Cost pressures affecting the manufacturing sector have been well documented in recent years. Original equipment manufacturers are continually looking to reduce costs in the supply chain, and manufacturers have had to shrink payrolls, reduce inventory, and improve quality, all while increasing productivity. There is simply no margin for error, and any rework or scrap can eat up already razor-thin profits.

Furthermore, manufacturing processes that involve brazing typically run at higher operating costs than most other processes. Labor costs are higher because brazing requires a specialized skill set with a technical background and extensive on-the-job training. Capital costs also tend to be higher since the equipment used (such as vacuum furnaces, induction heating units, metallurgical testing equipment, and fixtures) are often custom built. This equipment requires significant power consumption and the need for inert and/or fuel gases. Unstable commodity prices associated with many filler metals, especially those containing precious metals, add further pressure to material and consumable costs.

It is only natural that companies look for cost savings in commodity purchases, such as filler metals and consumables. Many companies attempt to extract further savings by purchasing filler metals in bulk or raw form, and modifying their form for uses specific to their application. However, a closer look at the true costs involved in making preformed and premixed materials in-house often reveals those savings aren’t realized.

**Bulk Wire vs. Preformed Rings**

The manufacture of tube assemblies, heat exchangers, and manifolds often involves many brazed joints and fittings. Common practice is to form a preformed ring made from braze filler metal wire to be inserted into a joint prior to brazing. This method is highly effective because it controls the amount of brazing filler metal used, reduces setup time, and produces consistent results. However, many companies make the mistake of forming their own rings out of bulk spooled braze wire. A common practice involves creating a mandrel or tool that’s machined to the desired inside dimensions of the finished ring, and setting it up on a lathe. The bulk wire is coiled onto the mandrel at a low speed until the desired length of coiled wire is formed. The machine operator then performs a cut along the length of the mandrel to produce the individual split wire rings. At final assembly of the ring onto the detail, an operator often has to straighten or flatten the ring, due to the offset produced during the coiling operation.

Let’s now take a look at the internal work involved to produce the rings. First, a valuable piece of machinery, such as a

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**Consider all the cost factors involved when deciding whether to make your own braze rings and pastes or purchase them ready-made**

BY JAY KAPUR

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JAY KAPUR (jkapur@aimtek.com) is general manager, Aimtek, Inc., Auburn, Mass.
lathe, is tied up in order to perform the process. In addition, a skilled machinist is needed to set up the tooling and operate the equipment. Undoubtedly, some scrap is also generated in the setup process, as the beginning and end stubs of the wire can’t be used. Finally, the assembly operator’s throughput is affected when he or she has to stop to straighten each ring for it to properly fit onto the joint. Conservatively speaking, it takes one to two hours of direct labor and shop overhead to make a small batch of 100 rings. In addition, the scrap can add up in value, especially when dealing with precious metal alloys containing gold, silver, or palladium.

Filler metal suppliers use an entirely different method to produce braze rings. Specialized, automated equipment is used to form rings individually, precisely, and at high speeds. The rings are formed exactly to the required dimensions with minimal or no offset, so that no further straightening is required. Depending on the dimensions, thousands of rings can be produced in an hour. In addition, most suppliers do not add scrap costs to the price of the finished product. The end user can control inventory and handling costs better by issuing only the amount of rings needed for each job — Fig. 1. This becomes a critical factor when working with expensive alloys. While the price of a finished ring varies depending on size, alloy, and quantity, the premium paid to purchase finished rings is relatively small compared to purchasing bulk wire.

**Powder vs. Premixed Paste**

There are many applications where joint clearances and part configuration require the use of a braze paste as a filler material. The paste (or slurry) is created by mixing an alloyed powder with a suitable binder, which burns off in the brazing process. The mixture ratios can vary, based on the viscosity or results desired. Sometimes, flux can be added to the mixture, depending on the application. The paste is often dispensed out of syringes at a controlled rate using simple dispensing equipment and different sized applicators. Many companies choose to mix their own paste and fill syringes as needed; however, this can cause problems and added costs if not done properly.

Mixing is typically done manually in a bowl or container. The mixture must then be transferred into the syringes for use with the dispensing equipment. Air pockets can be formed within the syringe during the transfer process, which can cause splatter upon dispensing. The splatter often results in braze filler ending up in unwanted areas and can cause rework. There can also be a significant amount of waste created during the mixing process, as residual paste ends up in the bowl, on the mixing tools, and in the syringes. Again, this waste can be costly when working with precious metal alloys, such as gold, silver, and palladium. Scrap and waste rates of up to 10% are not uncommon. Most binders and flux have a shelf life, so control of expiration dates is needed for all of the components and the finished paste product.

As with the production of braze rings, filler metal suppliers use different methods and techniques to mix and fill braze paste syringes. The automatic mixing and filling equipment that is used ensures smooth, consistent mixtures with minimal air pockets — Fig. 2. Most importantly, customers only pay for the net weight of paste purchased; the scrap and waste is the responsibility of the supplier. The finished paste is the only shelf life product to control. Once all of the true costs are evaluated — labor, overhead, waste, and inventory control — it likely will prove to be more cost effective to purchase finished paste product than to mix it yourself.

**Summary**

It is important to evaluate all factors when determining how to purchase filler materials. Material cost is an important factor, but labor utilization, overhead, inventory control, and scrap minimization are all equally important. Work closely with your supplier to determine the most cost-effective solutions available, and maximize the use of each other’s core competencies.