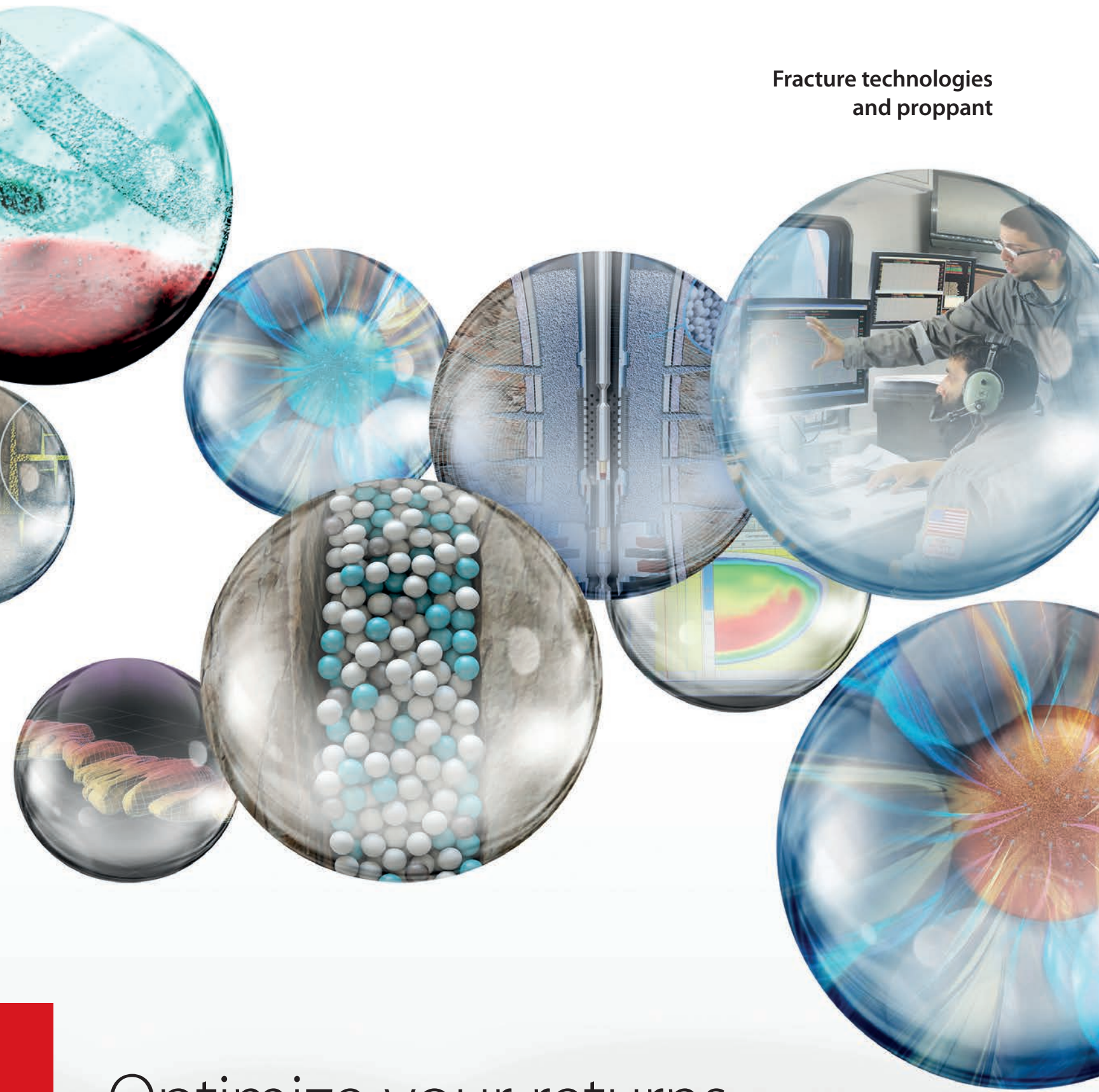


Fracture technologies  
and proppant



Optimize your returns

Integrated technology solutions to enhance production, recovery and efficiency

**CARBO**  
Production. Enhanced.

# Advancing through technology innovation

Innovative fracture and proppant technologies from CARBO, combined with our expertise, help you develop integrated solutions to optimize well performance.

## Meeting production and economic challenges

The pressure on E&P operators to continuously find new ways to improve production, increase recovery and deliver greater efficiencies is greater than ever. CARBO continues to meet this challenge as the leading developer of innovative proppant and fracture technologies to optimize well performance, so you can achieve the best possible return from every well.

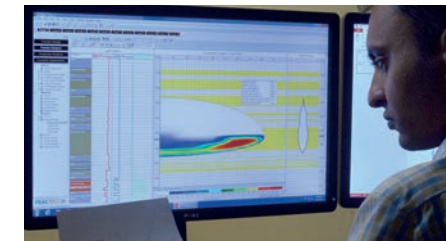
## More ways to enhance your production

Today, our technology portfolio is more comprehensive than ever. We offer more options to help you engineer integrated technology solutions to solve challenges, enhance production and achieve your economic objectives.

Our technologies can be incorporated into any sand or ceramic fracture or completion design. They often represent a small proportion of the total proppant volume pumped, while having a significant positive impact on fracturing efficiency, well productivity and economic performance.

### Our technology platforms include:

- Ultra-conductive ceramic proppant technology
- High-quality, high-performance ceramic proppant and frac sand
- Proppant-delivered production assurance technology
- Proppant-delivered evaluation technology
- Proppant-delivered flow enhancement technology
- Diversion technology



## Full support from frac design to well optimization

Our team of fracture technology specialists can provide end-to-end technical support from frac design and technology selection, treatment supervision and post-treatment analysis. We employ our industry-leading FRACPRO fracture design, evaluation and monitoring software to develop optimized fracture designs and safeguard execution onsite.



## Committed to continuous research and development

We continuously invest in research and development of new technologies. Our cutting-edge Technology Center brings together a wide range of knowledge from different disciplines, including expertise in materials science, polymer technology, oilfield chemistry, fluid systems and nuclear logging. Chemists and chemical engineers contribute a depth of expertise in polymers and coating science, while geologists, ceramic engineers and materials scientists add their critical knowledge of ceramic materials in downhole conditions.

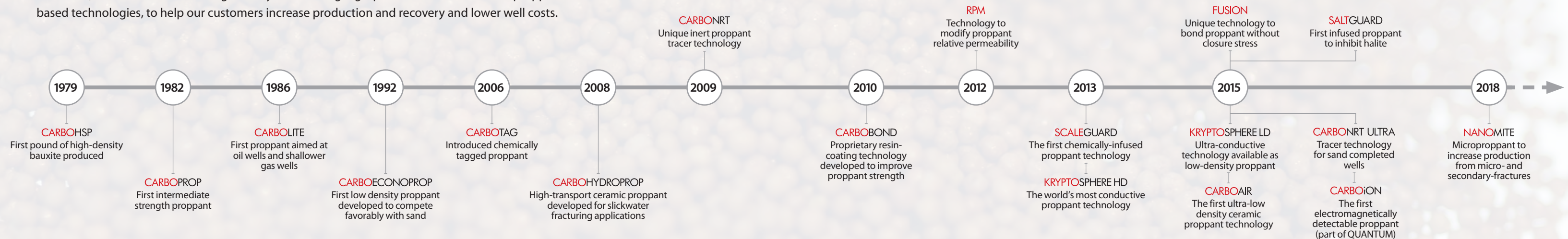


## Quality manufacturing to assure performance

The success of our world-class manufacturing plants and processes is the result of more than 35 years at the forefront of the industry. Our quality-control process begins with the superiority of our raw materials and extends all the way through our supply chain. We track over 2,000 data points during manufacture to assure quality. Our plants are ISO 9001:2008 certified.

## Forefront of technology development

Since 1979, CARBO has been leading the way in delivering high-performance fracture and proppant-based technologies, to help our customers increase production and recovery and lower well costs.

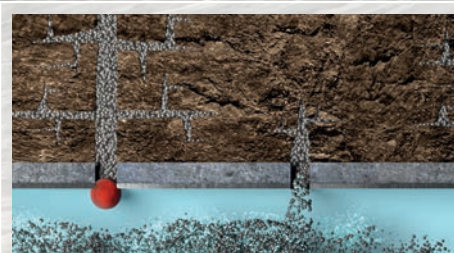


# Extract more value from every well

Integrating our fracture and proppant technology into your ceramic or sand-based frac designs delivers operational efficiencies, enhanced production and increased returns.

## Our technology can be utilized in:

- Unconventional reservoirs
- Offshore wells
- Deepwater wells
- HPHT wells
- Gravel packing and sand control
- Cement evaluation
- Steamflooding/geothermal



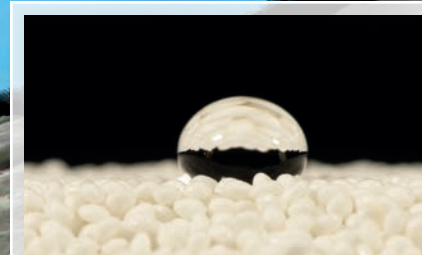
### Improve stimulation effectiveness and efficiency

Various diversion media such as CARBOBALL biodegradable diversion ball sealers are available to redirect fracturing fluids to non-stimulated perforation clusters, ensuring more uniform stimulation coverage.



### Ensure microfractures contribute to production

Ensure your microfractures are contributing to production with NANOMITE microproppant. Sized at a fraction of the smallest proppant commonly deployed, NANOMITE is available as a sand or ceramic microproppant.



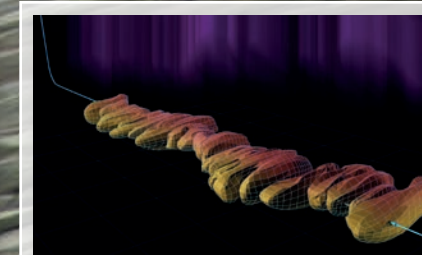
### Improve water-based frac fluid cleanup

To prevent the retention of water-based fluid in the proppant pack, RPM (relative permeability modification) technology is used to alter the wettability, ultimately increasing permeability of the pack to hydrocarbons.



### Maximize hydrocarbon flow for the life of the well

Maximize production in your critical wells with KRYPTOSPHERE, the world's most conductive proppant technology, available in low density or high density to suit your well conditions.



### Evaluate far-field fractures

To evaluate far-field propped fractures, QUANTUM was developed to provide a quantified stimulated reservoir volume based on actual proppant location.



### Control proppant flowback and fines

Reduce effective stress on proppant and prevent proppant flowback with CARBOBOND resin-coating technology. Formulated to be compatible with today's complicated fracturing fluids, the technology is usable in a range of applications.



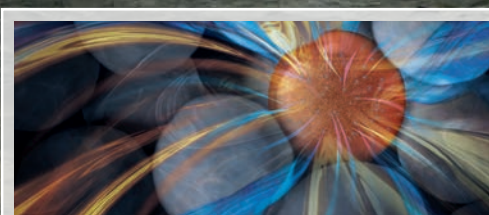
### Build the optimal balance of contact and conductivity

We have a comprehensive portfolio of high-performance ceramic proppant available in a range of densities to meet your reservoir conditions. For low-closure stress reservoirs, we offer high-grade frac sand.



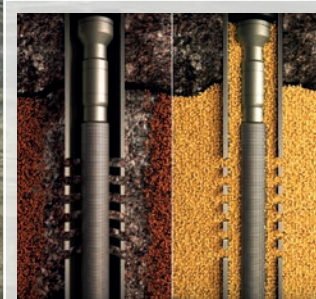
### Evaluate perforation cluster efficiency and near-wellbore connectivity

Gain direct measurement of near-wellbore propped fracture height and width to identify optimal sand or ceramic completion designs by utilizing CARBONRT inert tracer technology.



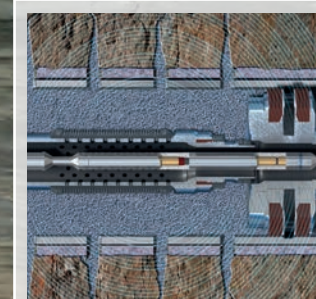
### Efficiently assure long-term production

Proppant-delivered production assurance technologies such as SCALEGUARD provide long-term inhibition to sustain production and lower well-maintenance costs.



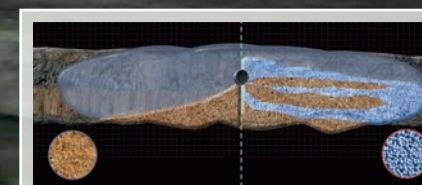
### Increase proppant and gravel pack integrity

Create a bonded, high-integrity proppant pack with or without closure stress with FUSION technology to prevent proppant washout in the non-compressive annulus, in near-wellbore regions and within gravel packs.



### Adjust gravel pack placement at low pumping pressure

Efficiently place gravel packs with lower fluid viscosity and pump rates using CARBOAIR high-transport, ultra low-density proppant technology.



### Improve proppant transport to increase reservoir contact

Increase propped fracture height and length to maximize reservoir coverage and contact area using CARBOAIR with its exceptional transport characteristics.

# Enhancing and protecting your production

Our range of fracture software, technologies and services help you design and build optimized wells, and protect your wellsite assets and your operations from the risk and cost of spills.

## Fracture technology and proppant technical support

We provide end-to-end technical support from frac design and technology selection, treatment supervision and post treatment analysis. Our proppant and fracture technology specialists help you evaluate, develop and optimize your fracture designs through the integration of our advanced technologies, enabling you to create production enhancement solutions.

## Empowering enhanced fracture design and execution

The versatile FRACPRO software portfolio provides unparalleled fracture design, analysis and monitoring capabilities, that enable the engineering and execution of fracture designs to optimize production, recovery and economic performance.

The FRACPRO portfolio improves performance from your wells by using built-in knowledge and real-time data to continuously evaluate and develop successful stimulation designs for any formation type, permeability or location. The software contains integrated modules for fracture design and analysis, economic optimization, and reservoir performance.

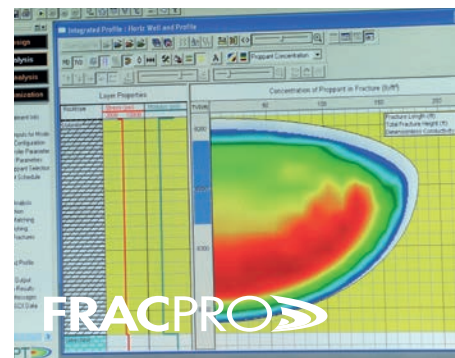
## Safeguard and continuously optimize fracture delivery

Our STRATAGEN field-based fracture consulting services ensure that your fracture designs are executed to plan and overcome any challenges experienced during stimulation operations. Our proven workflows, along with our team's vast expertise have helped operators save millions of dollars on their fracturing programs while improving fracture delivery.

## Protect your wellsite, production assets and the environment

ASSETGUARD provides a range of innovative products that offer the highest level of protection for your wellsite assets and the environment by preventing liquid spills and leak hazards. Our products are engineered with a highly durable polyurea coating technology to provide a seamless, leak-proof, maintenance-free layer of protection. It resists exposure to the harshest UV, chemical and temperature extremes.

Expertly installed by FALCON TECHNOLOGIES services business, our spill prevention, control and countermeasure (SPCC) solutions have no reported failures in 36,000 installations. By avoiding spill-related costs and protecting assets against corrosion, our solutions are proven to lower total life operating costs.





CARBO® is an industry-leading production enhancement company that integrates technologies and intellectual capital to design, build and optimize fractures. Our products and services enable clients to increase production and recovery for the life of the well by identifying the optimal balance of contact and conductivity for the reservoir, and building it efficiently to lower total finding and development costs per BOE.

[carboceramics.com](http://carboceramics.com)

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**CARBO**

Production. Enhanced.