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Tanaka, Miwa

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A Case Study Analysis of Company Strategy of Specializing and Non-specializing Die and Mold Manufacturers in Japan

Miwa Tanaka

Institute of International Business and Management, Kanagawa University

1. Introduction

This paper consists of a case study analysis of company strategy in specializing and non-specializing die and mold manufacturers in Japan. The classification of dies and molds in Japan is determined according to the materials handled and includes press tools, tooling for plastic materials, die casting and other types of casting, and forging. When conducting a survey of dies and molds, therefore, all of these classifications may be thought of either as constituting a single industry, which is then surveyed as one overall target theme, or an approach may be taken by focusing on dies and molds that are in common use, such as press tools or molds for plastic materials.

In addition, in industries such as the consumer appliance, electronics and automobile industries, which handle final products (or finished goods), there are cases when dies and molds are required for a trial production or for mass production. For the tooling (die and mold) industry, these industries are positioned as those that have a substantial demand for tooling. Furthermore, people who have worked in the tooling industry for many years, point out that the reason why Japan's tooling industry was strong is that "the demand industries themselves were strong."⁽¹⁾

A brief explanation of the Japanese tooling industry as a research theme will be given here before going into the main argument. As an obvious fact, molds, dies and other tooling are not final products. They are simply tools that are used for the mass production of other goods. While being little more than tools, surveys and research into the industrial sectors that form the demand industries for tooling (especially the automobile industry) have found that efforts toward tooling development contribute greatly to the shortening of trial production as well as design and development lead times.⁽²⁾ This has resulted in a gradually improved understanding of the important role performed by tooling in the development stage of finished goods.

Particularly in the case of a demand industry such as automobile manufacturing, where a large number of separate components is involved, mass production of parts of differing sizes is required. The benefit of cost reductions brought about by the use of tooling is therefore apparent. There are examples of tooling makers who have made technical proposals to automobile manufacturers that have enabled a changeover to production by press dies or molds for complex automobile components that had previously been produced by cutting work.

Reducing lead times for design and development as far as possible enables companies to place new products on the market before competing companies. This is a crucial competitive strategy for finished goods manufacturers. As the tooling industry is deeply involved in the series of manufacturing processes beginning with trial production of the product, to the mass production of components, and then on to their incorporation into the final product, a stronger recognition of the role of tooling is a favorable development for the industry.

When conducting a survey or research into the tooling industry, indispensable for mass

production, the several different approaches that may be taken include not only initiating studies from the tooling industry side, but also from the side of the demand industries who require tooling, such as the electronics and automobile industry. Therefore, where to start from and what theme to pursue when examining the tooling industry brings differing responses depending on the field of expertise or focus of interest of an individual researcher.

As mentioned above, there are different approaches and angles that can be taken when conducting studies and research on the tooling industry in Japan. By first explaining the background to the reasons why there has been only slow advance in understanding for the tooling industry, we attempt to convey the enormous width of the industry as a research target.

The title of this paper uses the expression “specializing and non-specializing,” but what is meant by “specializing” in the tooling industry? For die and mold manufacturers, to what does “non-specializing” work refer to? Before embarking on the analysis of specific strategic cases, in the next section we will provide a commentary on terms generally used in the industry.

2. Specializing tooling manufacturers and non-specializing tooling manufacturers

As mentioned, the tooling industry in Japan is finely segmented according to the materials that are to be processed, and there are also cases of dissimilar characteristics that depend on the size of the components to be mass produced. In addition, when one attempts to take an overall view of tooling as a single industry, it is insufficient to look simply from the industry side. The reason is that for dies and molds, not themselves finished goods, it is necessary to also turn one’s sight to the relationship with the important partners, the demand industries, who make use of the tooling. In the past, domestic electrical appliance manufacturers and the electronics industry had a high level of competitiveness and were extremely lively, and there was a long period of robust growth in the tooling demand industries. The demand industries have, however, changed with the times, and this is not something that is limited to Japan. In recent years, especially due to the weakening of the demand industries, the electrical appliance and electronics industries, statistics show that there has been a dramatic shift of the main transacting partners of the tooling industry towards the automobile industry.

The presence of demand industries other than the automobile industry has faded and one of the points that will require attention in the future is whether Japan’s tooling industry will become dependent, in the extreme, on just the one industry. It is impossible to reach a conclusion at the current transitional stage on the pros and cons of this phenomenon. A long-term view of the tooling industry, taking into account its partnership with the demand industries, will be necessary to discern the future direction of the tooling industry.

There was a time when it was possible for several demand industries, including the electrical appliance and electronics industries, to conduct domestic manufacturing. Until about the early 1990s, against a background of prevalent short product model change cycles, the industry could sell as many dies and molds as it could produce.⁽³⁾ The tooling manufacturers at the time, who were required to supply renewed tooling for the short cycles on the demand industry side, dedicated themselves to the production of dies and molds and were able to secure sufficient orders for their businesses in this way. They produced only dies and molds and delivered them to the demand industry customers, and when the time came around again for a model change, this process was repeated by delivering the new tooling for the manufacture of the renewed product. Tooling manufacturers who built their business on this cycle became known as specializing tooling manufacturers.

In contrast to the specializing makers, what is a non-specializing tooling manufacturer? These

are the tooling companies that originally positioned die and mold production as their core technology, but put the dies and molds they produced into use within their own company by equipping themselves with mass production facilities and engaging in the production of parts.

Thus it can be said that two business models exist among the domestic die and mold manufacturers. A diagram is shown below to explain these two business models more clearly.

One model (Model-1 in Figure 1) only sells tooling dies or molds. If their customers want to receive mass-produced components, the tooling company, such as a die maker, does not sell any tools to the customer.⁽⁴⁾ They use their own tooling dies or molds produced in-house to manufacture mass production components for the customer (Model-2 of Figure 1). Therefore, when we have an opportunity to visit a tooling company in Japan, we have to make sure we know which business model the tooling company is operating under. That is, are they the tooling die or mold seller type or the mass-produced components seller type.

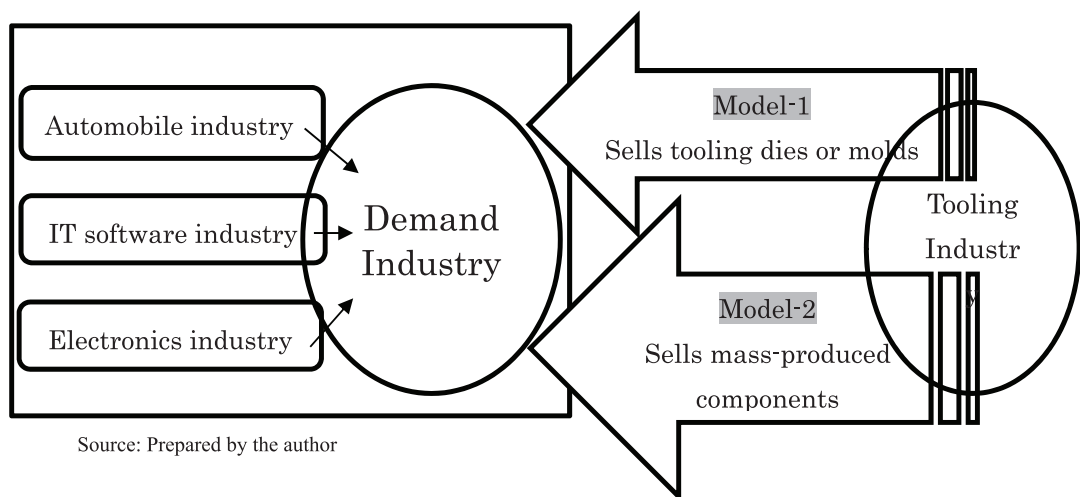


Figure 1. The relation between tooling & component supply and the demand industry

To transform from specializing maker to non-specializing maker requires the management to make a big decision that is influenced by various factors, including the required time, cost and the development of new human resources who will carry out the mass production work. Moreover, they will also have imposed on them different tasks and responsibilities in comparison with simply producing the tooling assigned to them by the demand company side in accordance with the drawings provided.

For instance, for a non-specializing maker carrying out integrated production from tool manufacture to forming will be required to prove that the produced parts or formed products meet the quality criteria demanded by the customer. As proof to the customer that a system capable of guaranteeing quality has been established, there may be cases when it is necessary for companies to make huge and almost unbearable financial outlays for the scale of the company, including thoroughly ensuring that work is carried out in rooms that are temperature controlled for each process and to purchase expensive measuring equipment. Most Japanese tooling manufacturers are small and medium enterprises and they are considered to be large companies if they have 100 or more employees. Nearly all the tooling makers are small-scaled organizations. It is extremely

difficult for these tooling makers to purchase a full set of expensive German or Swiss measuring equipment or precision tools.

Furthermore, this is not the whole story for the path to mass production as they may need special production equipment. A plastic mold manufacturer needs to install special mass production machines, such as injection molding machines, or in the case of press die makers, they would be required to purchase and install a large press machine. It can be seen from this that equipment already existing in the company would hardly be sufficient to build up the equipment necessary for mass production. It is therefore necessary to secure new premises and to establish an environment that can withstand even the installation of large-scale mass production machinery.

Several years ago, the author had the opportunity to visit the construction site of a factory where a tooling maker was building strong foundations for increasing the company's mass production equipment. Adding in the fact that the company was intending to operate the large-scale mass production equipment on a 24-hour basis, it became necessary to take appropriate measures and consider facility upgrades, including for the noise problem in the factory surroundings.

These efforts are the minimal conditions that need to be met by a specializing maker that attempts to become a non-specializing maker. Even though a specializing maker may have knowhow enabling it to manufacture advanced tooling, several hurdles exist to the establishment of the mass production system that will transform the specializing maker into a non-specializing maker.

In addition, when making this changeover, the kinds of industries that will be the main transacting demand industries is a crucial issue for non-specializing makers. In the case of the automobile industry or industries related to medical equipment, since the necessary standards for the industry and certification as specialized factories is necessary, there may be cases where entry barriers other than those originally foreseen or planned for arise. To minimize unforeseen circumstances as far as possible it is necessary for tooling makers to make continual corporate efforts to research the demand industries with which they already have transactions and to which they aim to expand their business.

What is vital for tooling manufacturers in the future in making the switch from the demand industries which have now declined domestically, will depend on how they seek out demand industries that have potential to become the mainstream in the future and ways to construct close relationships with those industries. Whether intending to continue as specializing tooling makers in the future or intending to boost their corporate value as an integrated production company producing formed products as a non-specializing maker, it will be necessary for companies to endeavor to find ways of meeting the demand industries' needs and demands and improving customer satisfaction in ways that only tooling makers are capable of.

3. Case study of the business strategy of a non-specializing manufacturer

From survey activities on domestic tooling makers, requirements from the demand industry side have apparently become stricter in recent years. Let us take up here the case study of Company A, a non-specializing die manufacturer with a company head office factory in an industrial park in the North Kanto region, looking also at the transactional relations with the demand industry side.⁽⁵⁾

The current owner, inheriting the company base from the previous company president, firstly set about to reform the in-house environment, which had been a typical household industry-style company up until that time. From that time onwards, the owner gradually recruited excellent human resources, and in around ten years the company has grown to its current scale of a few dozen employees. The owner now feels that he wants to hold down the scale of the company to a maximum of 30 personnel in the future. The company policy is "to always have an R&D theme, to

always be carrying out some R&D, and to continue to do so in the future.” Company A has a research facility to which a business partner has contributed investment funds. As the business partner’s activities have confidential aspects, the facility is naturally off-limits to unauthorized outsiders. The owner says that the most important characteristic of the workers at the factory is that they are all completely cross-trained, and that the usual workflow process is for the workers to prepare a drawing using CAD and then take part in the manufacturing process in the factory using the data they have prepared. It is the policy of Company A never to disclose the drawings of dies or mass-produced parts that they prepared and manufactured in-house.

The company’s business contents are the manufacture of press-stamped parts for automobiles and precision metal components, and the design, development and manufacture of press dies. Automobile-related parts accounts for about 20 percent of the total work volume. Since many of the new development jobs are automobile-related, it is possible that the proportion of automobile work will increase in the future.

What impressed me most about my visit to Company A, rather than the company’s advanced skills and contents, or the concrete details of the press-stamped products, was the content of the discussions with the owner regarding his analysis of competitor non-specialist tooling makers.

Company A is a non-specializing tooling maker that forms mass-produced parts at its own factory. The company intends to continue in the direction of an integrated production system for mass-produced parts. There are also competitor companies, Company X and Company Y, whom Company A has no possibility of out-competing in terms of numbers of employees or numbers of mass-produced parts. These two companies are also non-specializing tooling makers. Even if Company A was trying to catch up with Companies X and Y in terms of the mass-produced items they manufacture, there is little chance of out-competing these companies in the manufacture of the same types of items. The owner feels that little point in trying to compete with Companies X and Y.

The owner of Company A had a full grasp of the potential competitor companies and the types of items that those companies were mass producing. During the discussion, the owner mentioned some of the important policies of his company. These were, “We must not compete,” and “We will never compete.” If so, then how, as a non-specializing maker, while knowing about competitors and consciously avoiding competing with them, could it possible to gain research themes and development jobs from the demand industries? Moreover, does Company A have the capability to have these themes and jobs leading on to the securing of continuing volumes of work?

According to the owner of Company A, the types of formed articles handled by competitor companies X and Y had the characteristic of specialization in mass-produced parts formed from thick metal plate. Company A, therefore, has a clearly defined target area for the scope of mass-produced items that the company would focus intensively on for manufacture. These are “parts that fit in the palm of the hand, or smaller,” and which are “mass-produced from thin metal sheet.” This was expressed by the owner as “Choosing a different way from Companies X and Y.” Having this clear in-house criterion as a company policy means that they can respond fairly swiftly to business enquiries concerning the content of development projects that are broached by demand industries.

Additionally, this criterion increases opportunities to become involved in development projects that are almost all outside the targeted scope of other non-specializing makers that, in normal circumstances, would be potential competitors. Thus the company is able to create an in-house environment where it can build a close relationship with the demand industry side business partner. In the introduction to Company A in this section, it has been mentioned that there is a research facility supported by investment funds from a business partner. It was impressive that, in just the way Company A had aimed for, there had been an accumulation of similar success experiences, and the owner had taken a strong stance of sharing information about these experiences with the

company's cross-trained workers.

Company A also had one further key phrase: Aim for a business management that benefits from local geographical advantages. This notion is part of the owner's business strategy with regard to the siting conditions of the company. The idea is that, precisely because Company A is located in the North Kanto region, it is crucially important to get a firm grasp of local business partners and types of industries and to think strategically about what kinds of "sizes" and "volumes" the company could handle. Company A's factory is located in an industrial park, is situated close to an expressway, and is blessed with a top-class logistics environment. For instance, considering the mass production of small parts, by making use of this local geographical advantage and with this logistics environment, it is fully possible for Company A to handle both domestic and overseas transport and distribution.

Having gained a good picture of the business contents of Company A, we can summarize the essential points as below.

- Form a clear picture of the business contents of other companies in the same business, right down to the details of the stamped components they produce, and make strong information gathering efforts.
- Always have R&D themes and make efforts to continue these.
- Connect the factory's location and the "size" and "volume" of the business contents to make proposals and appeals about the competitive edge of companies that are able to benefit from local geographical advantages.

The special features of Company A were that in order to stabilize its business management as a non-specializing maker, it had to show clearly, both inside and outside the company, the owner's judgement criteria on, for example, the best target area to concentrate on, and how to avoid competition with rival companies in the same business.

4. From industrial clusters to a business management strategy that makes use of local geographical advantages

Here we take up a theme that can be applied to both specializing and non-specializing tooling makers. In every region in Japan, there exist various kinds of industrial clusters that concentrate mainly on manufacturing. Local companies that make use of the clusters to foster relations in each of the regions are in a position to take on the challenge of manufacturing and product development that one company alone could never rise to. Municipalities in the cluster regions also frequently become actively involved or display leadership, and efforts are also made by young business owners to take initiatives by exchanging information and working together among differing industrial types.

In 2014, I had the opportunity to visit a mold manufacturer in a region famous for its manufacturing industrial cluster in the Kanto area. This Company B is engaged in sales of molds for plastics and is also a mold manufacturer that carries out in-house molding. According to the owner's explanation, Company B is a mold maker that will also perform mass production, but only in small lots. Company B, while conducting its business management in a local-based style within the manufacturing industrial cluster, holds to the target of placing importance on "business management that makes use of local geographical advantages" in the near future.⁽⁶⁾

Company B, a plastics mold manufacturer, especially in the current situation since the Lehman Shock, has no specific main industry type as its demand industry, but has a wide range of various transactional partners. To mention concrete examples, these include cell phones in consumer electrical appliances, cameras, security equipment, and medical equipment. Since the company has

been carrying out molding since the company was founded, that serves as their strength, and it has achieved differentiation with other companies in the same industry. At one point, however, the company was so busy with the mold manufacturing business before the Lehman Shock that it seemed that the company would do well without engaging very much in in-house molding.

According to the owner, it is extremely important that Company B is a tooling maker that can carry out tooling manufacture and also has the processing technology for mass production within one company. For instance, suppose a defect appears just as a customer has started up mass production. In this case, it is important to know if the defect occurred because there was some problem with the mold they were using, or if it was because they were using the mold incorrectly, or what the molding conditions were at the time. Problems like this, however, sometimes include delicate issues which cannot always be easily resolved into black and white answers, and it is necessary to have human resources who understand the molding conditions. In addition, in contrast to trial production, mass production demands that articles are produced “even one second faster.” Also, despite this race against time, to continue the stable production of high-quality products, while one naturally has to have the necessary equipment, this is extremely difficult to carry out without an accumulation of experience in terms of human resources.

I asked the owner of company B about the fact that finished products makers are raising their rate of in-house production, including the manufacture of tooling. The response was very interesting. His impression was that the finished product maker’s in-house production was not particularly a bad thing. It was later possible to elicit several reasons for the makers’ in-house production from the tooling maker’s side. The following three points were indicated.

- Since they are a large company, they have a surplus of employees in the company,
- The company has technology and knowhow over which they wish to maintain absolute confidentiality,
- The finished product makers feel that they can manufacture components at lower cost if they manufacture tooling in-house.

Switching to in-house manufacture, the large companies will probably attempt to manufacture as much of the tooling as they can in-house, but there is still potential for cases where it might be cheaper to supplement certain tooling parts through outside orders. If so, it may be that for Company B delivering only some of the parts rather than a complete mold might increase the profit ratio and lead on to very profitable work coming in. It was pointed out that if the system for handling this kind of order is constructed within the company there might be cases where there is some benefit for tooling makers.

In recent years, Company B has received several development project requests from various types of industry. In these cases, the company is making the maximum effort to accept the projects. The reason is that in development projects it is always first necessary to conclude a non-disclosure agreement. Since it has confidential aspects, there is a tendency for the client company to wish to concentrate on a particular company as the business partner, and it is thought that this will result in a decrease in competitors.

The advantage for the tooling maker in the case that such projects might lead on to mass production in the future is that there is a reduction in the risk that the tooling maker will be exposed to price competition. To a certain extent, the tooling maker is able to request a profitable price at which the customer’s side will also go along with the transaction. Naturally, there are also disadvantages. Because these are development projects, there is absolutely no guarantee that such a project will definitely lead on to a product. However, by taking part in a development project, there is also a possibility that demand will appear in a different form from that of the project in hand. At

times an order will come from the business partner for a different purpose, and it is thought that this kind of transaction will lead on to the widening of the potential for company survival.

We had some insights about reasons for this tooling maker to receive these development project (including trial productions) requests. Firstly, the company is blessed with a favorable location. For instance, one of the partner companies broaching project requests had, up to that time, engaged in joint development with relatively distant tooling makers in the Kansai and Chugoku regions, but as information exchanges and an environment where the two companies can make mutual visits are vital, there are advantages to be gained from working on development with a nearby company.

In the case of Company B, rather than being located in a manufacturing industrial cluster, they have had a real sense of importance about the fact that the surrounding area consists of a large number of universities and company research facilities located in proximity to each other. That said, for a company like Company B to gain business management results from the use of local geographical advantages it is necessary to make corporate efforts to ensure that opportunities that at first enabled participation in development conclude by going on to continuing transactions. For that reason, when differing proposals and themes arise within the transactional partner, Company B must continually be the kind of tooling maker that is thought of as worthy of receiving the content of the consultation. It is also possible that the tooling maker's side is required, as an effort to make even further improvements in the relationship, to engage in active provision of information and make proposals for development projects to the customer.

5. Conclusion

This paper has classified the domestic industry into specializing and non-specializing tooling makers, and has carried out a strategic analysis by taking look at relatively recent corporate trends. Japan's tooling industry has thus far been able to increase its competitiveness through demand industries possessing international competitiveness, such as the automobile industry and the electrical appliance and electronics industry. The expansion overseas of the domestic demand industries that were once competitive, and passing through the associated issue of industrial hollowing, the environment surrounding the tooling industry now appears to be entering a period of transition. An important reason for this is that, with the exception of the automobile industry, the demand industries are weakening and losing their competitiveness.

Thus far, the tooling industry has been able to make efforts to avoid risks while diversifying its business contents through transactions with various demand industries. Not relying on a few business partners in particular industries was positioned as one corporate strategy aimed at shepherding an unstable order situation in a direction toward stable incoming orders. However, with the dwindling of the domestic market, and with the fading of demand industries such as the electric appliance and electronics industry, the main future transaction partners are thought likely to shift drastically toward the automobile industry, the sole industry maintaining its international competitiveness. To meet the demands of the automobile makers, there will probably be cases of tooling makers who are aiming to secure stable work volumes by attempting to convert themselves from specializing tooling makers to non-specializing tooling makers aiming to construct in-house integrated production facilities, even if they face an uphill financial battle in doing so.

I do not mean to deny that companies could make a shift toward a demand industry that promises orders. Nevertheless, I always recall the words of a tooling company owner who said, "Precisely when times are good, I always keep an image of the worst possible situation in mind, and I am always thinking about the next theme." Moreover, a tooling maker who had the self-awareness to see that their transactions were already skewed too far toward the automobile industry has begun to make the following active efforts. As a means toward an earnest attempt to enter the medical care

equipment field, which yields higher added value, they are continuing to send out development proposals to this industry that make effective use of their advanced processing technology.

For domestic specializing and non-specializing tooling makers, based on the decisive judgmental barometer established by the business owner in each company, participation in development projects from the demand industry side will probably become more important in the future. Furthermore, efforts to be increasingly engaged in public relations activities in the trial production and R&D field about the kinds of work through which the tooling industry can contribute to companies in the demand industries would likely be effective for the growth of their own industry. In particular, the automobile industry currently faces a huge number of uncertainties, such as how to move forward on the different types of environment-friendly automobiles, for which future directions have not yet become entirely clear, and the development race toward autonomous automobile (driverless car) technology to which the global IT-related industry has added itself as a competitor.

It would be advisable for the tooling industry to engage in public relations activities from its position close to the demand industries concerning its understanding and consideration for these issues facing the demand industry side, their main transaction partners in the future, and about the contributions the tooling industry can make to effective mass production making use of dies and molds. A position close to the demand industries means to exist as a supplier in the position of gaining or accepting trial production and R&D projects. The role of tooling makers in shouldering active participation in development proposals while engaging in both tooling manufacture and moving toward mass production is, for the automobile industry, not only limited to a reduction in lead times, but also has the potential of increasing the tooling industry's presence as an important partner that will provide a stable supply of large volumes of crucial parts. Each tooling maker needs to constantly identify where its company's ability to contribute to the demand industries that are its transaction partners lies, aim to secure an environment in which it can become involved in development through its position close to the demand industries, and further position as part of its company strategy, for example, the construction of human connections that make it possible to obtain information on development.

Notes:

- 1) In *Japan's Die and Mold Industry History*, published by the Die and Mold Technology Promotion Foundation (2015: 30), the contents of an interview with a person related to the industry on the modernization of the die and mold industry and the organization of industrial policy and industry associations is taken up, and the relations between the tooling industry and the demand industry side are mentioned.
- 2) Empirical research highlighting the contributions of die and mold development in the automobile industry at a relatively early stage can be seen in Clark and Fujimoto (in Japanese) (1993: 239-244).
- 3) Sakura Institute of Research Inc. (1992) drew attention to the background of the times in which the increasing momentum toward a high-mix low-volume production system (flexible manufacturing) was being reviewed in the automobile and electric appliance industries and analyzes the impacts on die and mold production due to lengthening of the model change cycle.
- 4) This tooling industry's customers are not the end consumer or final user of products. The customers are, for example, the automobile industry, the IT software industry and the electronics industry. These customer industries require a large range of parts, from micro components to large size components. The tooling industry supplies them either with dies and molds or mass-produced components.
- 5) From an interview survey with the owner of the head office factory of Company A, June 2014.
- 6) From an interview survey with the owner of the head office factory of Company B, August 2014.

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