

# Making Purchase Decisions on Capital Equipment

## Remanufactured Versus Used

### Fully Remanufactured Equipment: Used in Name Only

Remanufactured equipment is becoming a viable alternative within the electronics assembly marketplace, as established manufacturers seek to expand capacity and entry-level manufacturers look to get started, both at the lowest-possible capital cost. Universal Instruments' Remanufactured Machine Division estimates sales of "used" and remanufactured electronics assembly equipment to be worth more than \$750 million and growing at double-digit rates. Many electronics manufacturers consider used equipment in their budgetary process. New machinery, built on a "platform" basis, makes it easier to rapidly remanufacture, customize, and add new technology.

A major business driver for the increased use of remanufactured equipment is the declining growth of through hole technology and the rapid rise of contract manufacturing. Contract manufacturers, in taking over the production responsibilities of electronics product firms, need the flexibility to quickly add capacity to meet surges in demand and qualify for upmarket, higher-value-added work.

Contract manufacturers are considering remanufactured equipment for a number of reasons: the expense of new equipment, the increased reliability of fully remanufactured machinery, (often) shorter lead times to delivery, the desire to maintain consistency of equipment type to reduce operator and maintenance learning curves, the worldwide competition for capital and the cost of money, and to keep pace with rapid technological advancement (new technology overtakes existing machinery approximately every three-to-five years).

But not all remanufactured equipment is alike, as customers quickly discover when quoted prices can cover a wide range of the cost of the original equipment for the same type of machine. Some remanufactured equipment is simply brokered used machinery: moved from one customer to another by a third party, with no servicing, rebuild, or warranty of any kind. A second alternative is provided by used-equipment dealers who offer minimal remanufacture: they clean up the machine, replace a broken part here and there, slap on some paint, and resell it.

A third option is used-equipment dealers providing a "minimal-plus" rebuild: partial teardown, replacement of more parts. Finally, a small group of OEMs provide a fully remanufactured machine: complete disassembly to the frame and castings, thorough cleaning, damaged and worn items replaced, parts upgraded, full field installation, "as-new" warranty, and global aftermarket support.

How does a customer choose among these alternatives? The most important thing to consider is this: once you put a piece of equipment into your manufacturing cell or production line, the expectations regarding the performance of the equipment should be as rigorous as they are for any acquisition in this price range. If you expect the equipment to perform as well as it did when new, then this needs to drive your decision on what level of remanufactured machine to purchase.

Operationally, you should demand that your remanufactured equipment provide the same throughput and reliability - and the same level of vendor support - as if it were a new piece of machinery. Financially, the key determinant in the selection process should be this bottom-line proposition: What will be the cost-per-insertion, or cost-per-placement, of the piece of equipment once it is integrated into my manufacturing line?

In the fiercely competitive marketplace of electronics assembly, there is no room for equipment - remanufactured or new - that cannot maintain the yield, throughput, reliability, and quality your customers demand and you benchmark for your operations to ensure profitability. The initial cost of the equipment is only one part of the investment decision - more important is the total cost of the investment over the equipment life cycle and whether it can contribute to competitive advantage and increased customer satisfaction.

### **Choosing Remanufactured Equipment**

The first step in the selection process for remanufactured equipment is to perform a thorough assessment of your production requirements, manufacturing practices, and business/financial constraints. You must also decide how much "risk" your production environment can assume. A cross-functional team - composed of the production and engineering managers, manufacturing process engineers, financial management, and other key executives who oversee these decisions - should be assembled to perform this due diligence to determine the level of remanufacture you need and the vendors qualified to supply it.

Obviously, financial constraints will play a major role in the decision-making process, otherwise you would be buying new machinery. But the cost of purchase of a remanufactured piece of equipment must be evaluated beyond the initial purchase price. While the lowest price may be attractive and include quick delivery - obviously, the less that is done to the machine, the faster you can get it - the life cycle cost may be inordinately high. And if the equipment has not been properly rebuilt, these life cycle costs - additional parts, troubleshooting time, diversion of scarce maintenance resources, repair costs, lost production, missed opportunities - can impact almost immediately, negating any perceived savings.

A critical question you must ask is: "Is the pre-owned equipment still supported by the original equipment manufacturer (OEM)?" There is no point in considering a piece of equipment if parts are no longer available or if no one will service the machine.

Once it has been determined that OEM parts and support are available, the next questions are: "What level of remanufactured equipment should I purchase? Should I simply get a piece of used equipment drop-shipped from another facility to my plant, expecting that my maintenance people can work on it? Should I commission a remanufacture? If so, to what extent should the machine be rebuilt? How much risk do I want to assume?"

### **True "Used" Equipment**

Basic used equipment is the least expensive option, sometimes costing as little as 10% of the purchase price of a new machine. Typically, the customer contacts a broker who canvasses the marketplace and locates a machine at another production facility or in storage. The broker then arranges for the machine to be drop-shipped as-is, directly to the new customer, without rebuild, warranty, or support of any kind.

While this is the cheapest way to go, it may only be the beginning of the true cost of the equipment. The buyer, upon receipt, must take full responsibility for assessing the actual condition and operating capabilities of the machinery. If the customer needs the equipment to fill a gap in production and quickly ramp up capacity, this can place an undue burden on the maintenance department - already charged with maintaining existing equipment - and minimize a company's chances for maintaining a smooth production flow to meet order demand.

The next step up the ladder is buying the electronic-assembly equipment from a used-equipment dealer. This alternative breaks down into two parts: dealers who perform minimal remanufacture and those who offer a medium-level rebuild. Prices here typically range anywhere from 30-60% of new.

At the low end, the dealer will perform a superficial "face-lift" of the pre-owned piece of

machinery. This will include cosmetic cleaning, replacement of obviously defective parts, and possibly a fresh coat of (non-OEM) paint. The dealer will turn the machine on and cycle it in a limited fashion to determine that it functions. The equipment is still sold essentially as-is, with minimal warranty and after-sale support. Often, the vendor will steer the customer toward the OEM for aftermarket assistance, which may involve registration fees and other unforeseen costs. Machines in this category, depending upon age, are typically priced in the 30-50% range of original list prices.

At the higher end of this segment, in what might be considered a midrange rebuild facility, the equipment provider will perform at least a partial teardown of the machine. The vendor will examine major systems and replace more parts than were replaced at the lower end. These dealers typically have more infrastructure in place to provide a modest level of support.

However, they still fall far short of rebuilding/replacing at the subassembly level or providing extensive upgrading or enhancements to the equipment. They typically do not supply comprehensive warranty, spare parts, and global aftermarket support for what they sell. Machines in this category typically sell for approximately 40-60% of original equipment price.

### **Fully Remanufactured Equipment**

The highest level of used equipment is fully remanufactured equipment. At this level - where machines typically sell at 50-70% of original price - the equipment is completely disassembled down to the frame and castings. All machine parts are cleaned to remove oil and dirt, providing a good, clean baseline for rebuild. All damaged and worn parts are replaced with original manufacturer parts, not aftermarket parts that may not have been inspected and tested to the same rigorous quality standards. This not only includes parts that are not working, but also parts that the remanufacturer has identified from its own warranty and field reports as typically requiring replacement after a certain period of time - even if they are currently operational - to prevent future breakdowns or degradation in production performance.

As an example of complete remanufacture, a rebuilt axial lead component inserter would include substantial work performed to the heads, clinch, positioning system, controller, I/O box, and other miscellaneous items. For the heads and clinch, the remanufacturer would replace all wearable parts with upgraded OEM parts. For the positioning system, the rebuilder would replace all wearable parts; inspect and replace all wearable parts in the rotary table; and replace the lock assembly, lead screws, and drive motors.

Additionally, the control would be upgraded to the latest revision possible. All printed circuit boards in the I/O box would be replaced with upgraded printed circuit boards. Miscellaneous activities would include inspection of the pneumatic lines and assemblies; inspection of covers and machine frames; replacement of all belts; and inspection of all other items and replacement as necessary.

### **Getting the Latest Components**

This level of rebuild - complete remanufacture - also features retrofit and enhancement parts at the highest revision levels available from the OEM. The remanufacturer may be rebuilding a machine that, since its original sale, has been upgraded by the OEM with parts that have been revised one, two, three or more times to embed engineering changes in response to user feedback, field-test results, and new technological developments. These OEM (or OEM-certified) parts, software, and control-system upgrades ensure that the customer is getting enhancements that will make the machine perform better, faster, more reliably, and perhaps at an even higher throughput and capability than the original specification.

Typically, hardware enhancements to a higher revision level involve parts such as chain clips, head and clinch tooling, motors, and other items that normally wear in the course of production activity. The software upgrades may involve systems that provide performance enhancements, such as taking time delays out of the machines for higher speed and more throughput (customers

should insist that software upgrades be provided for some specified period of time after remanufacture). The control-system upgrades will feature the latest generation available for that particular system.

This is true of safety improvements as well - many times the remanufactured machine can be retrofitted with the latest safety equipment and safety enhancements that have been developed to comply with international requirements not in force at the time of original manufacture.

### **Complete Quality Assurance**

After the machine has been completely remanufactured - as well as during the rebuild process, for that matter - the customer should expect that the supplier will perform stringent quality-assurance (QA) testing, including the utilization of rigorous statistical process control (SPC) measurements.

Customers should typically insist upon a defined QA process for machine rebuild. The first step is a pre-dry cycle, to ensure that all machine functionality is performing as required. The machine is then run through a dry cycle for break-in. Next, the machine is cycled through performance runs. Finally, the remanufacturer - with the customer on-site - will run the machine at production levels to make sure it performs to all agreed-upon specifications for speed, tolerance, reliability, and placement accuracy. This must be a fully documented process - often referred to as Quality Acceptance Testing (QAT) - and the customer should be given a copy of the report.

After testing, the customer should expect complete field installation. The remanufacturer will come on-site and fully install the machine as if it were bringing online a new piece of equipment. This includes complete setup and installation, operator training (at either the remanufacturer's site or the customer facility), and all necessary support until the machine is performing to agreed-upon specifications for yield, throughput, and accuracy and the customer is ready to sign off on acceptance.

This level of remanufacture will include a full warranty, with the same terms - typically one year, parts and labor - that are provided for a new piece of equipment. The complete rebuild will also include comprehensive, global, post-installation support by qualified field-service technicians, including access to technical support staff via telephone and the Web.

### **Fully Remanufactured: Price-Sensitive, Operationally Excellent, Complete Support**

With a fully remanufactured machine, customers get exactly what they are looking for: a price-sensitive piece of equipment that runs as well as it did when new and can be integrated quickly into the manufacturing line to increase output and meet customer demand. This enables the customer to operate the production line and manufacturing flow at the same performance levels as before, but with the additional capacity of another piece of machinery and at a cost savings over new equipment.

A fully remanufactured, fully supported machine limits the unforeseen risks that stalk used equipment around issues such as reliability, guaranteed performance, warranty support, production interruptions, and redeployment of maintenance staff from scheduled preventive activities to seat-of-the-pants, pressure-packed repairs.

With a fully remanufactured piece of equipment, the customer can expect a piece of equipment that performs to, and often exceeds, its original operating specifications. This allows electronics assembly manufacturers to focus on their customers' needs and meet their commitments around delivery date and quality.

This, in turn, provides an electronics-assembly manufacturer with the flexibility and cost savings necessary to react quickly to changing demand and technology requirements in pursuit of customer satisfaction and business success.