

November 4, 2014

Tanaka Precious Metals
Tanaka Holdings Co., Ltd.

Tanaka Kikinzoku Kogyo to Commence Provision of Spark Plug Electrode Platinum Tip Able to Halve Material Costs

Platinum that had previously been used too much can be saved using clad technology as a highly durable material for electrode

Tanaka Holdings Co., Ltd. (Head office: Chiyoda-ku, Tokyo; President & CEO: President Akira Tanae) announced today that Tanaka Kikinzoku Kogyo K.K. (Head office: Chiyoda-ku, Tokyo; President & CEO: President Akira Tanae), which operates the Tanaka Precious Metals Group's manufacturing business, will commence the provision of evaluation samples of tips made from platinum alloy and nickel clad (bonding of dissimilar metals) (the "Product") as side electrodes used on spark plugs from January 2015. The company also plans to have an exhibit at the electronica 2014 trade show to be held in Munich, Germany from November 11 (Tue) until 14 (Fri), 2014.

Platinum alloy tips are utilized to extend the useful life of electrodes for discharging electric charges from spark plugs used in automotive engines. Conventional tips used solid platinum alloy throughout the entire tip, but the Product only utilizes platinum alloy in the part contributing to the electric discharge through the use of clad technology; the portion that does not contribute to the electric discharge is composed of nickel, the same material used in the electrode base. This enables a 50% material cost reduction while maintaining similar performance as existing products.

^{(*)1}

■ Issues concerning the improvement of combustion efficiency of automotive engines

In current automotive development, it is becoming common to use direct-injection turbo engines^{(*)2} even in gasoline vehicles due to improvement of combustion efficiency becoming an important issue that needs to be addressed in respond to environmental regulations such as regulation of carbon dioxide emissions. In such designs, spark plugs need to be made more durable due to the increased voltage requirements. In general, increasing the electrode size can be used as a means of improving the durability of spark plugs, but due to the increase amount of platinum used, the increase in material costs is an obstacle.

In such conditions, electrode durability of long-life spark plugs is improved by using platinum alloy tips on the side electrodes. However, when platinum alloy is welded to the electrode base, a thick alloy layer of several hundred micrometers is formed from the nickel of the base and the platinum alloy at the bonded interface; there is excess, unwanted platinum in the weld which ultimately does not contribute to the overall electrical discharge.

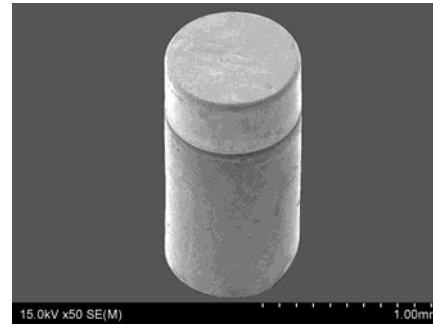
■ Product features

The Product is a clad tip using flat solid-phase bonding of platinum alloy and nickel, and a thin diffusion layer of approximately 20 to 30 micrometers is formed in advance to ensure the reliability of the bond. Customers weld the nickel surface of the product on the base when attaching the Product to a side electrode. Because it is a nickel-nickel weld, there is no unnecessary platinum in the weld.

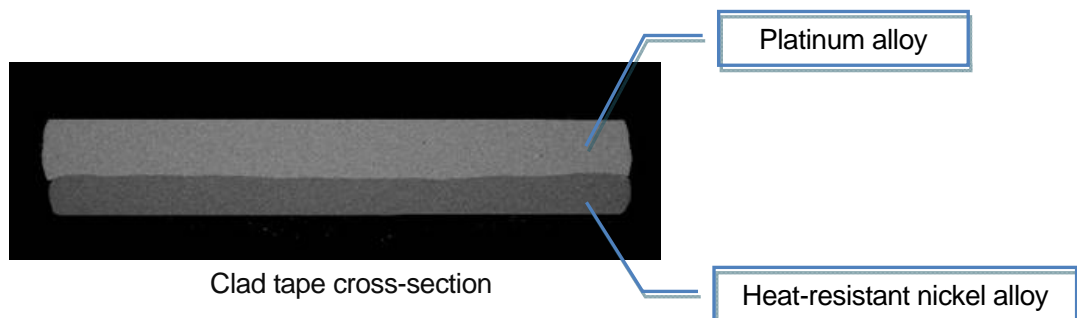
To develop the Product, Tanaka Kikinokogyo has conducted joint research from 2010 on the bonding conditions such as the bonding process window and bonding monitor factors on the production line with Professor Kouzou Fujimoto and Associate Professor Shinji Fukumoto of the Division of Materials and Manufacturing Science at Osaka University to confirm the practical viability of the bonding method.

Furthermore, it is also possible to provide clad material in tape form as a variation of the Product, responding to the product shapes and dimensions matching customers' plug designs and manufacturing processes.

Tanaka Kikinokogyo is aiming for annual sales of approximately JPY 2 billion with the Product.



The newly developed platinum tip for electrodes



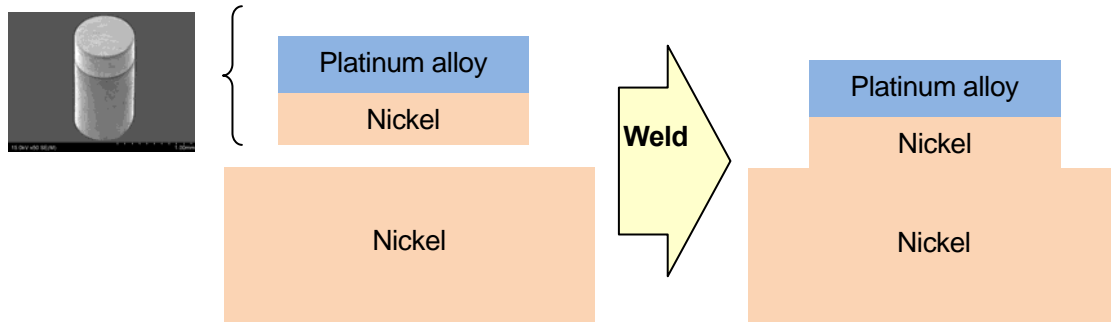
*1 The amount of platinum used in the tip is selected by the customer, but Tanaka Kikinokogyo has conducted experiments confirming that the same performance as solid platinum alloy can be obtained with the Product even when the material costs are reduced by 50%.

*2 A direct-injection turbo engine is an engine design that has become mainstream mainly in Europe in recent years as a so-called "downsizing turbo" providing high output with little engine displacement. Even in compact engines with little engine displacement, high output can be obtained by using a turbo to send compressed air to the engine and directly injecting gasoline into the cylinders.

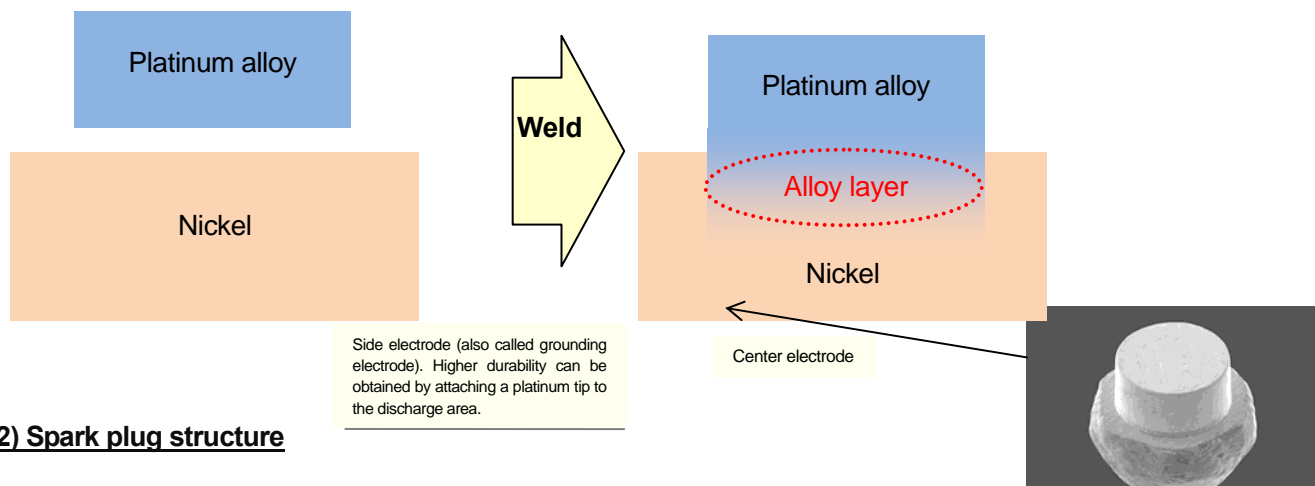
<Reference Materials>

(1) Conceptual diagram of welding a platinum alloy tip to the base of a side electrode

- When the product is used, there is no unnecessary platinum in the weld.



- In contrast, when solid platinum alloy is used, excess platinum forms in the weld.



(2) Spark plug structure

High voltage of tens of thousands of volts is applied between the grounding electrode and the center electrode to cause an air discharge between the electrodes and generate a spark.

The Product processed into the shape matching the customer's requirements is attached to the side electrode.

■**Tanaka Holdings Co., Ltd. (Holding company of Tanaka Precious Metals)**

Headquarters: 22F, Tokyo Building, 2-7-3 Marunouchi, Chiyoda-ku, Tokyo

Representative: Akira Tanae, President & CEO

Founded: 1885

Incorporated: 1918

Capital: 500 million yen

Employees in consolidated group: 3,562 (FY2013)

Net sales of consolidated group: 967.6 billion yen (FY2013)

Main businesses of the group:

Manufacture, sales, import and export of precious metals (platinum, gold, silver, and others) and various types of industrial precious metals products. Recycling and refining of precious metals.

Website: <http://www.tanaka.co.jp/english> (Tanaka Precious Metals),

<http://pro.tanaka.co.jp/en> (Industrial products)

■**Tanaka Kikinzoku Kogyo K.K.**

Headquarters: 22F, Tokyo Building, 2-7-3 Marunouchi, Chiyoda-ku, Tokyo

Representative: Akira Tanae, President & CEO

Founded: 1885

Incorporated: 1918

Capital: 500 million yen

Employees: 1,430 (FY2013)

Sales: 929 billion 60 million yen (FY2013)

Main businesses:

Manufacture, sales, import and export of precious metals (platinum, gold, silver, and others) and various types of industrial precious metals products. Recycling and refining of precious metals.

Website: <http://pro.tanaka.co.jp/en>

<About the Tanaka Precious Metals>

Established in 1885, the Tanaka Precious Metals has built a diversified range of business activities focused on the use of precious metals. On April 1, 2010, the group was reorganized with Tanaka Holdings Co., Ltd. as the holding company (parent company) of the Tanaka Precious Metals. In addition to strengthening corporate governance, the company aims to improve overall service to customers by ensuring efficient management and dynamic execution of operations. Tanaka Precious Metals is committed, as a specialist corporate entity, to providing a diverse range of products through cooperation among group companies.

Tanaka Precious Metals is in the top class in Japan in terms of the volume of precious metal handled, and for many years the group has developed and stably supplied industrial precious metals, in addition to providing accessories and savings commodities utilizing precious metals. As precious metal professionals, the Group will continue to contribute to enriching people's lives in the future.

The eight core companies in the Tanaka Precious Metals are as follows.

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| - Tanaka Holdings Co., Ltd. (pure holding company) | - Tanaka Kikinzoku Kogyo K.K. |
| - Tanaka Kikinzoku Hanbai K.K. | - Tanaka Kikinzoku International K.K. |
| - Tanaka Denshi Kogyo K.K. | - Electroplating Engineers of Japan, Limited |
| - Tanaka Kikinzoku Jewelry K.K. | - Tanaka Kikinzoku Business Service K.K. |

<Press inquiries>

Global Sales Dept., Tanaka Kikinzoku International K.K. (TKI)

https://www.tanaka.co.jp/support/req/ks_contact_e/index.html