Growing energy demand is leading the industry to reevaluate resources found in challenging conditions such as unconventional formations. Cost-effective development of these resources depends upon strategic application of advancing production solution technologies. To enhance production and improve recovery processes, more efficient perforating and fracturing methods have evolved along with advancements in wellbore production hardware via use of solid expandable tubulars or combinations of solid expandable and conventional tubulars.

Expandable technology applied as a completion or recompletion production string provides an optimized or customized wellbore that can facilitate increased fracturing rates, resulting in improved conductivity and enhanced hydrocarbon production. A fully expandable or combination system with standard casing can provide an integral component in either new wells or reentry wells where low-permeability reservoirs, such as those characteristic of unconventional formations, require isolation and separation for pinpoint hydraulic fracturing.

Although successful stimulation is routinely attained from hydraulic fracturing, ancillary downhole tools, such as conventional completion equipment, often compromise results by restricting flow and affecting pressure performance. Solid expandable combined with swellable or bonded seal anchor systems can optimize the fracturing parameters by maintaining larger diameters and providing positive seals for selective multi-zone isolation purposes. These production systems consist of expanded sealing sections in combination with expandable or conventional intermediate tubulars utilizing premium connections thereby providing a superior completion solution for hydraulic diversion.

**TECHNOLOGY DESCRIPTION:**
MaxFrac and ReFrac systems are multizone isolation completion solutions utilizing solid expandable technology and swellable or bonded elastomer technology to enhance fracturing operations. Swellable or bonded elastomers are placed as needed along the length of the expandable liners to attain desired isolation for fracture stimulation. Without mechanical complexity or drill out of components, this technology provides:

- the means to individually create and fracture unlimited zones or entry points
- a much larger ID than conventional solutions
- larger frac volumes and higher frac rates with less required horsepower
- flush ID for ease of intervention in support of refracturing and recompletions
OPERATIONAL CONSIDERATIONS

- Unlimited and customized isolation points can be preplanned to accommodate not only the first but all future refrac programs. This minimizes repeated log analysis.
- Allows for short or long intervals to accommodate high or low density clusters of perforations.
- Long continuous clads that can be installed in a few hours and in single trip. This has been done with high reliability.
- Typical pump down perforating assemblies, composite plugs, tractors and other intervention products can be fully utilized. Suppliers have existing field-proven products compatible with expandable completion strings/liners.
- Pressure/rates and production/stimulation performance through stacked expandable liners remains within acceptable limits.
- Any type of perf and plug system can be combined with an expandable completion.
- Management of debris can easily be addressed with running open float shoe assemblies on bottom and reverse circulating out debris laying on the low side of the wellbore.
- Large flush or near flush IDs for ease of reentry to support repeated perforating, plugging and coil operations.
- Isolation anchor hangers can be easily positioned at any point within the wellbore to ensure the frac is placed where the frac is desired.

LIFE-CYCLE PLANNING

Operators today have numerous completion solution options to address multizone diversion when planning their original well programs. However, as those original well production rates significantly decline, the recompletion options to boost the rates back up are not as clear.

Expandable completion liners can be utilized in new well programs in place of more conventional cemented liners or the more recent frac sleeve completion systems. If the original wellbore is a conventional cemented liner, then expandables are also an ideal recompletion solution for all the reasons and benefits noted herein.

Going forward, expandables now provide operators a true life-cycle solution. This solution provides for the most optimized stimulation program and greatest initial production with the largest flush ID wellbore possible. Further, operators can use this original wellbore as the platform for additional laminated expandable recompletion liners and accommodate future refracturing programs. These expandable recompletions continue to provide the largest flush ID wellbore possible to accommodate easy intervention, optimum frac rates and volumes, and positive diversion of the stimulation materials.

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