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 three 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**
History

TAM International, Inc. has been involved in R&D and installation of inflatable and swellable packers for unconventional resource projects for over 25 years. Starting in the late 1980’s, TAM developed open hole selective stimulation tools for coal bed methane projects in Alabama, Colorado and Poland. The inflatable straddle tool system provided a reliable means to isolate individual seams and achieve hydraulic-proppant fracturing in the open hole completions.

In the early 1990’s, TAM participated in U.S. Department of Energy (DOE) projects to isolate specific intervals of horizontal wellbores drilled in potential shale gas reservoirs. The system provided a means to selectively test prior to stimulation, stimulate the zone, and then re-test afterwards in order to fully evaluate the various stimulation processes. The tool system included Casing Annulus Packers (CAP), Port Collars (PC) between packers to allow for selective interval testing, and a Combination Tool to access and manually open or close the Port Collars. The success of this research project provided valuable information that is utilized today in the commercially viable development of multi-zone, selective interval treatment of shale formations for oil and gas production.

By the mid 1990’s, TAM was involved in the research associated with providing selective interval isolation in tight carbonate reservoir wells where cement was known to cause formation damage and thus reduce productivity of the well. The initial wells were offshore China with Casing Annulus Packers and Port Collars used to selectively place cement for long-term isolation. Later, the process was modified to inflate CAPs with a special cement slurry and applied in Qatar’s North Pars field exploration wells. Metal-to-metal seal Port Collars were utilized for selective testing and stimulation of the isolated intervals. In the late 1990’s, TAM initiated research with oil companies in several areas of the USA to provide “off bottom” cementing of air-drilled, shallow, vertical wells, leaving the reservoir as an open hole completion below the shoe and without formation damage that can result from exposure to mud and/or cement in conventional drilling and completion programs.

TAM developed the FREECAP® (swellable elastomer packer) based on polymer technologies in the mid 2000’s as a simplified means of isolating multiple intervals in horizontal wells to allow multi-zone hydraulic fracturing. This tool system and technique is now considered the “standard” for shale gas and shale oil field development. TAM then developed the high temperature swellable packer to expand the application into steam injection, Steam Assisted Gravity Drainage (SAGD), Geothermal and other types of high temperature well developments.

For over a quarter of a century, TAM has been the leader in research and development of products and techniques to improve the economics of developing unconventional resources. The mindset at TAM has always been focused on assisting companies in exploration and development of these resources and improving economic viability. TAM will continue to be heavily involved in research leading to unique solutions throughout the world for both fossil fuels and other alternative energy sources.
Tight Formations

More than 17,000 FREECAP® swellable packers have been run in conjunction with ball activated sleeves and/or Port Collars to provide zonal isolation and selective stimulation options in low permeability reservoirs using both vertical and horizontal wells. Extensive lab testing and field trials have proven the concept as a reliable and effective means of achieving zonal isolation in all types of unconventional resource projects.

The TAMCAP inflatable casing annulus packer has also been utilized to achieve reliable zone separation when inflated with gas, liquids or cement. When combined with Port Collars, this technique has also proven successful as a completion method for selective testing and stimulation. This technique is especially applicable in exploratory wells where testing before and after various stimulation processes provides data to allow optimization of the stimulation procedures and completion design.

In hard rock and stable shale formations where the horizontal open hole can be completed without a liner, selective testing and stimulation is achieved using a TAM-J multi-set inflatable packer straddle assembly. TAM’s straddle assembly provides a means of selectively stimulating multiple sections of the open hole horizontal well. In one Canadian well, drilled in a low permeability carbonate reservoir, over 100 acid treatments were achieved on a single trip into the well using this system.

The PosiFrac™ Straddle System has also been successfully deployed for hydraulic-proppant fracturing treatments in both vertical and horizontal wells for many years.

Low permeability shale and carbonate formations around the world contain massive “in-place” fossil fuel reserves and TAM has focused R&D efforts, product development and operating techniques to produce these reserves economically.

Isolation of specific open hole intervals is achieved with TAM’s inflatable packer straddle assembly. The tool system can be used for testing, treating (acidizing or hydraulic fracturing) or fluid inflow control in both vertical and horizontal wells.
Heavy Oil

TAM has developed a high temperature FREECAP GT™ swellable packer that is reliable in wells where temperature during steam injection cycles may reach 575 deg F (302 deg C).

The high temperature FREECAP GT™ can be deployed for zonal isolation on the slotted or pre-perforated liner in the initial completion or run as a scab liner to selectively isolate sections of the non-isolated, original slotted liner where steam breakthrough has occurred.

By reducing or eliminating the section of steam breakthrough the well can continue to produce, resulting in longer functional life of the well and additional reserves recovery. The additional reserves recovery versus increased cost of completion provides very attractive economics for the operator.

Using a special cement to inflate the TAMCAP casing annulus packer and high temperature or metal-to-metal seals in the Port Collar also provides a reliable completion method to achieve zone separation in wells with bottom hole operating temperatures in the 480 deg F (250 deg C) range.

TAM’s development of the high temperature FREECAP GT™ and accessory tools now enables many applications proven for shale gas and shale oil development to be extended to geothermal wells.

Standard tools such as the CAP and PC provide a proven completion method to improve the cement hydraulic sealing capacity above the high temperature producing intervals and assure long term, annular well integrity.
Coal Seam Development

TAM began research into completion methods for Coal Bed Methane (CBM) projects over 25 years ago and now offers a wide variety of proven completion systems for development of coal seams. Proven methods vary from “de-gassing” coal seams prior to conventional mining in order to minimize the potential safety issues from methane gas in the mine, to economical development of single- and multiple-layer coal seams for sustained gas production.

For “de-gassing” above a mineable seam and completion of a thicker single layer seam, utilizing a Casing Annulus Packer and Stage Collar (or Port Collar) to cement only above the seam has proven a successful method with flexibility for future operations. In many wells where shallow water aquifers have been protected with surface casing, the completion consists of an inflatable or swellable packer on the casing string set immediately above the producing seam without cementing. This method allows retrieval of the casing for use in another well or eliminates the possible interference from the production well during mining. In some mining cases, the production well has been converted to a fresh air shaft for the future mine.

In wells with multiple seams, selective completion using CAPs and Port Collars or FREECAP® swellable packers has been used to achieve multiple stage fracturing similar to horizontal shale development. In areas where formations are stable and can be left as an open hole completion, proppant fracturing can be achieved using the PosiFrac™ Straddle System for selective zone stimulation. These techniques were first applied in the Warrior Basin in the early 1990’s and have field proven history in Colorado, Poland and Canada.

TAM offers a variety of conveyance methods adapted to running inflatable packers into under balanced wells without having to “kill” the well. A study is underway to determine if this method can provide a reduction in “de-watering” time and improvements in production rate.

Storage Wells

TAM provides a variety of completion and intervention tools specifically designed for typical storage wells, especially with large diameter tubulars.

Standard, single-set, retrievable, inflatable packers are capable of expansion ratios greater than 2:1 versus run-in tool diameter and are available for casing or open hole diameters up to 36 in (91.4 cm). This tool configuration is run as a temporary bridge plug to perform mechanical integrity tests and/or set in the neck of a cavern well to provide a bottom support for running and cementing a new casing string in wells with leaking casing or where new regulations dictate a second cemented casing string is required above the cavern.

Where testing indicates a possible loss of integrity, the TAM-J multi-set inflatable packer is run to pinpoint the depth of the problem and aid in the repair process as a temporary plug or squeeze cementing packer. The TAM inflatable line of multi-set packers can operate in casing diameters in excess of 30 in (76.2 cm) where conventional packers are often not available or can create other problems due to the high point loading into the casing from the packer slips.

Temporary bridge plugs can be run using the TAM SlikPak™ system which allows conveyance into the well with a slickline or e-line unit. This product line is especially applicable where space only allows for a very small footprint of the workover equipment such as small offshore platforms or internally to a chemical plant or refinery.

Retrievable bridge plugs are also applicable as a secondary safety barrier and set inside a casing or tubing string that is being pulled from or run into a well. By setting the inflatable bridge plug near the end of the tubing string to be retrieved or run, potential flow up the tubing where an out of balance condition might exist is eliminated. The packer can be inflated in the first joint of pipe to be run while lying on the pipe rack as only hydraulic pressure is required to inflate and lock the packer in the set position. The bridge plug can also be pressure tested after setting, all while on the pipe rack.

Inflatable packers can achieve expansion ratios of 3:1 providing a means to pass thru a 12 in (30.5 cm) inside diameter and inflate in a 35 in (88.9 cm) diameter borehole. This system has been applied to repair storage wells with the inflatable packer set in the neck of the cavern. A new casing string can then be installed and the inflatable packer released and dropped into the cavern.

For drilling & completions, reservoir optimization, well intervention and unconventional resource completions, ask your TAM representative for additional information.
TAM's slickline conveyed inflatable packer system (SlikPak™) used in an underground storage well to set a bridge plug as a safety barrier allowing wellhead repairs without full evacuation of the cavern.

Well Intervention
Unconventional Resources
Reservoir Optimization
Drilling & Completions
TAM Solutions

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