Die and Mold Industry Players Inside PEZA in Cavite

Department of Science and Technology
Metals Industry Research and Development Center

Table of Contents

I. Introduction

The die and mold industry in the Philippines has a lot of potential due to the increasing demand for die and mold and other related tools and products [1]. Time has shown that die and mold investment is promising. The power tools market for instance, which is just one of the diverse clients served by the die and mold industry, is expected to gain market growth with a compounded annual growth rate (CAGR) of 5.5% in the forecast period of 2020 to 2027. Forecasts also say that growth will reach USD 13, 213.93 million by 2027 [2].

Mold and dies are tools that are essential to mass production in present-day manufacturing. Both are key elements in manufacturing. Molds are used in injection molding to shape resin as well as in casting, and dies are used in stamping [3]. In the Philippines, manufacturing production rose by 12.7% year-on-year in November 2022. Press mold is mainly used in the manufacture of electronics products which accelerated from 13.7% in October to 33.7% in November 2022 and fabricated metal products except for machinery and equipment from 51.2% in October to 53.3% in November 2022) [4].

In Cavite, die and mold companies including those inside industrial parks and economic zones are crucial parts of the supply chains of businesses ranging from semiconductors, engineering, industrial machinery, electric home appliances, house goods, construction, and manufacturing.

Being the sole government agency that directly supports the metals and engineering industries, the DOST-MIRDC established the Mold and Technology Support Center (MTSC) to build advanced skills in die and mold technology; forge strong ties among local die and mold-making and mold-using companies; and encourage the advancement of the Philippine manufacturing industry's competitiveness. The MTSC is located in the Cavite Economic Zone in Gen. Trias, Cavite.

In its pursuit to serve the metals industry, the Center carried out a study on the metals industry players registered in PEZA in the province of Cavite in 2022. From this, the DOST-MIRDC embarked on a study with a smaller scope – the respondents being die and mold PEZA-registered companies.

Methodology

This qualitative research was conducted with the purpose of describing the present status of PEZA-registered companies engaged in the die and mold industry. The industry study team subjected the survey questionnaire to testing and validation. The team employed the triangulation technique in this study: online dissemination of survey questionnaires, the conduct of interviews with die and mold experts (Annex A), and conduct of a focus group discussion (Annex B)

Scope and Limitations

Due to the COVID-19 pandemic, the industry study team's interaction with the respondent companies was through the PEZA zone managers. It is very much understandable that health protocols are in place as the companies' response to the continuing pandemic. During data gathering, companies opted to submit the filled-out questionnaires online. Face-to-face interviews and personal visits to the companies, which are typically conducted by the industry study team during data gathering, were not part of this research.

The results contained in this report are deduced from the information gathered and consolidated from the responses of the companies that participated in the study.

This report is divided into several parts: (1) Introduction – where we highlighted the significance of the die and mold industry in the economic growth of the Philippines; (2) Capabilities – here is where we present products, services, human resources, and machine capability by the respondent companies; (3) Business as Reflected by Market Served and Key Support Partners – where we defined the market served and discussed how key partners contribute to overall business success of die and mold companies; (4) Die and Mold Companies in the Face of Challenges, Trends, and Opportunities – where we enumerated the challenges encountered by the respondent companies, mentioned a few global trends that can potentially influence local die and mold companies, and identified opportunities for further enhancement of the business; and (5) Conclusion – where we presented the summary and discussed how the DOST-MIRDC's MTSC holds the potential to serve the needs of the die and mold industry players in PEZA in Cavite.

Objectives

The M&E industry report, focused on die and mold companies registered with PEZA in Cavite, aims to:

1. Present the current status of the PEZA-registered die and mold companies in Cavite in terms of products and services;
2. Determine human resources and machine capabilities; and
3. Identify business opportunities with the new trends in the metals industry.

Businesses in the field of die and mold are critical downstream partners of various industries that drive the country's economy. Shown in Fig. 1 are the intricate supplier-buyer linkages of different metal industry players. Since the respondent die and mold companies are tapping both the local and export markets, the PEZA die and mold company locators in the province of Cavite serve the requirements of a dynamic market - one that continuously grows and becomes increasingly sophisticated over time.

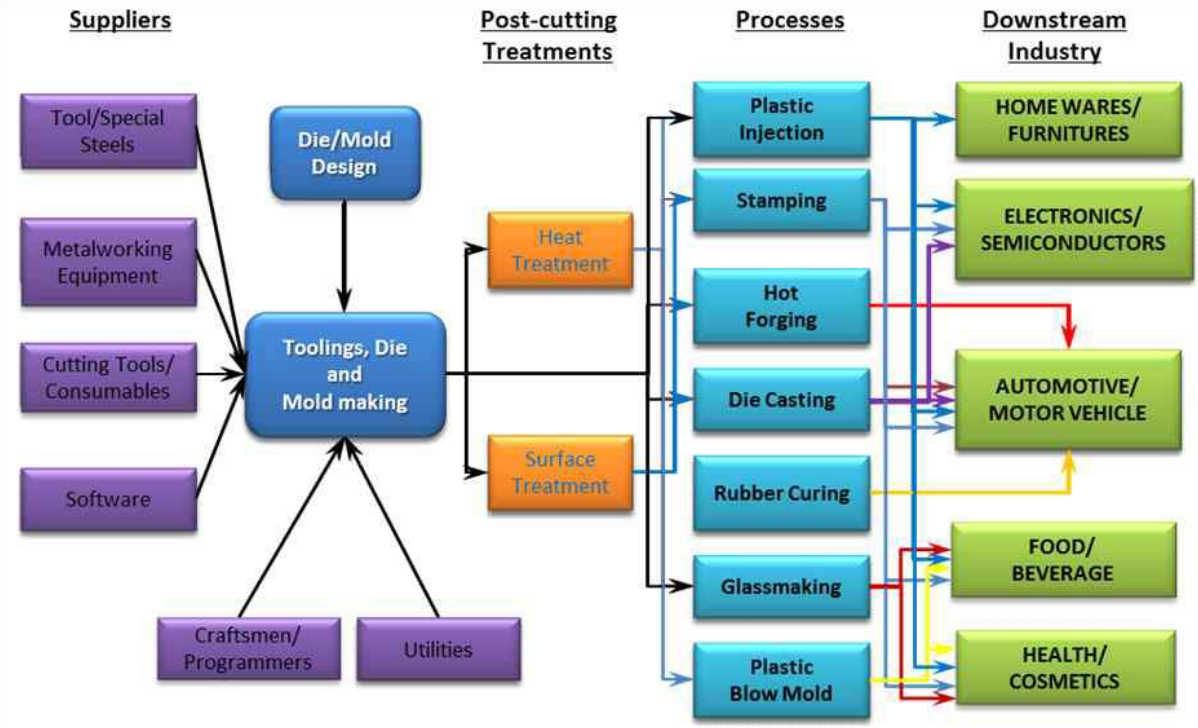


Figure 1. Downstream industries served by PEZA-registered die and mold companies.

Coinciding with the preparation of the promotional plan of the MTSC, the results of this M&E industry report focusing on the die and mold PEZA-registered companies will provide significant insights that will be useful in positioning the MTSC during its promotional and marketing activities among its potential clients, specifically the PEZA-registered die and mold companies.

In performing its crucial role as an upstream partner of frontline industries, the die and mold companies in PEZA are seen to be the most immediate market to be served by the MTSC. This report intends to bring to the MTSC's attention the status of die and mold companies and the business and networking opportunities that the MTSC can take advantage of.

II. Capabilities

Based on the 2018 MIRDC publication [1], there were 138 die and mold companies total of 3,147 metalworking firms nationwide. However, for this 2022 industry study which only focused on the PEZA-registered companies in Cavite, the identified die and mold companies only totaled 82.

As shown in Figure 2, the highest number of die and mold firms is located in Rosario. These enterprises, involved in the export of die and mold, plastic injection mold,

tooling, and other various metal products, are categorized as a medium- and large-sized based on assets (Annex C).

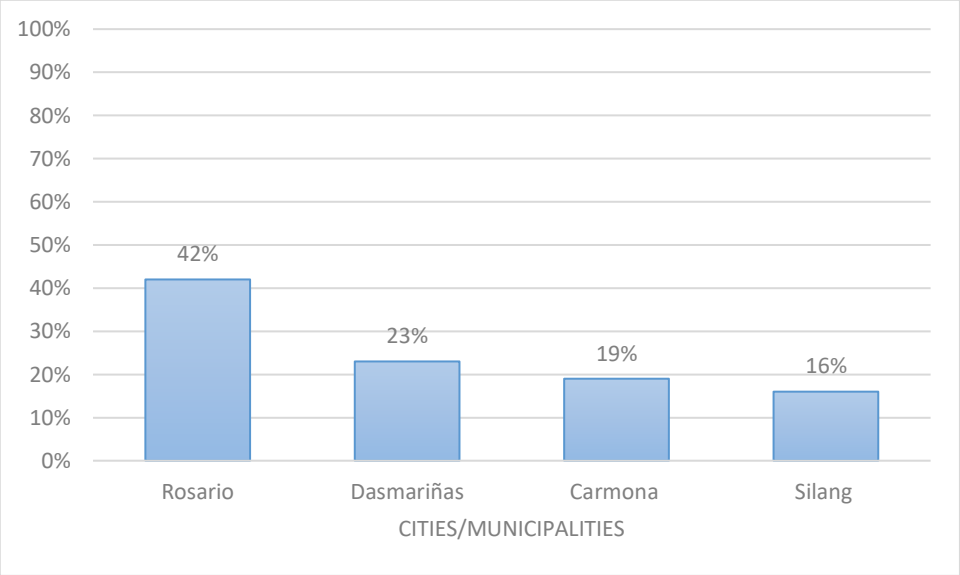


Figure 2. Distribution of the PEZA-registered die and mold players in cities/municipalities in Cavite

The majority (54%) of all respondents operate entirely as die and mold users only. They source dies and molds locally and import from Japanese, Chinese, and Thai manufacturers. 23% of the respondents are purely fabricating dies and molds while 23% of the respondents are both users and producers.

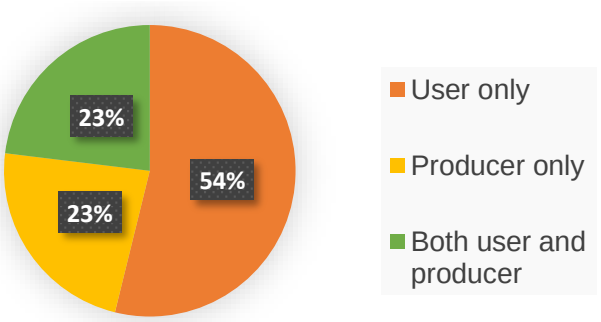


Figure 3. Percentage of users and producers of molds

The die and mold acquired by the locator companies are used as production materials for product development. Meanwhile, others are providing services such as die and mold fabrication, metal stamping, lathing services, cutting services, forging and die casting, and mold repair.

The products made and marketed by PEZA die and mold companies in Cavite are a clear demonstration of their capabilities. They export fabricated press molds through die casting and machining processes using both conventional and advanced technologies which are intended to mass-produce chassis, alternators, gears, metal mainframes, automobile motors, die, and mold, injected plastic parts, and other metal

fabricated products for automotive, automobile, semiconductor, electric home appliances, construction, and house goods. Locator companies engaged in tool and die fabrication are serving both the local market within CALABARZON and the foreign market like the USA, Egypt, and other countries in Asia such as Japan, China, Malaysia, Thailand, Taiwan, Vietnam, and Hongkong as shown in Figure 4.

Figure 4. Countries where PEZA-registered companies export their products

Most of the locator companies are only users of forge mold, die-casting mold, and injection mold (Annex C) which are imported from Japan, China, and Thailand to serve the requirements of automotive, semicon/electronics, industrial machinery, and house goods construction sectors. Through the machining process, they can produce metallic doors, auto parts such as bolts and shafts, nut and collar Denso/alternator, and semiconductor parts. Injected plastic parts, and painted and printed plastic parts, are other products produced through plastic injection (Figure 5).

Source: https://www.bipaphilippines.com/index.php/product-line/mold-fabrication

Source: https://www.shinkozan.com/product.html

Source: https://www.jfsprecision.com.ph/#products-services

Figure 5. Various metal products produced by PEZA die and mold companies in Cavite

Metals industry players serving house goods and construction are importing die and mold from Japan to produce roof attachment parts, tight frames, and other various metal products.

The use of both traditional and cutting-edge technology has made it possible to meet the needs of the die and mold sector. Due to their ability to quickly make elaborate or complex shapes, CNC lathes and milling machines are used more frequently than any other machines by the producers of die and mold companies who responded. Additionally, some of the machinery utilized to create goods for export includes surface grinders, EDM wire cutters, and EDM sinkers. The effective operation of the equipment is acknowledged by locator firms as one of the essential elements in satisfying the expectations of the clients. Nearly 93% of respondents consistently do preventative maintenance on all their equipment to make sure that their production runs smoothly.

PEZA die and mold locator companies in Cavite can compete with neighboring countries in the field of die and mold because of the human resources that serve as the industry's backbone to survive and stay competitive. They can manufacture precise and accurate products such as machined car parts that will function as intended because they employ highly skilled mechanical engineers, manufacturing engineers, quality assurance engineers, machine operators, and technicians.

III. Business as Reflected by Market Served and Key Support Partners

Market Served

As shown in Figure 7, the construction and house goods industries are the top market served by die and mold companies (38%). Followed by automobile/semiconductor, and automotive transport (19%). Respondent companies offer their clients in this industry services such as the fabrication of plastic mold and repair of injection molds using welding and machining processes. They are producing plastic injected parts for their clients in Japan, Vietnam, and Mexico which are the top three markets for Philippine plastic injection molding exports [5].

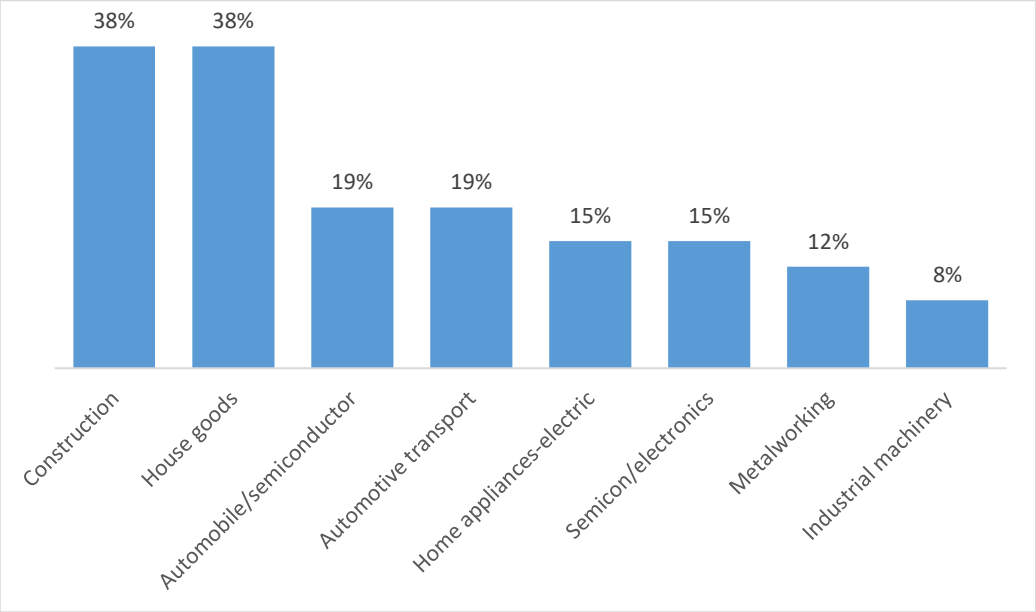


Figure 7. Market served of the PEZA die and mold companies in Cavite

Automotive plastic trays produced by some locator companies are exported to tap the increasing demand in the automotive industry in Japan. While USA, China, and Denmark are the top destinations for products manufactured by some of the PEZA locators in Cavite such as the metal mainframe, racks, panels, and covers that are used to serve the electric home appliances.

The electric home appliances and semicon/electronics industry represent the second biggest markets served by local die and mold companies in PEZA. Locator companies are exporting tin ingots, silver shots, and tin alloy ingots. These products are used for

various applications to serve electronics and semiconductor industries in Thailand which is known as the largest importer of tin ingots in the world [6], and in Malaysia with a 2% growth in the semicon industry [7]. The value of the Philippines' exports to Malaysia was US$1.89 billion in 2021 and the export of tin alloy got a total of $14.44 Million [8].

Key Support and Business Partners of Die and Mold Companies

A company must meet the requirements of its clients to stay in the business. To stay above the competition, a company has to offer and live up to its value proposition. This holds true even for die and mold companies in Cavite. Figure 8 presents the categories of value propositions of the surveyed die and mold companies.

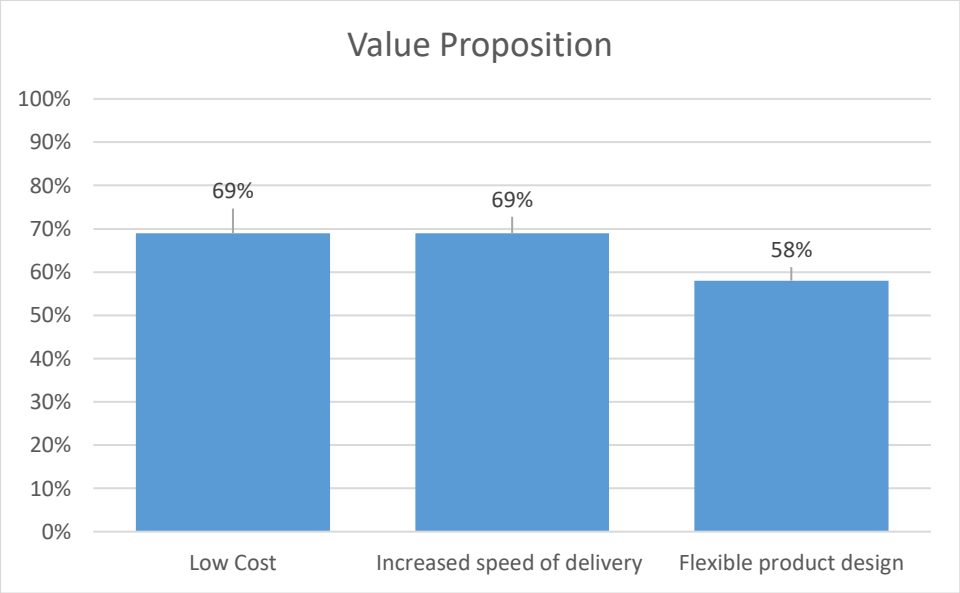


Figure 8. Value propositions of the PEZA die and mold companies in Cavite

To realize the value proposition they offer, die and mold companies link with business and support partners. These partners contribute significantly to the profitability of the business. The network formed by business partnerships among the die and mold companies and their support partners creates a more robust economic activity for the manufacturing industry.

Suppliers of raw materials are one of the most critical business partners of local die and mold companies. Competing in the arena of lowering costs, die and mold companies rely on the services offered to them by their raw materials supplier, allowing them to mass produce products such as dies and molds, jigs and fixtures, electrical, and other metals-related products.

Providers of equipment and maintenance services are the key partners of the respondent companies whose value offering centers on the speed of service. They ensure that all types of machinery are utilized and kept in good condition, which is an

essential component in enhancing the speed of their service. This is connected to the maintenance of the molds and dies used in the manufacturing process, which increases their productivity.

Providers of heat treatment and machining services are also relevant partners of some die and mold companies. Outsourcing tasks, such as heat treatment and machining, is another way for them to be more productive and efficient products and services.

Suppliers of raw materials and equipment help enterprises whose value proposition is flexible product design to satisfy their customers. They focus on providing the desired products of their clients depending on the preferred design. Locator companies are also partnering with equipment suppliers to ensure that the technology they will employ can make intricate designs of auto parts and other metal products for various applications. Additionally, they evaluate the significance of raw material providers who can match the expectations of clients.

Their partnership with the equipment suppliers influences them to sustain their business through their investments in both conventional and advanced machinery. Through this, they are gradually catching up with other countries.

The company respondents' established partnerships with equipment suppliers result in sound investments in advanced machinery which enable the die and mold industry players to create accurate and complex molds sold in the international market. These molds, having cores and cavities with fine details and fabricated using demanding surface finishing processes, are critical in the manufacture of automotive, medical, and consumer products that require high accuracy [9].

The most important of all these partnerships is the companies' crucial relationship with their human resource. Mechanical engineers, manufacturing engineers, quality assurance and design engineers, technicians, and machine operators make up the portfolio of die and mold companies in PEZA in Cavite.

IV. Die and Mold Companies in the Face of Challenges, Trends, and Opportunities

Challenges

Import and export activities of a country help determine business vigor. The imports and export in 2020 amounted to Php 5.62B and Php 252.89M of die and mold products, respectively. In 2021, the import of die and mold products increased to Php 9.16B, while export increased to Php 316.17M. [13]

Despite the presence of local manufacturers, there is still a significant amount of imported tool and die products making their way into the country – indicating that local supply remains insufficient to cover domestic and global demand. Below are some specific problems encountered that might affect the sustainability of the locator companies in delivering quality products and services in the global market:

- Insufficient understanding of mold design and blueprints
- Insufficient understanding of mold structure
- Lack of mold experts
- Hard to identify proper cutting tools
- Insufficient knowledge of the physical properties of materials
- Insufficient operating skills in machine tools
- How to properly utilize the results of molding analysis
- Identifying the cause of defective molding
- Insufficient machinery and peripheral equipment required for molding analysis

New Trends and Opportunities

One of the trends seen in the global die and mold industry is the application of artificial intelligence (AI). With adoption of these trending technologies such as AI and the use of the internet of things (IoT) and emerging technologies, die and mold companies in PEZA-Cavite will be better able to address challenges. This technology trend optimizes performance and minimizes errors at all production levels [10]. This will allow locator companies to produce higher-quality dies and molds with intricate designs for auto parts, electronic and semicon parts, and other metal products. As die and mold companies embrace the use of the said technologies, expanding market in the global arena is an opportunity that can be taken.

Another significant opportunity is machine learning. Through generative design software which uses machine learning algorithms to mimic an engineer's approach to design, die and mold producers in PEZA-Cavite will be able to generate thousands of design options for one product. In terms of extreme price volatility of raw materials, AI-powered software can predict materials prices more accurately than humans which may help the PEZA locators adapt to the unstable price of raw materials to remain competitive in the market. Another application to complete a task that cannot be fully automated is the use of cobots to work safely alongside human workers [11].

Utilizing 3D printing technology is a way for die and mold companies to be more cost-effective. Even if additive manufacturing (AM) is not used to produce end products, it can be used for the fabrication of tooling for the production processes. 3D printing molds and dies for injection molding and die casting holds a lot of opportunities due to the various benefits that AM offers in terms of making custom, on-demand, and complex parts. [12]

As mentioned earlier, the MTSC is a technology hub that aims to support and assist die and mold companies reach their full technology and business potential. As an output of the partnership between the Korean and the Philippine governments, the MTSC houses equipment, tools, and various technologies for mold and mold-related requirements of the industry. The establishment of the MTSC brings an opportunity to advance local mold companies, increase their productivity, and help them become globally competitive. With the services that die and mold companies may avail from the MTSC, the country will be less dependent on imported dies and molds.

The adoption of modern technologies is a trend among die and mold companies. Not too far off into the future, artificial intelligence, IoT, and cutting-edge software will be used in mainstream manufacturing, and die and mold companies, including the PEZA locators in the province of Cavite, should transition into the use of such technologies.

PEZA locators engaging in the die and mold business can take advantage of the services offered by the MTSC, and seriously consider forging and nurturing linkages with raw materials and equipment suppliers. As a response to the prevailing technology trends, a significant boost to competitiveness can be gained by die and mold companies by adopting additive manufacturing technologies.

V. Conclusion

Die and mold companies registered with PEZA in the province of Cavite are crucial economic drivers that enable the country to partake in stiff competition in the global market. For this study, respondents are either users of die and mold, producers of die and mold, and both users and producers of die and mold.

Competing for a share in the export market, PEZA die and mold companies rely on the use of both conventional and cutting-edge technologies. Presently, the die and mold companies have built and continue to build capabilities in various areas including tool and die, and press mold fabrication, among others.

They are helping keep business networks strong among themselves and their support partners – suppliers of raw materials, equipment, and equipment maintenance service providers. Moreover, die and mold companies are engaged in outsourcing certain operations such as heat treatment and machining. This business outsourcing strategy creates advantages for die and mold companies and other metalworking industry players as well.

Aside from the outsourcing of certain production processes, the use of modern technologies such as AI and additive manufacturing has started creating trends among die and mold companies in PEZA.

Enterprises involved in the field of die and mold are indispensable parts of the manufacturing industry. Playing the key role as a downstream support industry, die

and mold companies are behind the success and robust business of frontline industries including construction, house goods, electronics and semiconductor, and automotive transport, to name a few.

It is then imperative for the DOST-MIRDC to pay attention to challenges faced by the die and mold industry in PEZA and formulate action plans to help the industry address these challenges. Worth noting among the challenges identified by the die and mold company respondents is the lack of mold experts – people they hire possess an insufficient understanding of mold design, blueprints, and mold structure. Die and mold companies also face the challenge of a lack of skilled operators. Their business operation is also hindered partly by insufficient machinery and peripheral equipment required for molding analysis.

In view of the results of the study of die and mold companies in PEZA in Cavite, the MTSC holds significant potential in driving the industry to enhanced productivity. MTSC training program offerings should be tailored according to the requirements of its most immediate clients – PEZA-registered companies. Facility sharing is also one service that die and mold companies are looking for. As this is one of the services of the MTSC, proper information dissemination to potential clients must be considered carefully.

In the areas of automation and additive manufacturing, the DOST-MIRDC can offer much-needed interventions through its Advanced Mechatronics, Robotics, and Industrial Automation Laboratory (AMERIAL) and Advanced Manufacturing Center (AMCen). Proactive and targeted promotions, as well as periodic company visits, based on a strong endorsement by the Cavite Economic Zone, will help DOST-MIRDC create meaningful linkages with PEZA die and mold companies.

In its current stage of implementation, the MTSC has to define clear strategies to make its operations sustainable. The requirements and challenges of PEZA die and mold companies provide a sound basis for the packaging of MTSC services. Once the facility opens its doors to PEZA clients, long-term partnerships are bound to grow and strengthen.

References

[1] D. A. Gonzales, "researchgate.net," June 2019. [Online]. Available: https://www.researchgate.net/publication/351301519_Philippine_Die_and_Mold_Industry_2018_A_Status_Report/link/6090e4b2458515d315f594e2/download. [Accessed December 2022].

[2] stamod.com, "stamod.com," 2021. [Online]. Available: https://stamod.com/benefits-of-manufacturing-tools-and-dies-in-asia/. [Accessed December 2022].

[3] stamod.com, "stamod.com," 2021. [Online]. Available: www.keyence.com/ss/products/measure-sys/machining/peripherals/mold.jsp#:~:text=Dies%20and%20molds%20are%20both,resin%20or%20casting%20molten%20metal.. [Accessed December 2022].

[4] tradingeconomics.com, "tradingeconomics.com," December 2022. [Online]. Available: https://tradingeconomics.com/philippines/industrial-production#:~:text=In%20Philippines%2C%20Industrial%20Production%20is,VaPI)%20of%20the%20manufacturing%20industry.&text=in%207%20Months-,Manufacturing%20production%20in%20the%20Philippines%20advanced%20b. [Accessed December 2022].

[5] volza.com, "volza.com," December 2022. [Online]. Available: https://www.volza.com/p/injection-molding-plastic/export/export-from-philippines/. [Accessed December 2022].

[6] volza.com, "volza.com," October 2021. [Online]. Available: https://www.volza.com/p/tin-ingot/import/import-in-thailand/. [Accessed December 2022].

[7] [Online]. Available: 2. https://www.theedgemarkets.com/article/malaysias-semiconductor-industry-projected-grow-810-2022#:~:text=KUALA%20LUMPUR%20(Oct%2026)%3A,Bank%20Bhd%20(HLIB)%20said..

[8] tradingeconomics.com, "tradingeconomics.com," August 2021. [Online]. Available: https://tradingeconomics.com/philippines/exports/malaysia. [Accessed December 2022].

[9] J. Lorincz, "sme.org," August 2020. [Online]. Available: https://www.sme.org/technologies/articles/2020/september/moldmakers-power-up-with-advanced-tech/. [Accessed December 2022].

[10] G. Immerman, "MachineMetrics," 2 October 2018. [Online]. Available: https://www.machinemetrics.com/blog/the-impact-of-ai-and-machine-learning-on-manufacturing. [Accessed December 2022].

[11] C. Dilmegani, "AI Multiple," 1 August 2020. [Online]. Available: https://research.aimultiple.com/manufacturing-ai/. [Accessed December 2022].

[12] M. P. Insights, "Market Prospect Insights," 20 April 2020. [Online]. Available: https://www.market-prospects.com/articles/3d-printing-application-on-mold-and-die. [Accessed December 2022].

[13] P. S. Authority, "Import-Export of the Philippines," Philippine Statistics Authority, Quezon City, 2021.

[14] K. H. Negado, "mirdc.dost.gov.ph," MIRDC, 10 November 2022. [Online]. Available: https://mirdc.dost.gov.ph/2-uncategorised/350-dost-mirdc-launches-the-mold-technology-support-center-to-strengthen-the-country-s-local-manufacturing-capabilities. [Accessed December 2022].

Annex A

Interview with the experts.

Interview with Mr. Virgilio Lanzuela of Rollmaster Machinery Industrial Services in San Pedro City, Laguna.

Interview with Mr. Antonio Mangubat of Alpha Techno Precision Toolings Incorporated in PEZA Rosario, Cavite.

Annex B

Focus Group Discussion held in the MTSC building in Gen. Trias Cavite last Nov. 29, 2022.

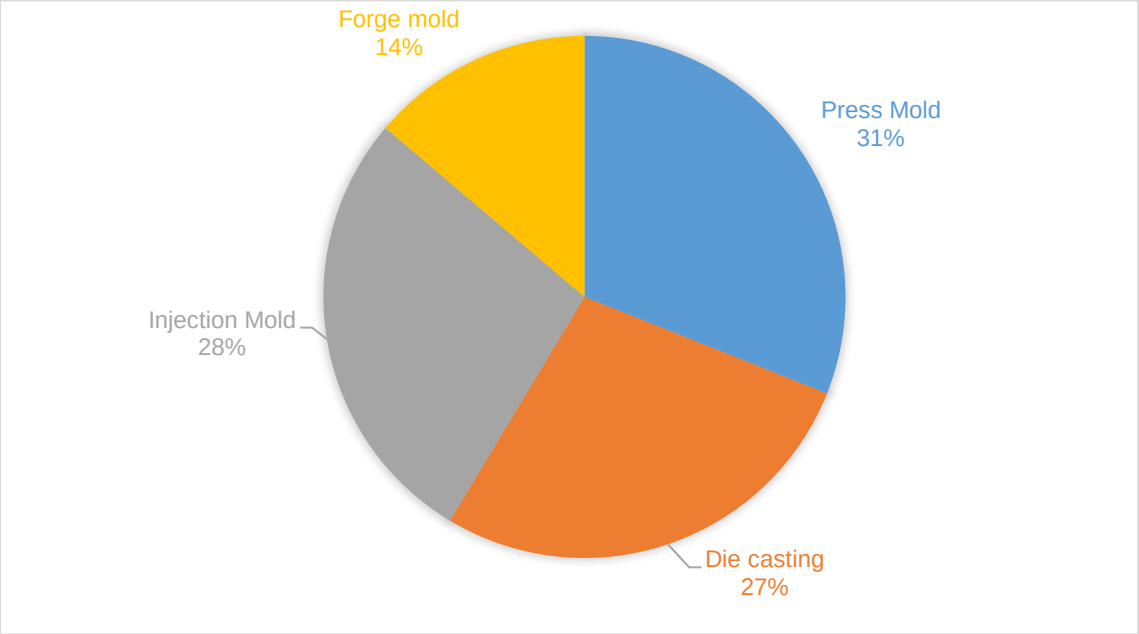
Attendees of the FGD are representatives from MIRDC, PEZA, PSTC Cavite, and respondent companies.

Representative from PEZA respondent companies from left to right Mr. Julius A. Ontang from Mitsuwa Chemicals, Ms. Ria Rose B. Soriano, and Ms. Lanie Tejeres from Toms Mfg. Corp.

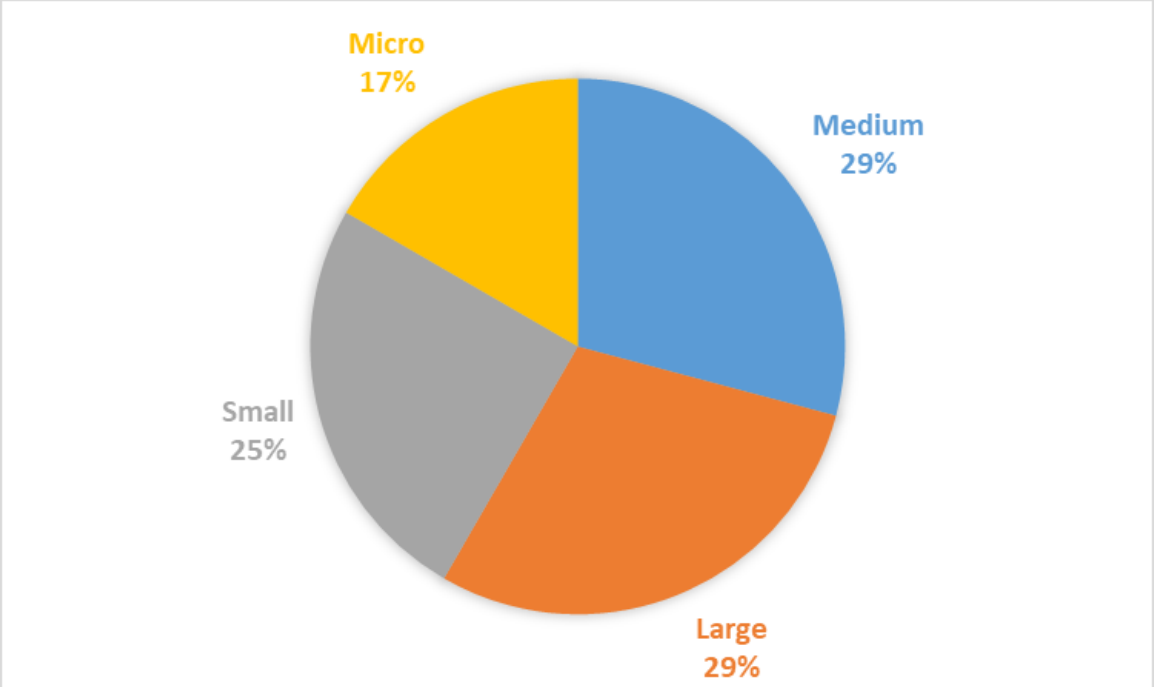
Representative from PSTC Cavite Ms. Gilda S. De Jesus

Dr. Agustin M. Fudolig MIRDC Deputy Executive Director for R&D, Atty. Norma B. Tañag, CEZ Zone Administrator, and Engr. Robert O. Dizon MIRDC Executive Director

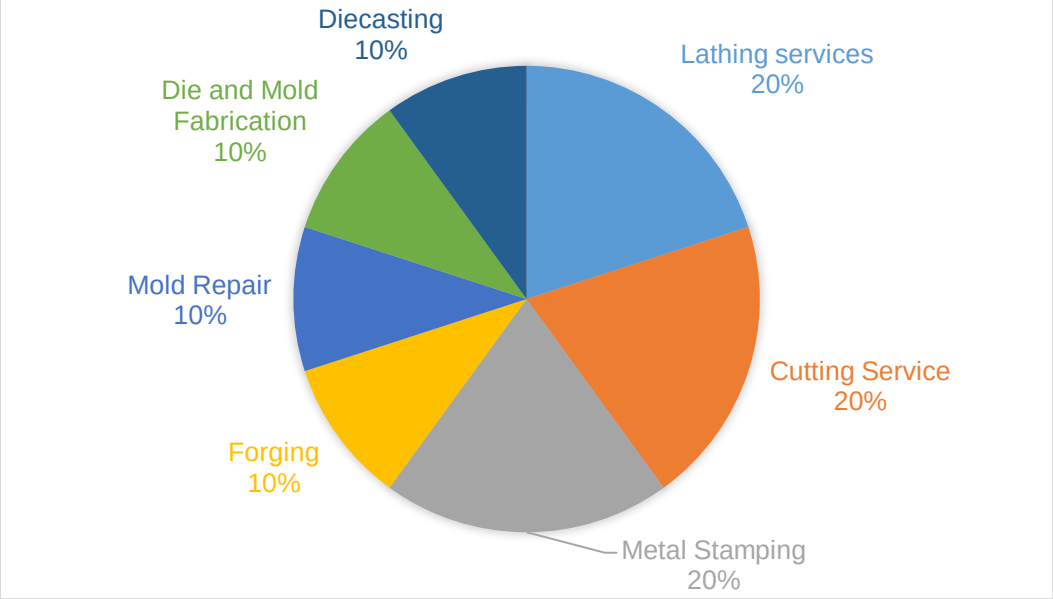
Annex C



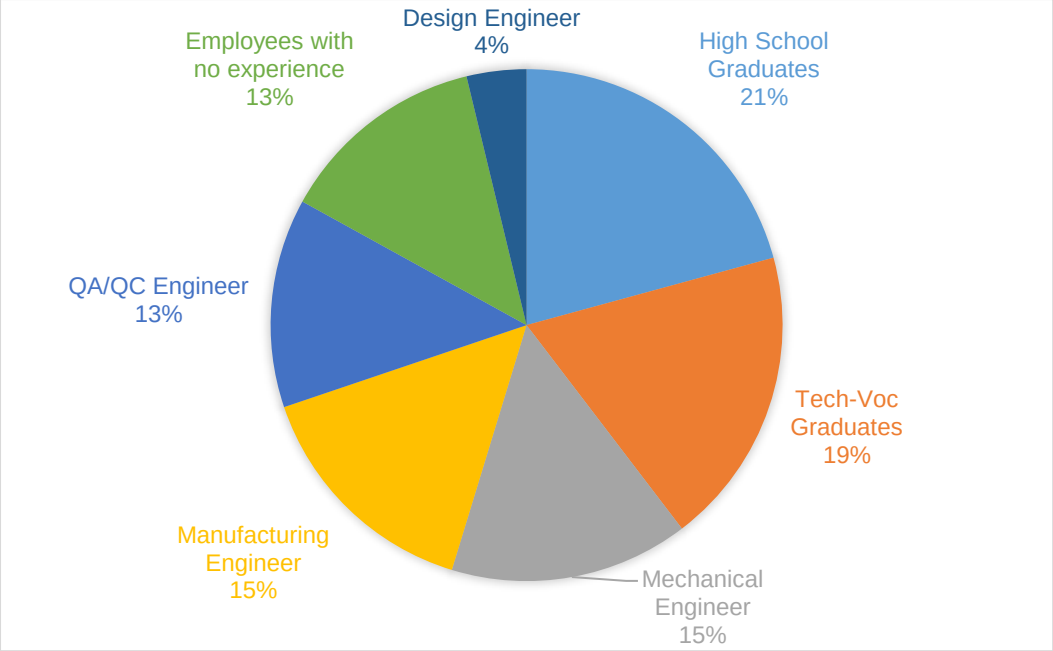
Types of mold produced by the respondent companies.



Company size of PEZA respondents based on their assets.



Service offered by the PEZA respondent companies.



Skilled workers the respondent companies mostly hire.