

## The Outcome of Support Program for Foreign Direct Investment (FDI) Investigation of Small and Medium-sized Enterprises 2013

### NIPPON PRECISION JEWEL INDUSTRY CO., LTD.

#### Company profile

■Address	100 Ashiya, Shin-onsen-cho, Mikata-gun
■President & CEO	Kazushi Nakagawa
■Industry	Manufacturer of fabricated metal products
■Business	Manufacturing and sales of stylus, gauge contacts, diamond bars, lens cleaners
■Sales	469.55 million yen
■Employees	55
■URL	<a href="http://www.jico.co.jp/">http://www.jico.co.jp/</a>
■Targeted countries	Germany and other EU member countries



#### ■Title

Developing Heat Conductive Material Based on the Diamond Processing Technology and Investigating the Possibility of Expansion into the Western Market

#### ■Business overview

Our business was founded in 1873 specializing in the manufacturing of sewing needles. From 1949, the company started to manufacture and sell steel needles for gramophones. We established the present company in 1959. Our headquarters and plant are located in a town facing the Sea of Japan, about 200 kilometers from Osaka and Kobe. When our business was first founded, people had to pass a number of ridges on the road to reach destinations. They also had to cope with heavy snow in winter. Despite all obstacles, our predecessors used their struggles as a springboard and sublimed them to the spirit of self-reliance and independence: to design, manufacture, and repair all production equipment and tools in-house. This mindset has been passed down over generations. Today, we constantly ask ourselves what it means to be original. Our company aims to pursue “*monozukuri* (excellent production) flawlessly delivering our heart and care to detail in a similar manner to ‘*omotenashi*’ (hospitality and service).” This is our “made in Japan” approach.

In 1966, we developed phonograph needles using diamond and since then, we have accumulated technologies in the field of diamond processing. Based on this, we have carried out a number of new technological developments including diamond bars (polishing equipment) that are manufactured by



electroplating fine-grained diamond to stainless. Our latest achievement is the development of heat conductive material. When we participated in a trade show in Europe, we learned that diamond is an excellent conductor of heat. So, we decided to use diamond and commercialize it as heat conductive material for heat-radiating machines and electric parts. Currently, heat sinks are widely used. They are designed in convex-concave or bellow shapes and radiate heat by expanding the surface area. The

disadvantage of heat sinks is that it is difficult to downsize them. In contrast, we thought that it would be possible to solve this space issue by directly mixing diamond in metal that covers heat-radiating parts. Accordingly, we are continuing our research and are striving to develop our business with creative

minds.

### ■ Motivation and aim of overseas development (Before Feasibility Study (F/S))

Our company has carried out research with support from Hyogo. In 2012, our project “the study of producing highly efficient heat dissipating composite material with diamond particles using a plating method,” was selected for the Hyogo COE (Center of Excellence) Promotion Project. While also receiving support from the Hyogo Prefectural Institute of Technology, we conducted the research. We used a heat-measuring instrument to evaluate the heat transfer level by utilizing the Hyogo Economic Development Center’s equipment leasing system.

As a result of the study, by using a wet plating method, we successfully developed a composite material in which diamond particles are dispersed and mixed with silver, copper, and nickel. The diamond material used for the study was residue generated from the polishing process of diamond at our company. The method of producing functionally graded material (FGM) was established in which the density of diamond particles is greater near the metal surface, increasing its capacity for additional processing. At the same time, this leads to an effective use of diamond. We have already obtained a patent in Japan and China and also submitted a patent application in the European Union (EU).

To realize the applications of this heat conductive material for high-heat radiating industrial equipment and train motors, we planned to spread the product in western countries first. By approaching to western companies that appreciate a quality product and are willing to immediately start a deal though the product has no track record, we would be able to quickly commercialize it. Subsequently, this will help us reimport our product back to Japan.

This is the reason why we presented our technology at the International Union for Surface Finishing (IUSF) held in Milan, Italy in November 2012. In April 2013, we visited the HANNOVER MESSE, the world’s leading trade show for industrial technology, held in Hanover, Germany to find companies that we can reach license agreements.



### ■ Objective, contents, and outcome of the Feasibility Study (F/S)

In order to present the outcome of our research, “the study of producing highly efficient heat dissipating composite material with diamond particles using a plating method,” we exhibited at “COMPOSITES EUROPE 2013” and “HYBRID Expo” in Stuttgart, Germany in September by utilizing the overseas development support program for SMEs run by the Hyogo Economic Development Center. We visited interested companies and presented a new material machine in order to gauge the possibility for outsourced production. We found that

reaching exclusive agreement for manufacturing and technological support seemed the most probable approach. Also, as we gathered information about the product trends at these trade shows, it became clear that there are no competitors of our product.

In October at the society of new materials held in Montreal, Canada, we showcased a movie of our special machine and received excellent response. Driven by the positive feedback, we exhibited at the International Conference on New Diamond and Nano Carbons (NDNC) held in Shizuoka, Japan.



### ■ **Future prospects**

Through the F/S support program provided by the Hyogo Economic Development Center (Hyogo International Business Center), we concluded that we should narrow down our market and strategically focus on Europe, Germany in particular. We also learned that the status of patent acquisition would determine whether we could reach exclusive agreements for manufacturing and technological support. If we could successfully obtain a patent in Europe, it will eventually lead us to develop a production base. Then, consequently, it will be possible to build a business model to generate profits including intellectual properties.

### ■ **Comments from overseas business development promoter (Yasushi Nagao)**

This is a company with a high level of technology, striving in the countryside far from big cities. By utilizing our center's F/S program, they have worked towards patent acquisition in Europe aiming to reach a technological support agreement in Germany. I believe that this case serves as an example of global development. If a company has excellent technology, they can develop business regardless of the location. I will continue to provide support and also give advice such as taking advantage of the representative office of Hyogo Prefecture in Paris to prepare for a trade show there and receiving "support for application to a foreign patent and a trademark" upon patent acquisition.