Do you need to take a sample from the pressure boundary of your equipment in order to gain insight into damage or degradation of your steel? Do you need to be able to perform metallographic examination at a location just below the surface of your steel to understand whether you have an active cracking mechanism? There are likely many reasons you may want to take a sample out of your pressure equipment, but in many cases, the concern is about the subsequent repairs.

Typical applications for the sampler include obtaining representative samples to investigate high temperature hydrogen attack (HTHA), creep damage, environmental cracking, or fire damage assessments.

E²G worked with Belcan Corporation to develop a sampling device named The Buckeye Sampler III, due to its roots in Ohio, the Buckeye State.

Traditionally, samples were removed from the steel using a grinder or similar method that leaves a sharp bottom “boat-shaped” divot in the steel. Depending on the damage mechanism you may be sampling to investigate, leaving a sharp indication in the pressure boundary may be highly undesirable; it leaves a local stress riser at which additional damage could accumulate. The Buckeye Sampler III uses a spherical
A clean cut in a single pass that does not require re-grinding.

blade to cut out a shallow sample that results in a smooth, rounded cavity in the steel. The profile of this cavity can typically be left as a local thin area in the steel without needing to perform any weld repairs. Simple fitness-for-service analysis can be used to validate the local thin area left by the sampler.

The depth of cut can be accurately controlled using a digital dial indicator and, depending on the size of the blade used (3 inch or 4 inch), can manage a range of cuts from a skim cut to 0.43 inches deep.

The sampler can be used on the inside or outside surface of a vessel and can fit inside equipment that is 18 inches in diameter. The typical arrangement uses four shunted magnets to hold the cutter in place; however, the device was developed with modularity in mind, whereby the cutter can be attached to multiple different bases to deal with non-magnetic steels or nozzle attachments.

For more information about the sampler and the services provided by E2G please contact, Ryan Jones, P.Eng at JRJones@EquityEng.com.

Belcan Corporation, headquartered in Cincinnati, Ohio is a global supplier of engineering services to a diverse spectrum of industries. The engineering services cover product design from conceptual studies to aftermarket support. Belcan has more than 6,000 employees in 49 locations serving more than 600 active clients globally. For more on Belcan, visit www.belcancorporation.com.