

ENERGY
Oil & Gas



DuPont™ Kalrez® Perfluoroelastomer Parts

Custom Shapes



DuPont™ Kalrez® perfluoroelastomer parts have provided long-term performance in critical sealing applications for more than 40 years. When you need a perfluoroelastomer part with outstanding chemical and heat resistance properties, our Kalrez® product is an ideal choice. We offer a variety of compounds to meet your specific application coupled with the design and manufacturing expertise to solve your toughest sealing challenges.

List of custom shapes

- T-seals
- Lip seals
- X-rings
- Electrical (boot) connectors
- Metal bonded parts
- Spring imbedded seals
- Packers
- Chevron seals and stacks
- Finite Element Analysis - FEA Capabilities

T-Seals

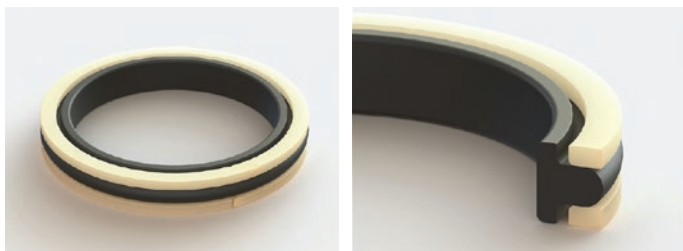
T-Seals build upon the capabilities of O-rings with added resistance to extrusion and twisting.

T-Seal advantages:

- Good static and dynamic sealing
- Improve groove stability / reduce twisting failure
- Excellent extrusion resistance
- Provides bidirectional sealing
- Can fit in standard O-ring grooves

Applications:

- Lodging while drilling LWD & MWD
- Wellhead
- Gate valve, actuator
- Connector seals
- Intervention tools
- Flow control equipment



Chevron seals & stacks

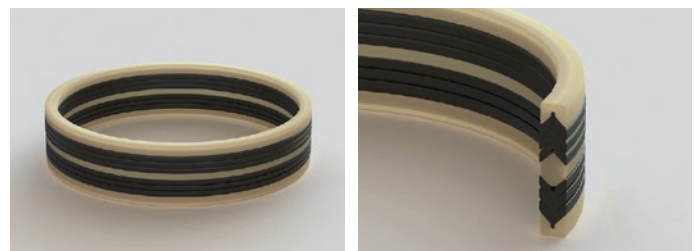
Chevron stacks set are made with several elastomer V-rings assembled on top of each other between male and female plastic adapter. The result is a multi-lip packing system that combines the performance of several elastomer seals with the strength of high-performance plastic, ideal for use in rod and piston applications in highly demanding environments.

Chevron stacks advantages:

- Used in extreme conditions
- Long service life, robust seal
- Rod and piston sealing
- Can be used poor hardware surfaces
- High pressure resistance

Applications:

- LWD, MWD
- Drilling tools
- Wellhead: tubing hangers
- Subsurface equipment
- Risers



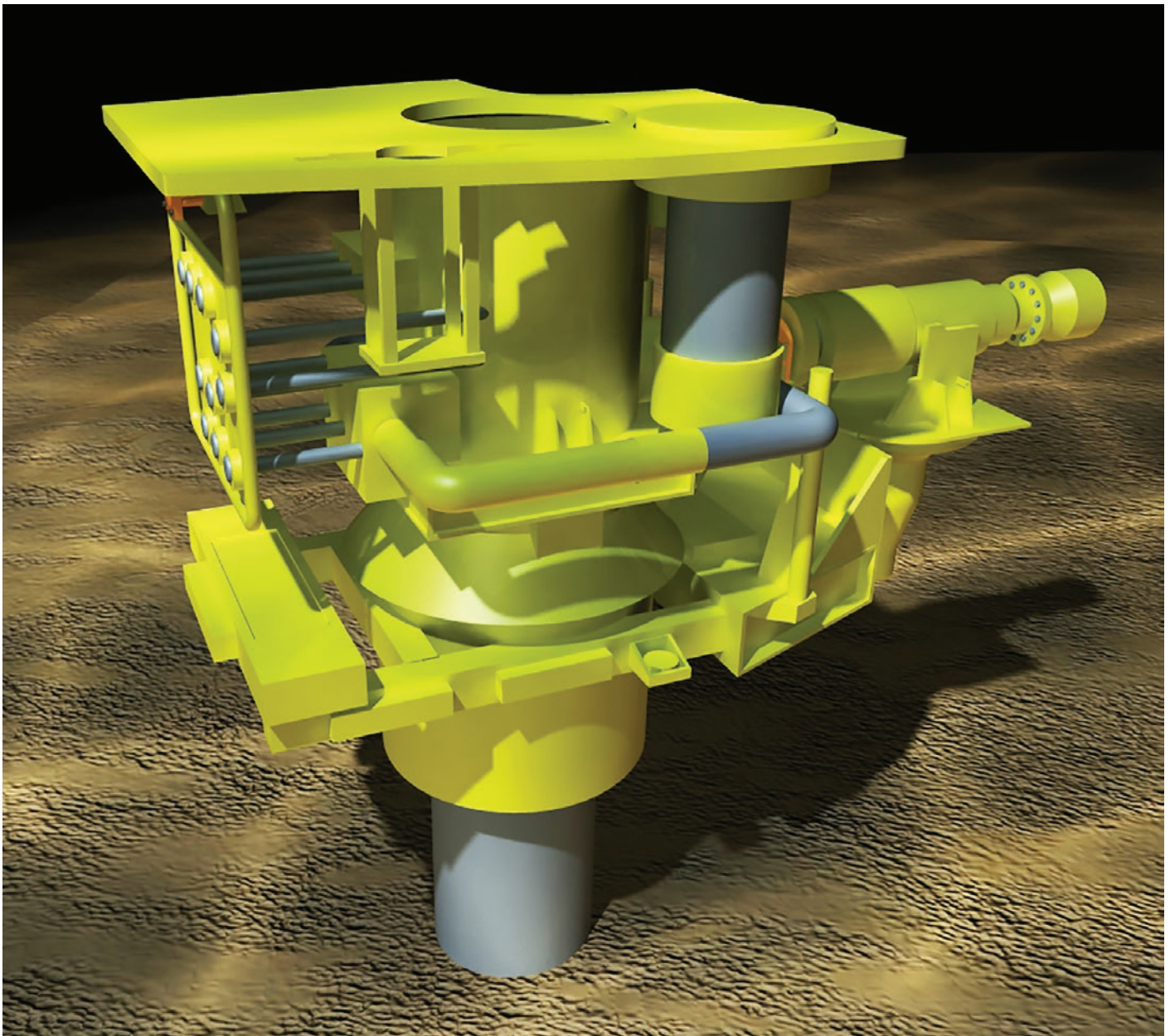
V-ring seals

V-ring advantages:

- Axial shaft seal
- Improved resistance to extrusion under extreme pressures
- Robust component
- Improved resistance to oil production environments

Applications:

- PBR: polished bore receptacle
- Wellhead
- Downhole tools



X-rings

DuPont™ Kalrez® X-rings are an ideal choice for demanding applications where features including sealing at lower % compression, maintaining lower friction, and minimizing the likelihood of twisting or rolling are needed.

X-ring Advantages:

- Multiple points of contact (4 lobes) provide improved sealing in dynamic application
- Suitable for axial and/or radial applications
- Less squeeze (compression %) required to achieve desired sealing which enables for reduced friction in dynamic loading applications (e.g., reciprocating or oscillatory)
- X-rings can be tailored to fit grooves designed for standard size O-rings

Applications:

- As option to O-ring applications
- In dynamic applications



Kalrez® composite seals

Kalrez® composite seals are available in a variety of compounds depending on the thermal and chemical resistance required. Kalrez® composite seal applications include micro valves, micro-pumps, and downhole oil and gas.

Electrical connectors

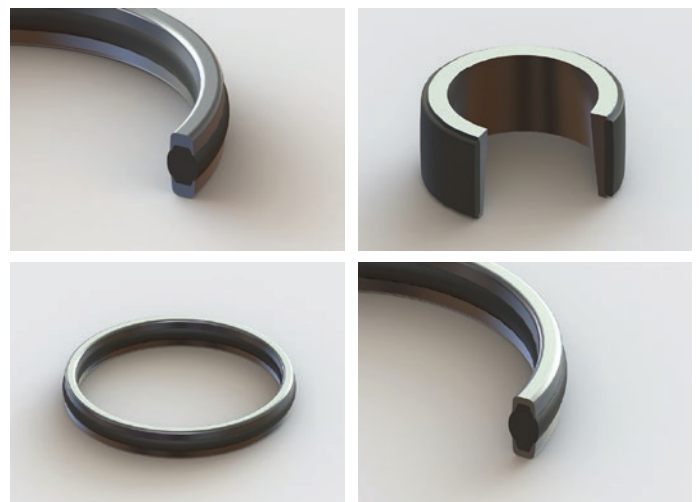
For downhole environments where excellent electrical properties are needed in combination with compatibility to well fluids, sour mixtures, and water among others, Kalrez® connectors exhibit excellent insulative properties making it an ideal perfluoroelastomer for use in harsh oil & gas applications.

Advantages:

- Can be easily installed in the field, reducing downtime
- Insulative properties

Applications:

- To protect electrical connectors



Spring imbedded seals

SS-Seals (Spring Seals) are designed with integrally molded springs that are used in extreme oil and gas critical sealing applications. These seals are specifically engineered for use in the oil & gas industry for surface, subsea, and wellhead equipment.

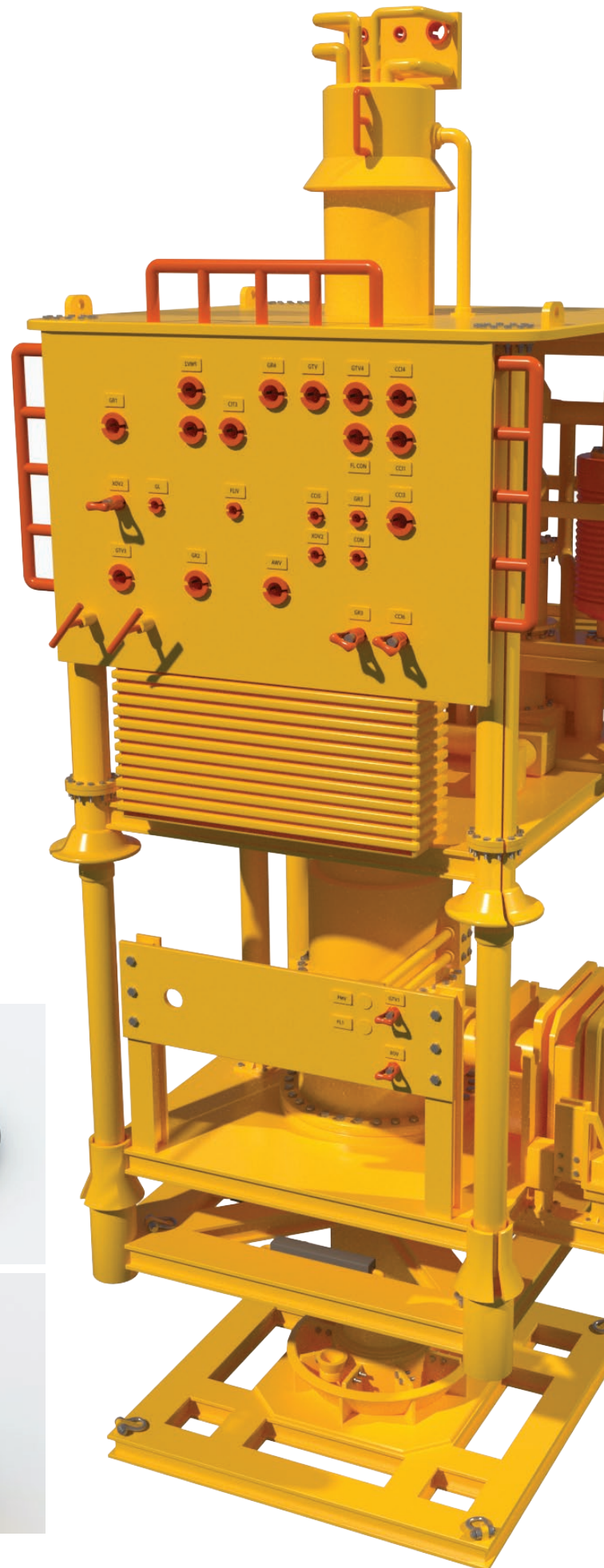
S-seals are used in surface and subsea intervention and production systems, designed to withstand HPHT conditions. Typically, S-seals handle subsea operating temperatures of 280°F and above and sealing bi-directional pressures ranging from 10,000–30,000 psi.

S-seals have been used for many years in sealing applications within oil & gas systems to ensure high reliability for subsea equipment. S-seals are mainly used as a static secondary seal in combination with a primary metal to metal seal, to form a primary sealing barrier system. These critical seals prevent any hydrocarbon leakage from oilfield completion or production equipment, thus preventing system failures and shutdowns.

Custom sealing profiles along with advanced sealing materials are allowing us to keep pushing the envelope. Custom profiles can be designed using FEA to handle the most extreme temperatures and pressures under prolonged exposure to very aggressive fluids and service conditions.

Typical S-seals applications:

- Wellhead
- Connectors
- Tubing Hangers
- Isolation Sleeves
- XT Valves and Actuators
- Tubing Hanger Running Tools
- Tree caps
- Chokes
- Hydraulic Couplers



Lip seals

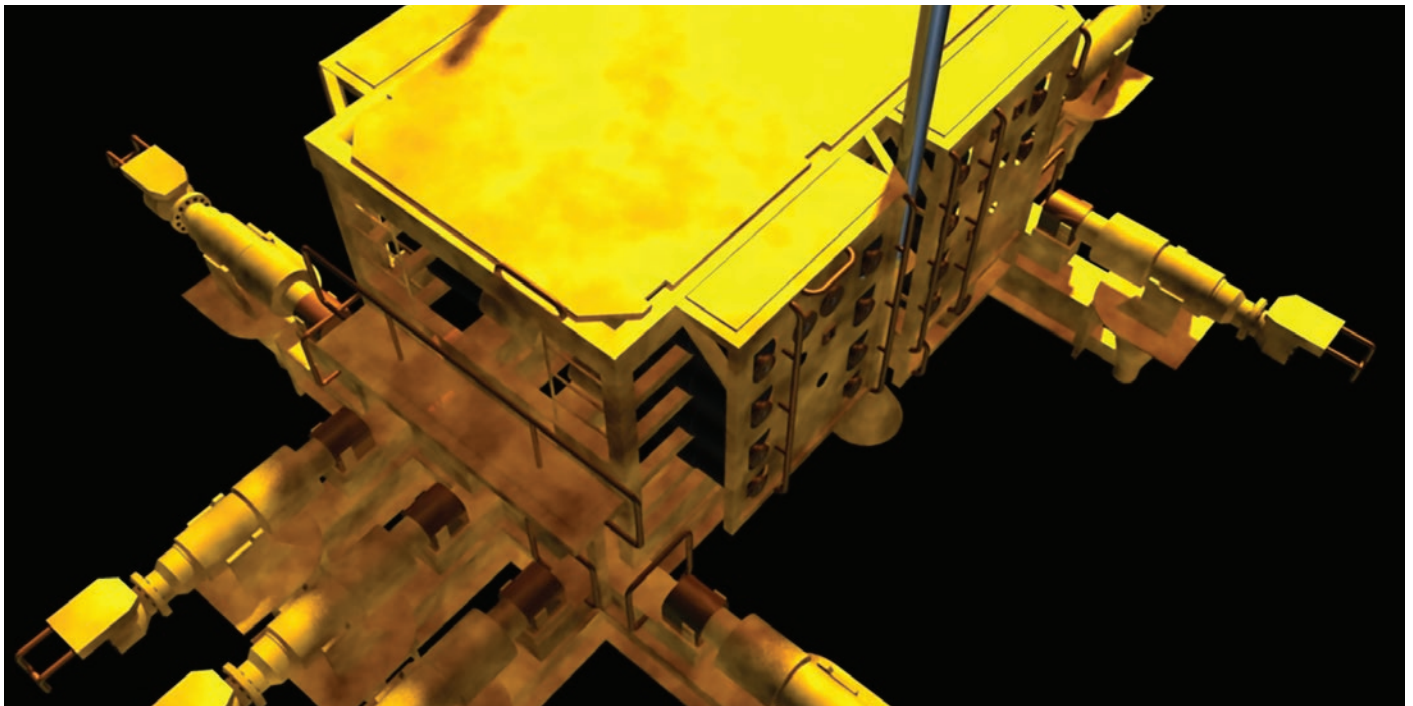
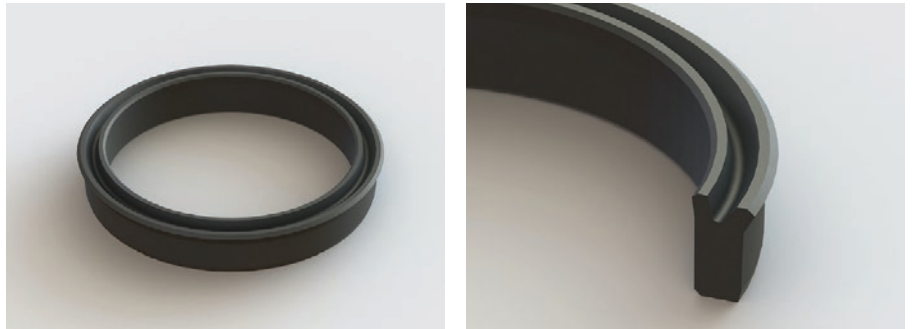
Lip seals are most commonly known as U-cup seals due to their characteristic “U” shaped cross-section. These types of seals are used for both dynamic and static applications. The “U” shape energizes the sealing lips as the applied pressure increases. These types of seals can be customized by making slight modifications to the design to create the best configuration, depending on the application requirements.

On a custom design process, the finite element analysis tool is typically used to refine new seal designs and to reach advanced levels of performance. This is generally established by achieving improved resistance to wear and extrusion while maintaining high sealing performances at both high and low temperatures. These customized modifications provide the necessary features for a wide variety of applications.

U-cup designs are very common designs used in oil & gas sealing applications, such as in offshore equipment requiring high performance and reliability for HPHT.

These types of seals are normally used in the following applications:

- Blowout Preventer (BOP)
- Connectors
- Shaft seal assemblies
- Hydraulic actuators
- Subsea Accumulators
- Subsea Gate Valves
- Swivel and Riser Connections
- Wellhead Seals
- Choke & Kill Connections
- Downhole Tools



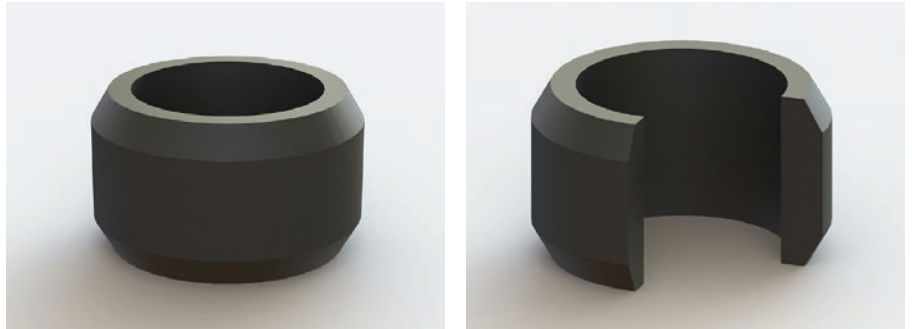
Packers

Service packers are used temporarily during well service activities such as cement squeezing, acidizing, fracturing, and well testing. Packers may also be used to protect the casing from pressure and produced fluids, isolate sections of corroded casing, casing leaks, and isolate or temporarily abandon producing zones. Sealing is accomplished with large, cylindrical rubber elements. For higher pressures (above 5,000 psi), metal rings are used on either side of the elements to prevent the rubber from extruding.

A packer is run in the casing on production tubing or wireline. Once the desired depth is reached, the slips and element must be expanded out to contact the casing. Axial loads are applied to push the slips up a ramp and to compress the rubber element, causing it to expand outward. The axial loads are applied either hydraulically or mechanically.

Applications:

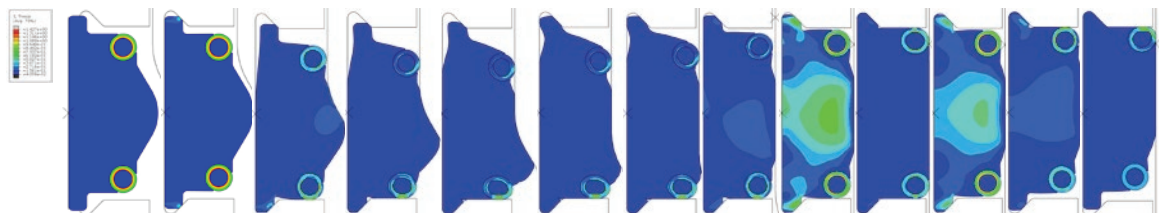
- Casing protection
- Separation of multiple zones
- Isolation packers
- Artificial/gas lift



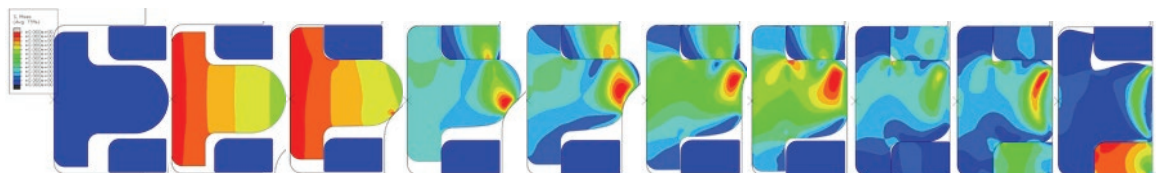
Finite Element Analysis (FEA)

Advanced Finite Element Analysis (FEA) capabilities are available to help design new seal shapes, optimize compound selection and groove geometry, and model performance of parts in service. Use of FEA can shorten development times and produce innovative sealing solutions for long-term sealing performance. Our Centers of Excellence (COE) give customers the advantage of collaboration through application and testing expertise within our global network.

Spring imbedded seal FEA simulation



T-seal FEA simulation



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(03/2022) Reference: KZE A40087 00 C0922 CDP



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