

Featured Articles

Aggressive Intellectual Property Management to Protect Business Activities

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OVERVIEW: Companies are seeking to identify the best strategies and tactics for obtaining intellectual property rights to the results of their research and development and using those rights to protect and promote the business, and are implementing policies accordingly. Hitachi Chemical Co., Ltd. is a B-to-B business, meaning it supplies corporate customers, and it operates its business based on a mission of contributing to society through the timely development and supply of materials and components that deliver new functions, processes, and value to customers. The support of patents and other IP rights is essential to achieving and maintaining the superiority of its materials and components so that it can expand its business. Accordingly, it obtains patents and other rights and makes active use of them. This article introduces examples of the company's efforts including dicing-die attach film (DDF).

INTRODUCTION

WHAT is meant by strong intellectual property (IP), and IP that is useful to business? This is a question commonly put to people who work with IP. Hitachi Chemical Co., Ltd. places particular emphasis on IP that is useful to business and has created a virtuous cycle for enhancing IP that is useful to its business and for making use of IP in its activities by establishing an IP strategy for using IP to support the business, discussing the tactics needed to execute the strategy, and working through a process of trial (execution) and experience (successful and unsuccessful initiatives) that is then used as feedback for subsequent IP management. Through these activities, the company has fostered a culture of actively investigating IP use in its operational departments so that the operational and IP departments are able to work more closely together.

IP STRATEGY

What is the best way to get operational departments to appreciate how IP rights have benefitted their business activities? While obtaining patents and other rights covering the company's own products is important, this alone is not enough to gain recognition for their benefits. At Hitachi Chemical, it is in many cases only when the exclusive rights (right to prevent patent

infringement) conferred by patents or other rights are exercised with respect to competitors to maintain the superiority of Hitachi's products and technologies that people appreciate how IP rights have benefitted their business activities.

Specifically, this first means increasing, if only by a small amount, the number of patents relating to the superiority of the company's products and technologies, namely those that cover features that provide competitive superiority over competitors' products (i.e., patents that prevent competitors from copying those features).

Furthermore, Hitachi Chemical uses the patents it has acquired for promotional purposes in its public relations. This is a way to promote the superiority of the company's products to customers in order to encourage purchases. It is also possible to ensure that competitors are aware of and respect the company's patents. That is, to prevent copying by competitors. Although the act of filing a patent makes it public, it is difficult for third parties to identify which patents are important from among the large number of patents that are published. Accordingly, it is important to actively promulgate information about patents that relate to the superiority of the company's products and technologies to inform people of the patents' existence and have them acknowledged by customers and competitors.

In the case of Hitachi Chemical, the company sometimes issues a written notification of a patent's existence to competitors that copy the company's patented technology without authorization. Hitachi Chemical also takes a firm stance against rights infringers who fail to respect its patents, making its willingness to sue clear, and taking legal action as needed such when using the infringement of rights as a basis for applying for an injunction.

Being persistent about its pursuit of these actions not only raises the presence of Hitachi Chemical's patents and other IP rights, it also makes it clear to customers and competitors that Hitachi Chemical expects its IP to be respected. As a result, ultimately, the ideal outcome is to create an environment in which it is possible to win without fighting. That is, to create a business environment in which competitors respect Hitachi Chemical's IP rights and instances of copying do not occur, without Hitachi Chemical itself exercising the exclusive rights conferred by its IP.

Amid the current ongoing trend toward globalization, competitors are increasingly overseas companies rather than Japanese companies. In emerging nations in particular, the current situation is that many companies only start thinking seriously about IP rights when they are taken to court, and it is increasingly necessary to take an active approach to enforcing company rights.

Meanwhile, to demonstrate to competitors a willingness to sue, it is necessary to have patents that will stand up in court. Primarily, this means identifying which inventions support the superiority of the company's products and technologies and are at high risk of being copied by competitors, coming up with patent claims based on the most likely ways in which copying by competitors might occur, and taking a determined approach to acquiring rights so as to obtain patents that will stand up in court with regard to things like patentability and ability to prove an infringement. It is important to take an active approach to dealing with patent examiners at the patent office based on a policy of obtaining patents that provide the desired range of rights rather than obtaining patents for the scope within which rights can be acquired, and to issue challenges when necessary to have patentability recognized even if it means going to court to dispute a judgment or decision.

There is also the question of how to identify which inventions support the superiority of the company's products and technologies and are at high risk of being copied by competitors. Hitachi Chemical operates

on a business-to-business (B-to-B) model. That is, its business model involves offering customers new materials and components (or ways of using them) that solve their operational troubles (problems) based on their requirements*¹. There are numerous cases in which inventions that support the superiority of the company's products and technologies and that are at high risk of being copied by competitors are present in their marketing to customers and the associated lead-up processes, but which are not recognized as inventions and therefore get overlooked. Getting the research and development staff to identify these inventions is an important task for the IP staff whose job it is to apply for patents and acquire rights. The activities of the IP staff at Hitachi Chemical are not limited only to inventions relating to materials and components marketed by the company, they are also working hard to establish an all-encompassing network of patents by striving to identify a broad scope of inventions, from raw materials to the ways in which materials and components are used, and the products in which they are used.

There is frequent talk in the IP world about a shift from patent quantity to patent quality and about improving invention quality. Instead of judging the quality of an invention by such criteria as how technically advanced the invention is or the thickness of the patent application documents, Hitachi Chemical assesses quality based on the extent to which a patent covers the superiority of the company's products and technologies, the risk of copying by competitors, and the extent to which it serves as an obstacle to the copying of those superior features by competitors. This type of assessment is only possible by having an understanding of the developments being undertaken by competitors and of the details of their products. Furthermore, assessments change over time. The IP staff in charge of applying for patents and acquiring rights at Hitachi Chemical communicate closely with the operational and research and development departments to obtain information about the development trends and products of competitors, etc., and use this information as a basis for continuously revising their assessment of inventions and adjusting the level (priority) of efforts put into acquiring rights.

*1 Since 2000, Hitachi Chemical has adopted its Material System Solution (MSS) business model for the marketing and supplying to customers of the best possible materials, services, and solutions to meet their needs in the form of a series of systems. Hitachi Chemical has also, since mid-2000, adopted the Working On Wonders business model whereby it has delivered "wonders" that exceed society's and customers' expectations by taking on the challenge of venturing into unknown territory and creating new value that goes beyond chemistry.

AGGRESSIVE TACTICS

Patent rights are based on exclusivity, and monopoly rights are not conferred automatically. Accordingly, using patents to protect a business requires that active steps be taken to obtain patents that will stand up in court and to make use of those patents. This section describes the associated tactics.

Obtaining Patents that will Stand up in Court Training

The rights that patents confer are not entirely reliable in the sense that they can still be rendered invalid by the presentation of new evidence of prior art, even after they have been registered. Accordingly, the need to prepare specification documents carefully and to counter any basis on which the patent might be rejected or decreed invalid means that the skills of the IP staff responsible for preparing specifications and acquiring rights play an important role in obtaining patents that will stand up in court. This means it is essential that IP staff hone their skills by undergoing training to improve their capabilities.

To this end, Hitachi Chemical is proceeding with the following four initiatives.

- (1) Conduct working group activities within the IP department to collate a manual aimed at improving the quality of specification documents and make it available for use.
- (2) Review and improve the skills of IP staff by having a committee of three examiners conduct half-yearly performance reviews to assess their ability to prepare specification documents.
- (3) Share experiences by holding half-yearly case study review meetings at which IP staff give presentations on successful and unsuccessful cases.
- (4) When exercising patent rights, have IP staff sit in on patent negotiations with other parties to get first-hand experience of the other party's counter-arguments in response to presentations by Hitachi Chemical asserting patent infringements, patent validity, and so on, so that staff can benefit from this experience in their subsequent work when preparing specification documents or acquiring rights.

In addition to IP staff, Hitachi Chemical also provides IP training to research and development departments and sales and operations departments to prevent IP-related problems and to share knowledge about how to make use of IP in business. This consists of the following five training programs.

- (1) IP training for new recruits

This training is given to new recruits when they are first hired and after they have been with the company for one year, and focuses on teaching them about the advantages and risks of IP.

- (2) Patent courses

Separate courses cover fundamentals and practice, focusing on teaching participants about the preparation of specification documents, procedures for acquiring rights, and how to exercise rights.

- (3) Patent search course

This course focuses on improving knowledge of database searching so that people can conduct their own patent searches.

- (4) Business course

Targeted at research and development staff who visit customers, this course focuses on encouraging understanding of the points to keep in mind regarding IP and what to do about them.

- (5) Training for sales and operational departments

This course focuses on encouraging understanding of IP problems in sales and marketing, and what to do about them.

Patenting in Accordance with Business Phases

IP staff are assigned to specific technologies and products, and they go about patenting work in their respective areas depending on the business phase.

- (1) The early development of new technologies and products is called "flare/flair activity" and involves holding invention review meetings and making applications in a consolidated manner. To ensure that the publication of initial patent applications by Hitachi Chemical does not obstruct the subsequent acquisition of rights for applications relating to improvements, an effort is made to make a consolidated application prior to the initial application being published. It is up to the knowledge of the IP staff to determine which inventions to select as "flare/flair" themes, with reviews being conducted every six months.

- (2) When plans for commercialization are formulated, work starts on patent portfolio management (PPM) by collating previous applications that relate to the same field. An effort is made to avoid omissions when issuing applications for patents that cover improvements, and, in the case of overseas patents, to create a network of patents in which the claims made in each country are the same. An emphasis is also placed on establishing substantive claims and acquiring rights.

- (3) The need to exercise rights becomes evident when competitors start to release products. As the company with respect to which the rights are to be exercised also

becomes clear, the “five fighting patents” (5FP) phase is initiated. This phase involves identifying which patents, among those for which applications have been made, are able to be exercised with respect to the competitor, and finding at least five actionable patents.

Use of IP to Protect Superiority of Hitachi Chemical Products and Technologies News Releases and Informing Customers about Patents

Hitachi Chemical uses news releases to announce the acquisition of core patents, the establishment of patent networks, suing for patent infringement, and other such developments that relate to important products. Hitachi Chemical does this to inform customers and the wider industry about its patents and its stance on IP, with the expectation that it will help prevent IP disputes while also promoting the technical capabilities of its products.

Issuing Warnings and Lawsuits when Necessary

Hitachi Chemical issues written notices (including warning notices) of the existence of patents to competitors that copy its patented technology. However, because this has little effect on its own, it is important to undertake patent negotiations regarding patent validity and infringements in consultation with the other party, and this frequently involves working with the other party to find ways to resolve the issue.

In cases where there is no hope of holding discussions to resolve the issue, Hitachi Chemical believes that a decision needs to be made to proceed with a lawsuit without hesitation. Winning a case that seeks to invalidate Hitachi Chemical patents makes customers and competitors aware of the patents. And, because this highlights to customers that choosing to use products that infringe on IP rights carries a genuine risk of supply interruptions, it helps to enhance Hitachi Chemical’s IP brand.

An additional benefit is that the experience gained from seeing how the other party defends a lawsuit enhances the ability to respond when Hitachi Chemical itself is the subject of an exercise of rights by another company.

Even in cases where negotiations with the other party leads to seeking a resolution based on licensing, rather than offering comprehensive licensing, it is important to protect the superiority of Hitachi Chemical products to a certain extent by, for example, stipulating the specific patents to which license is being granted, the specific applications where they may be used, and the scope of composition or

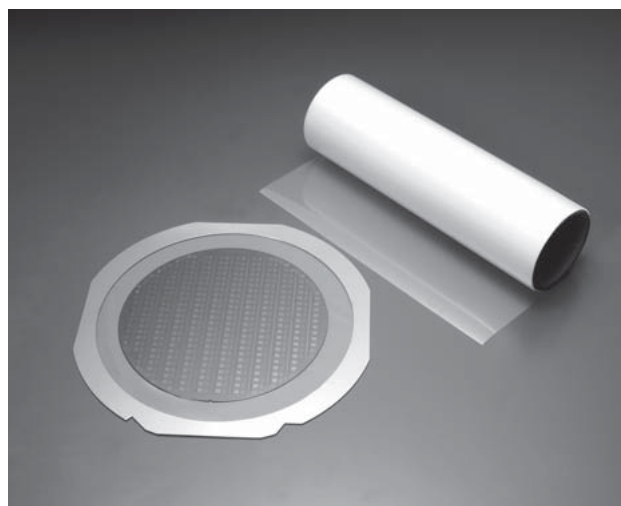
structure. Furthermore, it is not necessary to reject a settlement when taking on a lawsuit, and a settlement is desirable if it is beneficial to Hitachi Chemical. It is also common for internal dissent to be raised when halting legal proceedings that are already in progress. However, because the timing and content of a settlement are important, persuading others in the company to avoid missing the right timing is another important task for the IP department.

CONTRIBUTION OF IP TO BUSINESS

This section uses an example involving dicing-die attach film (DDF) to explain the contribution that IP management makes to business.

DDF

DDF is made by successively laminating die attach film (DAF) and dicing film (DCF) on a release liner, and is precut into a circular shape the same size as a silicon wafer (see Fig. 1). When used, the precut DDF is first peeled off of the release liner and the DAF side is affixed to the underside of the silicon wafer on which the semiconductor circuit has been formed. Next, after using a dicer on the silicon wafer side to dice it into semiconductor chips, the DCF side is expanded through exposure to ultraviolet (UV) light, and the semiconductor chips are picked up and mounted on the semiconductor package substrate (see Fig. 2).



DDF: dicing-die attach film DAF: die attach film DCF: dicing film

Fig. 1—DDF.

DDF is made by successively laminating DAF and DCF on a release liner, and is precut into a circular shape the same size as a silicon wafer.

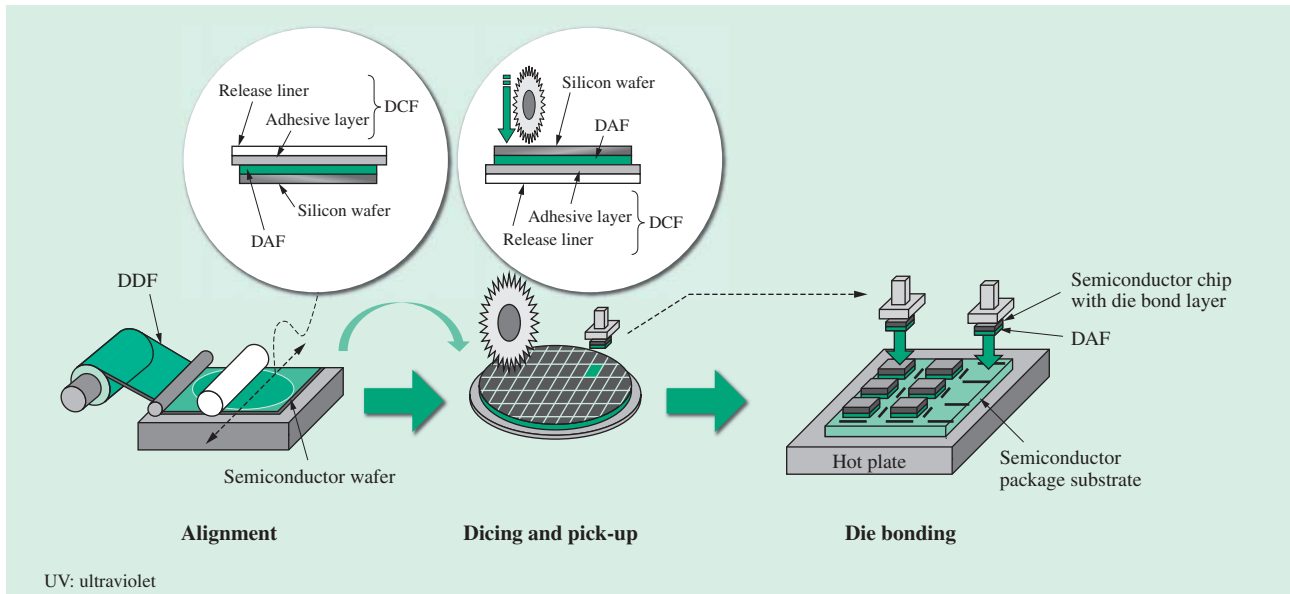


Fig. 2—Process for Using DDF.

Precut DDF is peeled off from the release liner and the DAF side is affixed to the underside of the silicon wafer on which the semiconductor circuit has been formed. Next, after the dicer is used on the silicon wafer side to dice it into semiconductor chips, the DCF side is expanded through exposure to UV light, and the semiconductor chips are picked up and mounted on the semiconductor package substrate.

In this way, DAF is used between the semiconductor chip and semiconductor package substrate, and also between semiconductor chips. The semiconductor device is then completed by performing wire bonding (whereby gold wire is used to connect the semiconductor chip circuits to the terminals on the semiconductor package substrate) and sealing in encapsulating mold compounds (see Fig. 3).

The method used in the past was to affix DCF to the underside of the silicon wafer and use the dicer from the wafer side to dice it into semiconductor chips, after which the DCF side was expanded through exposure

to UV light and the semiconductor chips picked up and mounted on a semiconductor package substrate coated with adhesive and adhesive film (see Fig. 4).

IP Activity for DDF

Because DDF is supplied and stored with the DAF and DCF in contact with each other, a method is needed to prevent the resins in the DAF and DCF from mixing during the time between manufacture and use. Also, DDF is a functional product in the sense that it needs to demonstrate the appropriate functions at the appropriate times. That is, while it is necessary to prevent delamination of the DAF and DCF when peeling the DDF off of the release liner, the DAF and DCF are peeled apart when picking up chips after dicing and the DAF must retain its function as an adhesive film.

The approach that Hitachi Chemical has adopted for DDF has been to supply total solutions that extend from upstream to downstream processes, and it has obtained patents that cover its materials and all stages of the manufacturing process, encompassing film formation, precutting, affixing to silicon wafers, dicing, and pickup and mounting on the semiconductor package substrate (see Fig. 5).

In particular, improvements and modifications intended to enhance convenience and boost productivity when the product is used by the

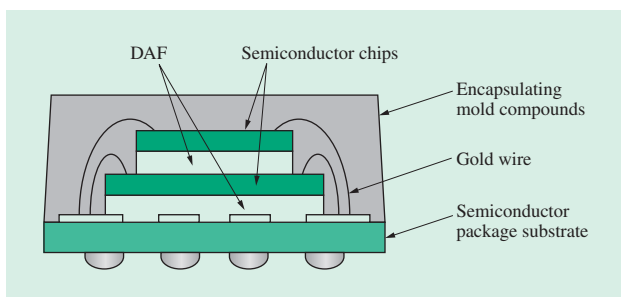


Fig. 3—Cross-section of Semiconductor Device.

DAF is used between the semiconductor chip and semiconductor package substrate and also between semiconductor chips. Wire bonding is then performed to connect the semiconductor chip circuits to the terminals on the semiconductor package substrate and the package is sealed in encapsulating mold compounds.

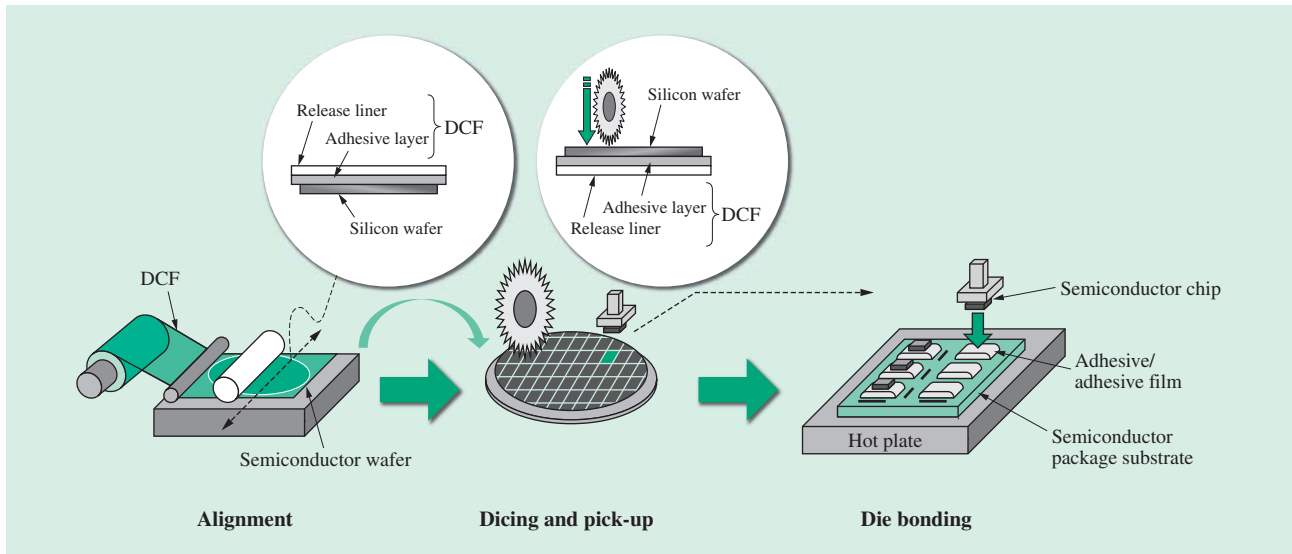


Fig. 4—Previous Method.

DCF was affixed to the underside of the silicon wafer and the dicer was used from the wafer side to dice it into semiconductor chips, after which the DCF side was expanded through exposure to UV light and the semiconductor chips picked up and mounted on a semiconductor package substrate coated with adhesive and adhesive film.

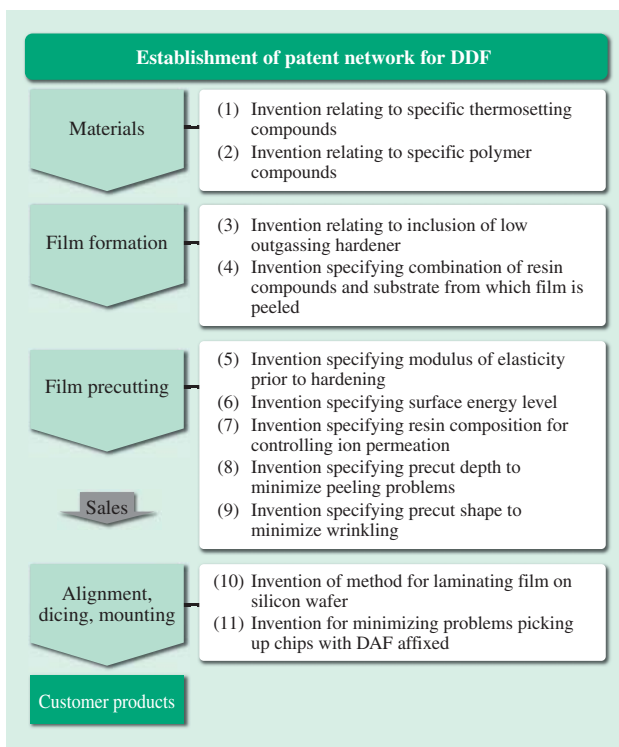


Fig. 5—Technical Flowchart of Invention Identification. Patent applications are made for inventions at each stage, primarily in Japan, USA, South Korea, China, and Taiwan to acquire rights in each country or region.

customer serve as prompts for patent applications by identifying at an early stage the needs (problems) of the customer, including any troubles they have, and undertaking various investigations into optimal

solutions to these problems based on the company’s accumulated technical know-how. Furthermore, Hitachi Chemical has sought to expand its patent network by undertaking invention identification, including by considering which inventions are at the greatest risk of being copied by competitors, and by making a variety of patent applications.

Also, IP staff have been building up a network of patents to use against competitors by visiting sales and development departments to obtain information about competitors’ development trends and product details, and through measures such as augmenting or splitting applications based on this information.

Hitachi Chemical dose not just hold the patent network acquired through this activity as a defensive measure or use it as a means of collecting royalties from overseas subsidiaries, it also adopts aggressive tactics to make active use of it.

Specifically, when a customer was deciding who to purchase its DDF from, Hitachi Chemical supplied them with a list of its patents that relate to the product. This was done to make the customer aware of the patents and to get the customer to query the other companies participating in the DDF product selection process about Hitachi Chemical’s patents. Because it forced competitors to respond in some way, such as by conducting an investigation or making design changes, this inquiry from the customer prevented competitors from copying and gave Hitachi Chemical a lead time advantage.

Next, Hitachi Chemical issued a news release describing the DDF patents. This was done because it anticipated that the news release would attract the attention of management at the customer's and competitors' companies. For the customer in particular, a word from its management has more effect than someone from Hitachi Chemical explaining the situation to the staff at its company. That is, it was anticipated that management at the customer's company would query Hitachi Chemical's competitors about its patents. Specifically, Hitachi Chemical purchased space in a Taiwanese trade newspaper to make sure that the customer in that country was aware of Hitachi Chemical's Taiwanese patents. In this case, the day of the week on which the notice was published was chosen by checking with the newspaper as to when there would be a high probability that management personal working in the industry would see it. A Taiwanese patent for DDF, which has a characteristic

shape, was chosen to ensure that management would be able to understand the characteristics of Hitachi Chemical's patent, and a notice regarding this patent was published in the newspaper (see Fig. 6).

The effectiveness of this tactic was subsequently demonstrated when a negotiation inquiry regarding this Taiwanese patent was received from a company, leading to an agreement on terms and the signing of a licensing contract. After the contract was signed, the company concerned issued a news release stating that the patent issue had been resolved.

Furthermore, studies were also conducted to analyze a competitor's product that had appeared on the market and to assess whether the company had been copying. In cases where it is identified that a competitor's product lies within the technical scope of a Hitachi Chemical patent, a warning notice or similar is issued to inform it of the patent and discussions are held to request that it be respected. While in some cases it has been possible to reach a resolution through measures such as licensing, Hitachi Chemical has taken a firm stand in cases where a negotiated settlement is unlikely and has not hesitated to seek a legal resolution in order to prevent those companies that do have a licensing arrangement from being put at a disadvantage. For example, Hitachi Chemical filed a lawsuit based on the Taiwanese patent for DDF against a South Korean company in an IP court in Taipei, seeking a halt to sales in Taiwan and compensation for losses*2.

When suing overseas companies, the decision on where to file the suit involves a broad consideration of factors such as where the competitor's manufacturing and sales operations are located, which countries have a greater or a lesser tendency to rule patents invalid, trends in court judgments, ease of third-party expert testimony, and ease of demonstrating proof. Filing a lawsuit in a country other than the defendant's home country (an "away suit") is also a consideration. This is because filing in a different country places pressure on the defendant in terms of both the progress and cost of the case.

DDF from Hitachi Chemical has established a strong presence in the market and has maintained its competitiveness thanks to this aggressive business support on the patent front coinciding in a timely manner with other factors, including developments to improve the company's products and the fall in the yen.

關於 DAF 薄膜
台灣專利第 303454 號之敬告聲明

一、 緣本公司多年來致力於 Die Attach Film (下稱 DAF 薄膜) 之研究，早於 1993 年，即已領先其他公司開發出堪稱為劃時代的 DAF 薄膜 (DF 系列、FH 系列)，並成功上市。

二、 本公司關於 DAF 薄膜，並取得台灣專利第 303454 號專利權。該發明係關於預先切斷深度之發明 (請參照下圖)，其可在 DAF 薄膜貼合時減少貼合上之錯誤(※)，並提高生產效率。

※ 近年在薄型化晶圓之趨勢下，一旦發生貼合錯誤，即很難將 DAF 薄膜由晶圓加以撕離，並可能會損及昂貴之晶圓。

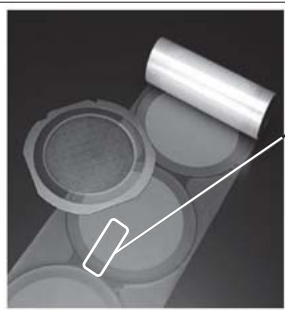
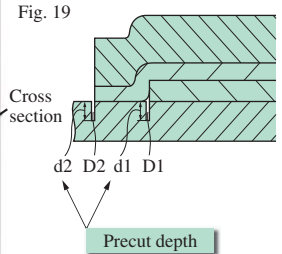


Fig. 19



三、 這幾年來隨著電子技術之發展，半導體用材料之 DAF 薄膜受到全世界之高度重視，此項產品漸有疑似侵權產品出現，對本公司之權益亦造成莫大損害！本公司茲鄭重聲明，如有未經本公司同意而貿然製造、銷售涉及侵權之產品，必定採取所有必要法律措施，以維護本公司之智慧財產權及客戶之合

Fig. 6—Notice of Hitachi Chemical Patent in Taiwanese Newspaper.

Hitachi Chemical published a notice about its patent in a newspaper to ensure that the management at the customer's company would understand the nature of its patent.

*2 By mutual agreement between the two parties, Hitachi Chemical subsequently withdrew its patent infringement lawsuit and the South Korean company withdrew its motions to have Hitachi Chemical patents ruled invalid.

CONCLUSIONS

Hitachi Chemical started working on its IP strategy in 2000 and has since built up a record of modest successes one step at a time through a process of trial and error. As a result, this has led to active management of IP, with research and development departments and sales and operational departments being among those who have gained an appreciation of the impact of IP on business and an understanding of the use of IP in business. While Hitachi Chemical is still working to create a business environment in which customers and competitors respect its IP, this takes a long time, and it is important to continue persistently in the future with measures for increasing awareness.

While the IP strategy and tactics described in this article and the example of a B-to-B business model relate to the specific business conditions of Hitachi Chemical, which involves investing in research and development to supply materials and components that will invoke wonder in customers, the authors hope they will also be of some use to IP management at companies in other industries.

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