editorial Board

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