

Probably the greatest user concern in buying non-Original Equipment Manufacturer (OEM) replacement valve trim and other critical valve components is personnel safety. Some extremely hazardous situations that affect personnel safety include process upsets and the sudden and massive release through valve failures of high pressure/temperature steam or the release of flammable, toxic, or corrosive liquid system. Beyond this, a user must realize that even benign services often control hazardous processes.

In addition, plant operation and maintenance costs resulting from poor valve performance such as leakage, galling sticking, noise, damaging vibration, and inaccurate alignment can escalate radically through the use of inferior, non-OEM replacement parts.

User “horror” stories that can be told by practically every industry abound. The common denominator is most often a direct result of trying to save a buck by using non-OEM replacement valve components.

Non-OEM Replacement Parts

Non-OEM replacement valve parts take many names - bandit parts, bogus parts and pirate parts, among others. They all mean the same thing: Replacement parts procured from other than the original equipment manufacturer.

Where do they come from? Almost anywhere - the sources are almost infinite. Machine-shop suppliers range from backyard garages to large and supposedly reputable machine shops that often say, “We’ve got engineers; we’ve got micrometers; and our quality standards are the highest.”

In addition, users may not even know they are getting non-OEM replacement valve parts, especially if they regularly use an outside equipment-rebuild outfit. Some of these operations have been known to price OEM parts, buy non-OEM manufactured parts and then pocket the difference when billing their customer. OEM part numbers or other identification have sometimes been stamped on the non-OEM parts. Even unauthorized nuclear “N stamp” counterfeiting has been known to occur.

Why Non-OEM Parts are Inferior

While of course many of these non-OEM valve component suppliers do have engineers and micrometers, they simply cannot know the design intent of the original valve manufacturer; the specifics of original component metallurgy; tolerances; heat treatment used; or plating and weld overlay techniques employed. For example, a DRAG trim valve on boiler feedpump recirculation service at an electric generating station was “repaired” by a non-OEM facility by oversizing the inside diameter of the disk stack and building up the outside diameter of the plug to keep the same tolerance.

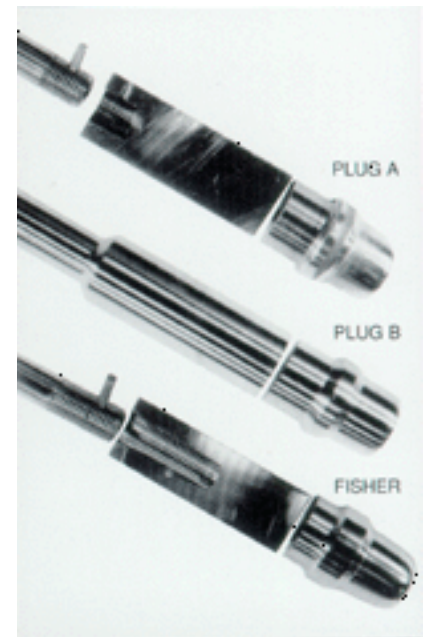
Upon reassembly of the valve, the new, oversized plug squashed and damaged the balance seal. Thus the balance seal did not seal, and the valve body washed out. Non-OEM suppliers do not have the technical support staff that OEM suppliers have. In addition, they have no way of knowing OEM design and materials updates to improve valve performance that may have occurred since the original valve was purchased. Non-OEM valve part suppliers do not employ application engineers who can diagnose valve application problems and recommend upgrades to resolve these problems.

Unless the non-OEM supplier has been given an OEM-supplied part to work from, they must resort to working from worn parts, and can only guess at the original contours and other critical dimensions. These factors and more make non-OEM supplied parts inferior in one way or another.

Fisher Controls International, Marshalltown, IA, has long publicized throughout the valve industry the many pitfalls inherent in using non-OEM valve trim. This has included an article in the May 1993 issue of Hydrocarbon Processing magazine as well as Fisher’s in-house publication - “FAST NEWS...Replacement Parts Information” newsletter. **Figure 1** (taken from “*The Fisher Replacement Parts Comparison Test Report*”) shows a dramatic visual contrast between a genuine plug-to-stem connection and two non-OEM replacement plugs.

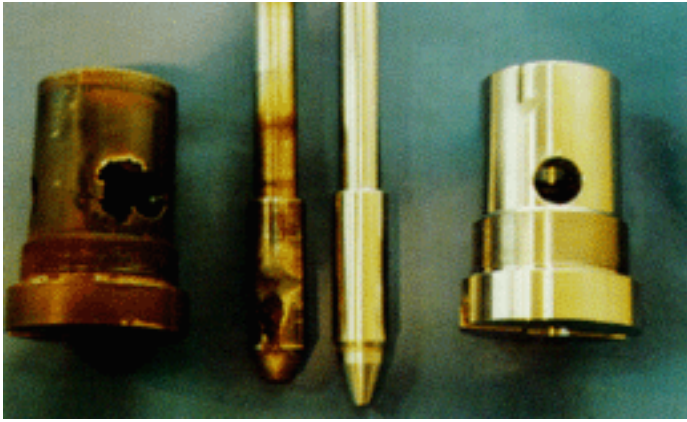
Bruce Quernemoen of Fisher Controls says, “Fisher standards call for a minimum of one stem diameter of thread engagement above the pin. Plug A has four threads engaged above the pin while the Fisher stem has ten threads. In this instance, a one-diameter equivalent dictates an eight-thread engagement. The Fisher plug incorporates a patented thread runout; Plug A does not.

If located too close to the top, the pin hole in the



A comparison between a genuine Fisher Controls plug/stem assembly and two non-OEM supplied parts for the same service.

If located too close to the top, the pin hole in the



A comparison between genuine Bailey plug/stem and cage components (right) and non-OEM-supplied "replacement" components (left) that failed.

stem will weaken the stem, and a weak valve stem connection can cause valve stem failure, resulting in expensive downtime.”

According to Control Components, Inc.’s, Product Manager for the company’s Bailey Line (Rancho Santa Margarita, CA). “The photo (Figure 2) illustrates that the non-OEM plug/stem was “guesstimated” for correct length and angles, and the corresponding cage was constructed of the wrong materials with insufficient threading. The plug portion was not completely hard faced as required and was more susceptible to wear. The wear is cavitation that started below the hard facing and worked itself under the hard facing material, breaking the surface. The overall length of the spindle is too short, resulting in poor control and a change of throttle characteristics. The cage was seriously damaged by pitting in the upper portion and by erosion in the lower portion. Improper assembly procedures created a leak path in the gasket register. Flow velocities expanded the leak to such an extent as to cause early valve failure.”

Beyond these cases, many instances exist where whole valves or actuators have been resurrected from a scrap yard, reconditioned (cleaned up and remachined), and sold by unscrupulous people as new, brand-name equipment to unwary users.

Don McArthur of Masoneilan/Dresser, Avon, MA, recounts an instance where even an OEM manufacturer was misled. “A Middle East petroleum company called to complain about one of our actuators that had failed. The actuator was not mounted on one of our valves, but on another manufacturer’s choke valve. The split clamp, coupling the valve and actuator stems, had come loose, and the actuator piston had accelerated upward, striking the top of the actuator. This impact loading had caused the actuator case to break, scattering pieces and causing a sudden shutdown of the system.

McArthur continued, “Investigation reveals that the

valve actuator did not possess a valid Masoneilan/Dresser serial number. The actuator had been discontinued ten years prior, but the choke valve had only been recently purchased. Further investigation as to the source of the actuator showed that the choke-valve manufacturer had procured the actuator from an independent supplier who was not an authorized manufacturer’s representative. The actuator supplier had obtained it from a junk yard, refurbished the actuator, and sold it as new equipment. However, the actuator could have easily been twenty to thirty years old.”

In some cases, valve body materials and other characteristics have been misrepresented through forged name plates.

Lou Martin of Pacific Valves, Long Beach, CA, relates a tale where a Texas refinery bought several large (10 in. and 12 in.), supposedly new, valves of reputable makes from a national distributor only to have them fail prematurely through seat wash out. “Upon investigation it was determined that not only was the trim remachined, but the replacement was incorrect for the service. Further, metallurgical testing proved that the valve body material was incorrect. If left in service for an extended period of time, the valve body could have suffered catastrophic failure, resulting in a life-threatening fire or explosion. This mistagging was revealed by the fact that the forged tag did not reflect our method of tag stamping. So, bone-yard scrap valves had been bought for maybe \$800 and then, after refurbishment, sold to the refinery for many thousands of dollars.”

Frequently, it is not an easy task for the user to identify a non-OEM-supplied valve component in the field unless a purely visual comparison reveals the difference. Probably the only way to be sure is to ship the suspect component back to the original valve manufacturer and have their quality-control engineers check it out.

What About Imaginary Cost Savings?

White non-OEM-supplied valve trim sets and other valve component parts usually run between 30 and 50% cheaper than comparable OEM-supplied replacement parts, this is only a minor part of the true cost of replacement.

The example of a 2-in, 600-psi, conventional valve in Table 1 compares the true costs for a biannual rebuild with OEM-supplied rebuild parts with those for an annual, non-OEM parts rebuild necessitated by premature valve failure.

The true-cost differential shown can easily be multiplied many times over when the life of the non-OEM rebuild is much shorter—very often the case. Instances are known to exist where non-OEM replacements have failed in just days.

Table 1

The Cost of a Typical Valve Rebuild (Conventional, 2-in, 600-psi Valve)		
	OEM-supplied valve trim set	non-OEM supplied valve trim set
Trim set purchased cost	\$1,000	\$700
Administrative and maintenance costs including:	\$1,100	\$1,100
Purchasing function		
Receiving and stocking		
Pulling valve and actuator		
Disassembling valve		
Shop testing		
Installing valve		
Instrument recalibration		
Actual true cost per build	\$2,100	\$1,800
Number of rebuilds for expected 2-year life²	1	2
Actual cost for 2-year life	\$2,100	3,600
(1) Cost based on a \$50 per hour labor rate		
(2) If non-OEM life is six months, its actual biannual rebuild cost becomes \$7,200 and so on up for lesser operational life which is far from unusual!		

A real total cost comparison for an OEM-supplied and non-OEM-supplied trim set.

instead of lasting an expected two years.

Beyond the true rebuild costs in Table 1, many other added costs can come into play. These include such things as the loss of product, clean-up costs from spills, regulatory fines, and impaired plant efficiency.

Table 2 shows the dollar value of steam losses. The graph assumes that steam at saturation pressures is leaked to atmosphere or a condenser for a range of equivalent orifice sizes representing leakage across a control valve. Other product loss can be even higher depending on the process involved. In addition, the costs of unscheduled outages resulting from premature shut down can be astronomical.

What Can A User Do About This?

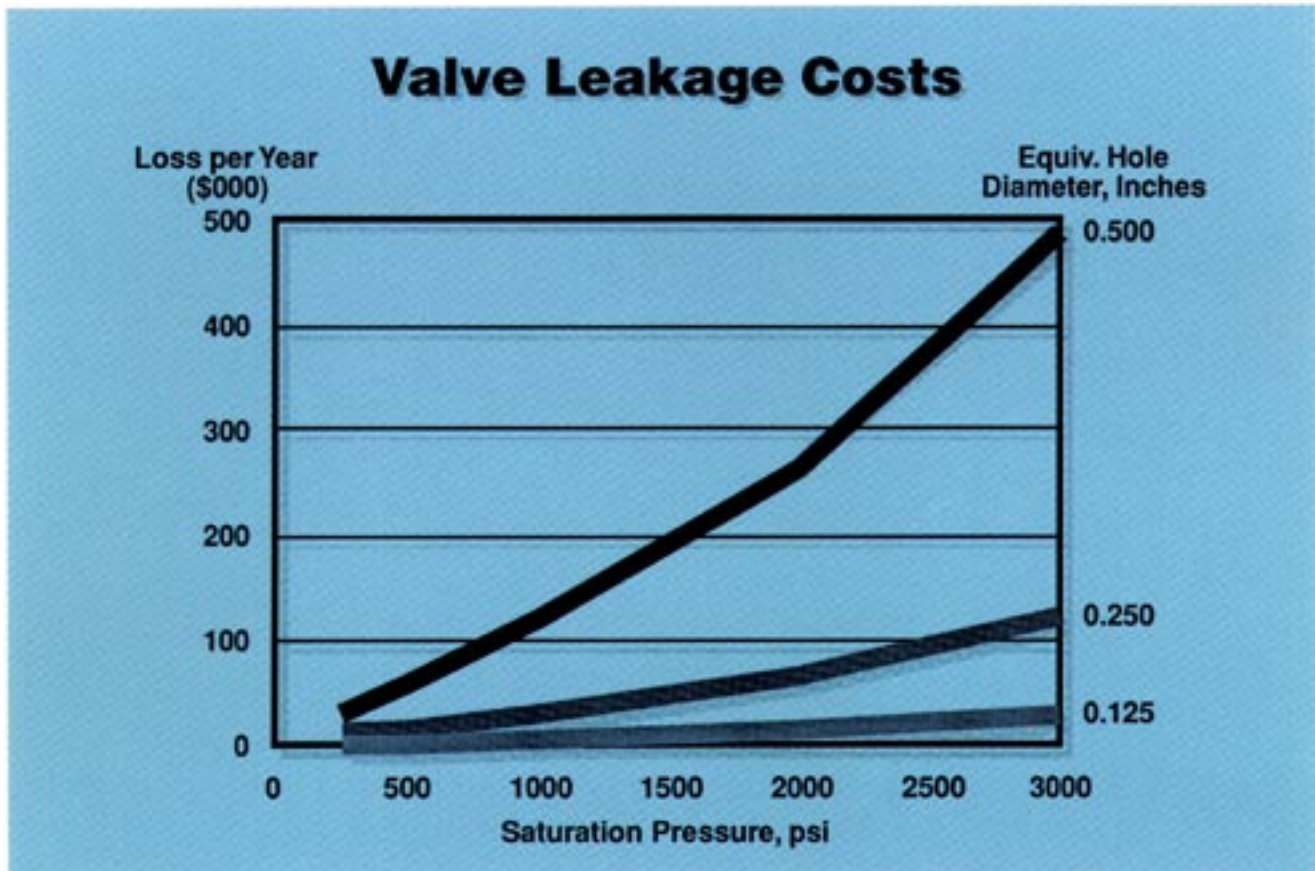
In extreme cases, lawsuits for damages against non-OEM-parts suppliers can be instituted especially where personnel injuries or facility damage can be attributed directly to misrepresented parts suppliers.

Users can demand invoices to assure that OEM parts were actually purchased and installed, when outside equipment repair outfits are used to rebuild valves.

Plant engineers can review service records to monitor valve rebuild frequencies and note abrupt changes between rebuilds. When these abrupt changes occur, the engineer can feed this information back to the purchasing agent. Often this will reveal vendor changes corresponding to these abrupt rebuild frequencies that will tell the tale—non-OEM replacement parts purchases are the culprit. The purchasing agent can then identify non-OEM suppliers or equipment rebuild outfits to avoid.

Valve users can help protect themselves against the unconscious introduction of non-OEM valve replacement parts by establishing strict procurement criteria that will prohibit non-OEM parts procurement. They can also actively encourage plant and operating engineers to watch for and report the tell-tale signs of interior non-OEM replacement parts procurement—current poor performance vs. good historical valve performance when OEM-supplied replacement parts were known to be used—so that non-OEM valve replacement component purchases are not repeated. In many cases, valve users can negotiate exclusive parts purchasing agreements with OEMs, frequently to their advantage, not only in internal operational and maintenance.

Table 2



Typical costs of saturated stem loss for various pressures vs. equipment orifice leakage rates.

interests but also in replacement parts purchasing costs. In effect, users and OEM suppliers become “partners” in ensuring optimum valve performance throughout valve life.

The widespread availability and use of non-OEM replacement valve trim and other critical valve components is downright dangerous - personnel safety and facility integrity can be severely compromised. Additionally, the presumed cost savings attributed to the purchase of non-OEM parts is all too often not realized in the long run. In fact, in most cases, a real and very significant operating and maintenance cost penalty results.

The bottom line here is in the use of non-OEM replacement parts for trim sets and other critical valve components is that it's the valve users who suffer. It therefore behooves all reputable valve manufacturers to police and monitor their authorized distributors, be more responsive to customer problems, and use more sophisticated methods in valve and parts identification. This will go a long way to protect their customers from the serious safety risks and the ultimately high operational and maintenance costs inherent in their short-sighted use of these non-OEM repair parts.

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