A World Leader in Industrial Ceramic Products

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RECLAIMED CATALYST BED SUPPORT MEDIA: SMALL SAVINGS, HUGE DOWNSIDE

In these times, saving a few dollars by internally reusing "spent" catalyst bed support media (CBS), or buying from an external reclaimer, can be an attractive suggestion. Although the economics appear attractive, users of reclaimed CBS should understand the pitfalls, particularly if used CBS are to be acquired from an outside reclaimer. This is a classic example of "Let the buyer beware!"

These are false economies. The problems:

1. CBS are often quite porous, and exhibit significant scavenging capacity for contaminants and catalyst poisons. Reclamation can spread these poisons throughout the refinery like a virus.

2. Most engineers understand the causes and consequences of metal fatigue. How many are aware that ceramic CBS are also subject to weakening from repetitive thermal and pressure cycling?

3. Reclaimers can not guarantee the source, history, or pedigree of the CBS being supplied.

4. Using reclaimed, or even internally reused, CBS often voids catalyst makers' warranties.

Failures of CBS have been known to cause tens of millions of dollars in maintenance costs, catalyst replacement, and most importantly, lost opportunity due to downtime. Unit shutdowns ripple throughout the complex, curtailing runs at related feeder- or takeaway-units.

<u>The downside of CBS failure is far out of proportion to any short-term savings.</u>

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To reduce costs for CBS procurement, to avoid tipping charges at classified landfills, or for "green" initiatives, some refineries and chemical plants are reusing spent catalyst bed support media (CBS).

Others are purchasing used CBS from catalyst recovery companies or metals reclaimers who scalp CBS out of bins of spent catalyst. Often these suppliers are not versed in ceramics technology, and might not appreciate hidden risks they are exposing to the refiner. The problems bulleted on the front can be further explained:

1. Contamination

- CBS can have porosities high as 20%v. Some types are even installed specifically for trash collection. This porosity is enhanced in high pressure applications, with contaminants being encouraged to diffuse into supposedly sequestered pores.
- CBS reclamation is often limited to sorting by size. This does not remove contaminants.
- But some CBS are cleaned with various levels of severity: water- or detergent-washing, solvent-washing, or even acid- or caustic-washing. Not only are these methods ineffective in removing internally absorbed contaminants, they can even add some unexpected ones.
- The result: contaminants such as sulfur and chlorine compounds, vanadium, arsenic, mercury, and acids move freely between refineries, and from reactor to reactor within a refinery. Often their presence is uneventful, but a harmless poison in one reactor can be ruinous in another.

2. Weakening

- CBS are subject to weakening (embrittlement) by repetitive thermal and pressure cycling, causing a loss of crush strength and impact resistance, and creation of micro-cracking (failure sites themselves, but also, more of the porosity discussed above).
- Most reactors are intended to maintain a relatively stable temperature profile. But, many adsorbers are designed for thermal cycles as often as every 4 hours, or are sacrificial poison traps. Where have your reclaimed balls been before? A high-temperature and pressure hydrocracker? A chloride/fluoride scavenger?

3. Pedigree

Reclaimers rarely segregate CBS by source or by application. Any "lot" of reclaimed CBS contains a broad mixture of CBS from different manufacturers, used in widely different applications, and may be decades old with numerous abuse cycles behind it. Records on prior use are virtually nonexistent.

4. Catalyst Warranties

Reusing CBS often voids any catalyst warranty. One well-known process licensor/catalyst supplier clearly stipulates:

- CBS may only be reused in the same reactor as before
- CBS may not leave its original site, and return, for any reason
- CBS from different manufacturers may never be commingled
- CBS may not be reconditioned under any circumstances

Conclusions

The above issues are even more worrisome today with the importation of poorly made CBS over the past decade. The cost of a new charge of high-quality catalyst support media is very low relative to the cost of the catalyst it is purchased to protect, and pales in comparison to the cost of a potential shutdown.

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