Reservoir Optimization
An 11-in OD multiple set inflatable packer (TAM-J) was used to selectively test a 12 ¾-in open-hole to determine water quality and productivity of shallow aquifers near Phoenix, Arizona.

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
- Casing
**Reservoir Management and Optimization**

TAM International, Inc. was established in 1968 as a manufacturer of inflatable packer elements for various open-hole Drill Stem Test (DST) companies and has continued for more than 40 years as a leader in the supply of equipment for reservoir evaluation and optimization processes, utilizing continued improvement in inflatable and swellable packer technologies.

A wide variety of tools and services are offered to assist in the evaluation of the reservoir and producing characteristics of oil and gas wells. Once the conditions are defined, various tools are available to modify the production flow stream and stimulate and/or selectively produce the wells. Production from single wells or entire fields can be selectively modified to optimize recovery and enhance operating economics.

**Production Testing**

Inflatable packers offer an advantage over conventional testing tools as they can be set as single or multiple packer tool configurations in open or cased hole. In addition, inflatable testing tools can be coupled with a variety of artificial lift methods to achieve build-up or injection fall-off tests with downhole shut-in capability.

The TAM-J multi-set straddle remains the most flexible and reliable inflatable packer system for selectively testing, producing or stimulating multiple zones in both open-hole and cased wells. The assembly can be inflated to isolate specific intervals and the well produced to achieve drawdown. The well can then be shut-in downhole for build-up, minimizing wellbore storage effects and providing an improved method of well testing. The tool assembly can be unset, moved and inflated to isolate additional testing intervals. With proper pre-job planning and dependable well site execution comprehensive testing and/or stimulation programs can be achieved in a cost effective manner.

Artificial lift methods in combination with the inflatable packers include continuous flow using jet pump, gas lift, coiled tubing lift and electrical submersible pump. Swabbing and rod pump have also been used to provide a non-continuous flow regime. By running a continuous flow artificial lift system coupled with downhole shut-in capability and pressure gauges, tests can be conducted in a short period of time with a reliable means to achieve multiple flow (or injection) tests.

Another method used for selective interval testing is to run and set an inflatable bridge plug and/or an inflatable production packer to test the intervals above or below the inflatable tool. Both can be run to allow testing of the interval between the bridge plug and packer.

A multi-set straddle assembly is used to test and evaluate multiple intervals in an open-hole, horizontal or vertical completion.
Flow Modification

Once the flow profile of the well is fully understood, based on selective interval testing, another set of tools can be run to modify the flow profile. Bridge plugs can be run and set to terminate production inflow from the lower end of the well or even an entire leg in multi-lateral wells. In cases where the desired production is from the lower end of the well, an inflatable packer can be set in open-hole and a compression packer set inside casing to eliminate the flow from the upper section of the well.

TAM also offers a wide selection of multiple packer configurations to allow selective isolation of various intervals. Innovative completions utilizing scab liners, full liners with port collars or selective cementing of specific intervals can be designed to resolve unique situations. The isolation packers can be either inflatable or swellable types set in open-hole or cased hole. The inflatables are particularly beneficial where damaged or restrictive casing ID is present in the well.

Permanent plugging of horizontal open-hole sections can easily be achieved by inflating a packer in the open-hole above the section to be plugged and squeezing cement into the zone. This technique has proven highly successful in fractured and vugular carbonate segments where undesired fluids are determined to be entering the wellbore.

TAM’s SlikPak system utilizes slickline to convey inflatable bridge plugs and scab liners to provide an economical means of modifying the flow profile of existing wells. SlikPak runs small OD inflatable packers capable of passing thru tubing and expanding up to 3 times their run in diameter.
**Stimulation**

The same inflatable tools that are utilized for selective interval testing can also be used to achieve selective interval stimulation ranging from acidizing to hydraulic fracturing with proppant. These tools allow flow modification of the well if damaged or low permeability intervals are detected during the testing program.

A record was set when over 100 selective interval acid treatments were achieved in a Canadian well on a single run into the well using the proprietary PosiFrac Straddle System. The inflatable straddle was coupled with a Fluid Control Valve to maintain the hydrostatic level of the acid column above the tools in a low fluid level well. This allows rapid deflation and movement to each additional interval without requiring full displacement of the acid. This method uses acid as the inflation fluid and thereby has acid immediately available to the next formation interval to be treated, eliminating the need to bullhead displacement fluids before acid can start to enter the interval.

**TAM offers flexible options for reservoir stimulation including the PosiFrac Completion System for multi-stage completions in new wells and the PosiFrac Straddle System for selective stimulation in horizontal open-hole completions (acidizing or hydraulic proppant fracturing) in either new wells or re-entry into existing wells.**

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**The combination of TAM’s FREECAP® (swellable elastomer packer) and frac sleeves allows selective isolation and hydraulic fracturing treatment in multi-stage completions. TAM has installed swellable packers in well over 1,000 horizontal wells since introducing the product in 2005.**
**Special Completion Methods**

TAM provides a wide variety of tools that can be used in the well completion phase on new or existing wells to allow easy modification of the well flow profile throughout the life of the well.

Casing Annulus Packers (CAP) and Port Collars (PC) have been used to allow the well completion to selectively cement intervals while leaving other intervals as un-cemented open-hole. This eliminates potential formation damage due to the cementing operations.

A modification of this method, when the CAPs are inflated with cement as the single isolation device, has proven to be extremely successful in completing long intervals of low permeability carbonate gas reservoir where formation face contact with cement is known to cause damage. This completion method eliminates the need for acid stimulation to remove the damage. This drastically reduces well completion, testing and production costs. Multiple Port Collars are used to achieve individual interval tests as well as selectively produce certain intervals while closing off others. These methods significantly improve the reservoir management aspects of the entire field.

TAM swellable packers (FREECAP) can also be combined with Port Collars to achieve a simple completion with multiple selective intervals isolated. FREECAPs, used in conjunction with Frac Sleeves, have been used in over 1000 wells to isolate the productive zones in shale oil/gas developments with multi-stage hydraulic frac completions.

There are many types of frac sleeves used with multi-stage openhole systems. The standard ball-drop frac sleeve has evolved from the original simple design into a more sophisticated sleeve. Advances in design, like rotational locks, positive lock-open mechanisms, and drillability, allow full opening for tools to be run through it for well remediation and HPHT capabilities. Tool designs include the ability to close the sleeve after opening in order to shut off water in-flow, or for re-frac capability.

TAM swellable packers are also combined with various Smart Well Completion Systems, Inflow Control Devices, Sand Control Screens and Alternate Path Gravel Packing systems to achieve zone isolation and allow improved reservoir management over the life of the well.

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

Selective completion using both cemented intervals and un-cemented intervals where formation damage is known to be caused by cement contact.

In SAGD, high temperature wells, the TAM FREECAP GT™ (High Temperature Swellable Casing Packer) achieves zone separation along the horizontal leg allowing isolation of various intervals when premature steam breakthrough occurs. This greatly increases the usable life of the well for enhanced recovery of reserves.

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