Successful utilization of an inflatable straddle tool to selectively acidize 11 perforated intervals in 7 in. (177.8 mm) casing, running thru a 3.75 in. (95.25 mm) tubing restriction on coiled tubing at 14,000 ft (4,267 m) depth.

TAM International, Inc., with corporate offices in Houston, Texas, has set standards in Inflatable and Swellable Packers for over 42 years, and offers efficient and economical options to conventional interventions.

TAM maintains over fifty support locations worldwide, with their focus on defining and implementing SOLUTIONS for drilling & completions, well intervention, unconventional resources and reservoir optimization.

Inflatable and swellable packers offer highly flexible tool systems that are effective in a broad range of intervention operations in a wide variety of well constructions, especially where conventional packers and operations are ineffective. These include:

- Cased Hole
- Open Hole
- Thru Tubing
- Vertical
- Horizontal
- Multi Lateral

Product flexibility also allows conveyance of tool strings into wells using a variety of methods – such as:

- Slickline
- Electric Line
- Coiled Tubing
- Drill Pipe
- Tubing
The first step in planning any intervention operation should include fully defining all problems and objectives prior to developing a plan to repair, stimulate, abandon or otherwise workover the well.

**Well Integrity**

TAM manufactures and services the highest reliability, multiple set, inflatable packer systems available. They can be used on coiled tubing or work string in tubular sizes from 2-3/8 in. (60.45 mm) through 24 in. (609.6 mm), including non API sizes and corroded or damaged tubulars.

By inflating the packer inside casing or tubing and testing above or below at a variety of depths, the exact point where integrity has been compromised can be determined.

Once an exact depth and extent of any leak has been defined, a variety of tool systems can be deployed to re-establish integrity including squeeze cementing, scab liners or in extreme cases, replacement of the failed tubular.

**Production Improvement**

Inflatable packer systems can be configured in a variety of ways to allow production testing to determine fluid influx type and rate at various depths as well as determining formation damage when used in conjunction with standard well testing tools. Configurations include straddle assemblies, bridge plugs and production packers and can be deployed on coiled tubing or work string. Inflatable packers can be used in open hole or cased hole completions, in vertical, deviated, horizontal or multi-lateral wells.

Once a reservoir flow profile is determined, similar tool configurations can be deployed to isolate undesired fluid and/or stimulate areas of low productivity or formation damage. The methods for modifying flow profiles can include use of inflatable packers for squeeze cementing or mechanical isolation and swellable packers on scab or full liners for mechanical isolation.

**Complex Multi-Lateral Well**

1. Set a scab liner across the water zone in the lower leg to allow production above and below.

2. Set a Cement Retainer in the middle leg and squeeze cement the water zone at the toe.

3. Set a scab liner across the upper leg exit to allow selective production of lower/middle leg and/or upper leg.
Remedial Operations include applications of various inflatable and swellable packers for:

**Gas/Water Shut-Off**

TAM provides inflatable products for inflow control including cement retainers, bridge plugs, production packers, and scab liners. TAM also provides swellable packers for use in effective zonal isolation to achieve an annular seal when run on scab liners, conventional liners and full length casing. For thru-tubing water shut off and gas migration remedial operations, using an inflatable bridge plug set above lower perforations provides a higher success rate of placing an effective cement plug. In some cases, using an inflatable, and squeeze cementing the existing perforations through the packer can even eliminate the existing cement channels external to the casing.

**Well Integrity Repair**

TAM provides inflatable tools including scab liners, cement retainers and bridge plugs to facilitate repairs or isolate areas of well-integrity loss. In some cases such as wellhead change-out, deployment of these tools using slickline can drastically reduce total remediation costs. With the small equipment footprint required for wireline operations, placement of an inflatable packer - mechanical barrier and/or cement can be achieved in a simultaneous operation adjacent to an operating drilling rig on the same platform, thus saving valuable rig time and reducing costs.

In one case history, an inflatable bridge plug was set in the tail pipe below the production packer to provide an extra level of safety and minimize potential formation damage from kill fluid losses. The rig was then skidded over to replace the tubing string. After the tubing replacement operation, the inflatable bridge plug was retrieved using a slickline unit. A series of wells were repaired using this technique, resulting in a substantial cost reduction and elimination of acid stimulation jobs required in prior workovers.

Successfully set a 5 5/8 in. (143.0 mm) OD Scab Liner across the section of corroded casing above the perforated producing interval.

Used slickline to run and set a 2 1/2 in. (63.5 mm) OD Retrievable Bridge Plug above the lower perforated interval to isolate water production. A cement plug was dump bailed above the BP to ensure long term integrity.
Stimulation

TAM’s proprietary, multi-set TAM-J inflatable packer tool can be deployed in either a single or straddle configuration to selectively stimulate multiple zones using scale removal acids, formation matrix acids or hydraulic proppant fracturing of open-hole or multiple perforated interval type cased hole completions. In one Canadian horizontal open hole carbonate completion, TAM successfully acidized multiple intervals by accomplishing a total of 101 packer settings on a single trip into the well with an inflatable straddle tool string with 33 ft (10 m) intervals between packers. TAM provides specialized accessory tools to even further enhance the overall operations and effectiveness of such stimulation programs.
Well Abandonment

TAM bridge plugs and cement retainers provide a reliable solution where a bridge plug is required by regulations when abandoning a well with corroded or non-API casing. Inflatable packers can provide a means to abandon multiple wells on a single offshore platform using a combination of coiled tubing, electric wire line, slickline, crane and cementing unit versus a conventional workover rig program. This type of operation has yielded cost reductions in excess of 80% compared with conventional rig operations.

In abandonment of exploratory wells, inflatable bridge plugs or cement retainers can reduce the cost through rig time savings as there is no need to run gauge rings or junk baskets since the inflatable packer OD to casing ID clearance is larger than conventional packers. The elimination of non-productive rig time using an inflatable packer as the abandonment plug has been proven to more than offset the tool cost differential. In cases where temporary abandonment is required to allow the rig to leave location such as in approaching storms, icebergs or for reducing rig time for equipment repairs, the inflatable and retrievable bridge plug again offers an alternative method versus conventional tools.

Sand Control

TAM has partnered with sand screen suppliers to offer a wide selection of special sand control systems to optimize production. Both swellable and inflatable packers can be coupled with various Inflow Control Device (ICD) sand screen systems. The use of inflatable packers and port collars can offer simple, reliable, zonal isolation solutions for your multi zone pack or frac-pack systems. Advanced systems have also been designed to couple swellable packers with shunt tubes through the packers.

Other Applications

The flexibility of the TAM inflatable packer product line to expand up to 3 times the tool run-in diameter in cased hole and 2.5 times in open hole allows for a broad array of operations that can be undertaken. These include:

- Used as a base for exit-window whipstocks
- Cement retainer for effective cement plug placement
- Thru-tubing/plug back recompletions
- Temporary abandonment or well suspension
- Any number of applications that require a packer where well conditions do not allow for use of conventional tools or techniques

TAM’s objective is to assist you in finding solutions to any of your well intervention operations. We use exhaustive training and testing to ensure that both our technical specialists and tools are well-suited for your service needs. Contact your nearest TAM office or on the web at www.tamintl.com.

For drilling & completions, reservoir optimization, well intervention and unconventional resource completions, ask your TAM representative for additional information.