

# An Introduction

Edition II



Johnson Matthey

Introduction

# Setting

## General Overview



With the proper design, palladium's favorable metallurgical properties are similar to platinum and ideal

for gemstone setting. Both platinum and palladium have little or no memory as opposed to gold alloys which often causes prongs and channel walls to spring back after forming. Because of palladium's malleability and other favorable bending and forming characteristics, designs incorporating shorter and heavier prongs will hold up better during normal wear as opposed to thin prongs with tall profiles and no gallery wire supports.

Tooling required for setting palladium is similar to burrs and tools used for gold and platinum. When creating bearings for palladium, about 35 to 45% of the prong or wall thickness is typically removed. In gold, about 45 to 55% of the wall or prong thickness is removed. The thicker wall dimension used for palladium is helpful in holding its shape during normal wear. Because of palladium's malleability, the heavier beads, prongs and wall thickness are easily shaped and formed over gemstones.

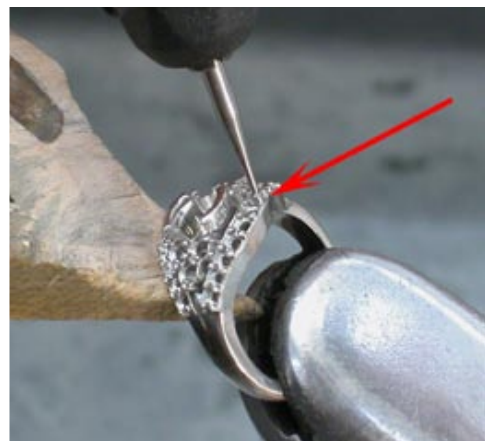
## PROJECT:

### Setting Round Brilliant Cut Gemstones in Prongs and Partial Bezel



This ring was designed using CAD jewelry design software. The customer wanted the stones set closely

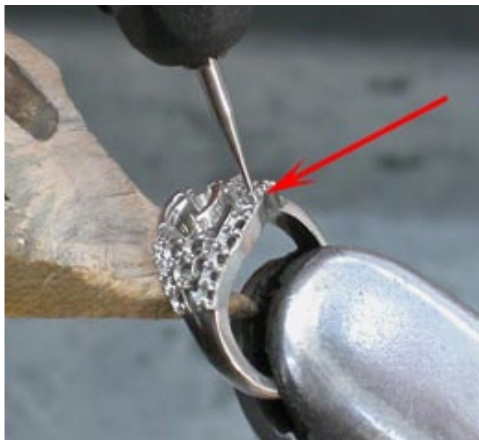
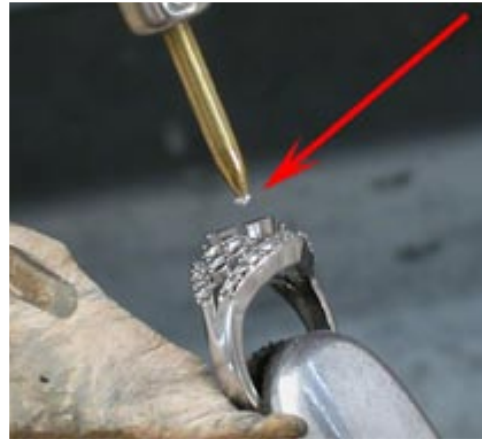
together with visible metal kept to a minimum. The 6.00 mm center gemstone is surrounded by round brilliant diamonds ranging from 1.75mm to 2.7mm. This ring design provides an excellent example for gemstone setting and working characteristics of palladium. Alloy characteristics such as malleability and overall strength provide for secure setting.



In preparation for gemstone setting, this rough casting was pre-finished then polished with gray platinum Tripoli® and then Bendick® rouge. The first gemstones to be set were

the rows of diamonds on each side of the center grouping. The small prongs were shortened slightly by filing, then rounding using a cup bur of slightly larger diameter (arrow).

**Tech Note:** Prior to polishing, the pre-finishing process included tumbling the ring for 30 minutes in a magnetic finisher with stainless steel micro pins. This process provided a semi-polish to the 950 palladium ring giving a suitable luster to the hard-to-reach areas of the mounting.



A setting burr was selected to create the bearings for the diamonds in the shared prongs (arrow). There are 6 diamonds on each side measuring exactly 1.90mm. The tungsten vanadium setting bur measured 1.80 mm. While burring the depth of the bearing, pressure was applied from side to side to slightly enlarge the bearing to accommodate the 1.90 mm diamonds.

**Tech Note:** When creating the bearings or seats in palladium jewelry items use lubrication such as oil of wintergreen, standard machine oil or burr lubricants with the setting burr. This helps to maintain the sharpness of the burr as well as easing the cutting of a precise bearing. The lubricant also reduces the friction that causes overheating.

A brass pusher was used to pick up and place the diamonds in their bearings. The brass pusher is made from 3.1mm brass brazing rod and a wooden handle. The end of the brass rod is tapered. The end should be slightly smaller than the outside diameter of the diamond being set. A thin smear of beeswax is used to make the end of the brass rod tacky enough to pick up a diamond from the pre-assigned layout and position it in its bearing.

**Tech Note:** These diamonds matched in diameter and proportions. If the diamonds are not matched, care must be taken when creating the bearings so the tables of the stones will be level and aligned when setting is complete.



After placing the diamonds in their bearings and making sure their face up orientation was consistent with the curve of the setting, a beading tool was used to seat and secure the diamonds in their bearings. Select a beading tool with a cup size slightly larger than the prong diameter to shape and form the prongs. The same procedure is used to set the 1.75mm diamonds—four on each side—using a 1.65mm setting burr and smaller beading tool.

**Tech Note:** Lightly secure the diamonds in place, pushing the prongs only part way, and working opposing points of contact. This will allow you to make final alignment adjustments as the diamonds are secured in their settings.

With the 1.90 and 1.75mm diamonds set, the diamonds immediately adjacent to the center stone were next. There are four 2.70mm diamonds and two 2.50mm diamonds to be set. For this, setting burrs slightly smaller than the stone diameter were used to create the bearings. About 20% of the prong diameter was removed during the burring process from each side of the prongs.



All 6 diamonds were seated in their bearings using a brass pusher. The prongs have been pre-shaped and as with the smaller diamonds, a beading tool was used both to secure the stones in the bearings and to shape the prong tops.



The diamonds were checked for consistent orientation and alignment of the tables to ensure that they faced up evenly before finally securing the stones in their settings.



All stones were set and the shared prongs ready for final shaping. For this step, a beading tool (cup size slightly larger than the prong diameter) was shortened and fitted into the Micro Motor Setting handpiece. The unit was set at low impact and adjusted so the foot pedal would control



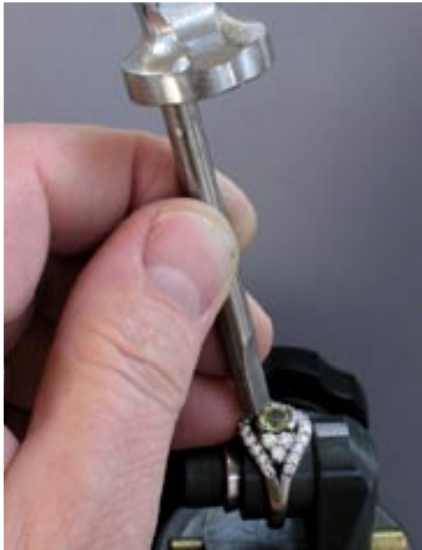
the speed of the handpiece. The beading tool was placed over individual prongs to quickly and consistently shape the prong tops and to do the final compression of the metal over the diamonds.

To create the bearing for the center stone, a 3mm 90° bearing burr was selected. The bearing was established in the model by the jewelry design software (arrow) and the goal at this point was to precisely shape that bearing. The fit of the center stone was checked throughout the burring process.



After seating the center stone, the ring was placed onto a ring holding device for setting. The central portion of the holder expands to firmly hold the ring in place for hammering. The stone was first partially set on one side of the bezel, then the other. The setting punch was placed over the midpoint of the bezel and was lightly hammered with a chasing hammer, partially bending the metal over the stone. This procedure was continued from the midpoint outward on each half of the bezel.





With the center stone secured, the ring was then placed on a steel ring mandrel. The mandrel was positioned into the bench slot created for it. A smaller setting punch and chasing hammer were used to perform the final bending of the bezel.

## PROJECT:

### Setting Cabochons in Palladium Bezels



This tourmaline and cultured freshwater pearl pendant is made in palladium and karat yellow gold.



For convenience during the setting process, the pendant was held in a thermoplastic holding compound. The compound was heated with hot water to make it pliable. When the compound cooled, it firmly held the piece for setting. The bezel was trued and fit to the center gemstone using a small inverted cone bur and a wheel bur.



With the seat prepared, the center stone was set using a micro motor with a reciprocating handpiece and a polished flat chisel point. The hammer was adjusted for light impact.

**Tech Note:** The bezel metal around the corner curves of the gemstone was lightly hammered to begin the process. Then the metal between the curves was hammered. Applying impact from the top completed the process of securing the gemstone. Bezel setting in palladium is made easy because the alloy is malleable and has no memory (does not spring back). Because little pressure was required in the setting process, risk of damage to the center stone was minimized.

After setting both cabochons, the holding compound was removed from the holding device.



The assembly with the pendant pieces was placed into hot water. After about 10 minutes, the pieces were removed.

## PROJECT:

### Setting a 5-Stone Palladium Ring<sup>8</sup>



Design by Lainie Mann<sup>1</sup>

The center stone is an aqua-colored Montana sapphire and set in 4 prongs. The pear shaped side stones are tourmalines set in a “v” prong and partial bezels. The small round brilliants are diamonds and set in the side bezels.

**Setters comments:** “I’ve been a stone setter for over 15 years specializing in all setting styles and I enjoy setting in palladium because it is a tough metal that is not hard and springy. It is malleable and workable taking forms and shapes with ease. The metal is easy to cut with standard gemstone setting burrs of all shapes and gravers. Forming the bezels, prongs and partial bezels is easy. The metal formed and shaped without springing back.”

Designer and shop owner<sup>9</sup> comments: “Designs for palladium must be considerate toward its metallurgical characteristics. Because of its desirable malleability, prongs should be heavier than when made in white gold so they will hold up and retain their shape during normal wear.”

## PROJECT:

### Bead Setting Small Diamonds in Palladium<sup>3</sup>



Design by Tom McLaughlin, Lennon's Jewelers

The top portion of these 950 palladium earrings is bead set with small round brilliant diamonds on one side. When worn, the bottom portion swivels and is bead set with small round brilliant diamonds on both sides. The two sides of the bottom portion are separated by 18-karat yellow gold spacers. The diamonds on each side of the bottom portion accent the round Tahitian cultured pearls as they swivel when worn.



The first step in the setting procedure was to cut the bearings for the small diamonds. Each diamond is secured by shared prongs. The spacing between the diamonds is minimal, so precise cutting of the prongs was essential. A 1.2mm 90 degree bearing burr was used to cut the prongs individually. The size of the burr dictates the depth of the cut into the prong, an experienced diamond and gemstone setter gauging the height of the bearing by eye on each prong.

**Tech Note:** The size of the concave cup in the beading tool is slightly larger than the top of each prong. The beading tool is placed on the top of the prong and moved in a small circular motion while applying downward pressure. 950 palladium is malleable and workable so only moderate pressure is required.



These stones were set 3 at a time. With each of 3 diamonds placed in their seats, a flat bottom graver was used to push the outside prong toward the center while applying pressure from the top, slightly bending it. This procedure provided the final security for adjacent diamonds. After all of the diamonds were set, a beading tool was used to shape the tops of each of the prongs.



PROJECT:  
Channel Setting  
in Palladium<sup>10</sup>



Design by Barney Jette,  
Barney Jette Jewelry Design<sup>10</sup>

This palladium ring features five 0.25 carat diamonds channel set around the radius of the top design element.

reciprocating hammer was used to lightly tap the metal on each side of the bearing.



The setting is inspected and another diamond seated into its bearing.



The bearings were cut individually for the diamonds using a 70 degree bearing burr.



After all of the diamonds were seated, the reciprocating hammer was used again to finally seat and secure the diamonds. Channel setting in palladium is ideal, given its strength and malleability.



The diamonds were also placed and pre-set individually, starting at the top of the ring. For pre-setting, a

## Unusual Setting Styles

Palladium's malleability, lack of spring-back (memory) and capability of being formed smoothly makes it an ideal metal for setting gemstones, including those with unusual shapes, angles and features. Given palladium's mechanical properties and assuming proper alloy selection, design, engineering, setting preparation and execution, a gemstone will not become loosened during normal wear.



Jewelry by Thomas Dailing, Image by Azad Photo

This fancy cut diamond center stone and round diamond side stones for this exclusively designed 3-stone ring is securely set by using opposing bars that conform to the diamonds outside shape.

This center stone is a rounded triangular brilliant cut. Its unique shape is securely set in opposing walls, one formed to the rounded side of the gemstone and the other cradling the pointed corner. Palladium's malleability eased the stress of fashioning the setting for this unusual style.



Jewelry by Thomas Dailing, Image by Azad Photo



Jewelry by Nina Basharova

The cabochon is securely held in this palladium ring by a full bezel. Palladium at the thickness and height of this bezel easily conforms to the shape of the stone. Hammer setting followed by use of a burnisher securely locks this gem in place.

# Credits

Johnson Matthey wishes to acknowledge the following technical experts for their input and contributions:

**1 Lainie Mann & Schuyler Mann**, Mann Design Group, Corvallis, MT: Lainie - Jewelry designs and wax modeling used for example projects, jewelry design annotations, technical research and editing. Schuyler - 3D design layout and wax model making of projects cast and used for research.

**2 Scott Kay**, Scott Kay, Inc., Teaneck, NJ: Provision of palladium jewelry images.

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**4 Stephen Adler**, Automated 3D Modeling, Rye, NH: Rapid prototype model for casting.

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**6 Steece Hermanson**, Heirloom Hand Engraving, Sumter, SC: Hand engraving project and hand engraving annotations.

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**8 Vidi Beccera**, Holman Design Group, Dallas, TX: Stone setting annotations.

**9 William Holman**, Holman Design Group, Dallas, TX: Stone setting, engraving and workmanship annotations.

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