

# New Technologies for Reducing Rod Packing Fugitive Emissions



2019 Gas/Electric Partnership Conference  
Reducing Fugitive Emissions from Compressors  
February 6-7, 2019

David Schroeder - VP Technology  
[www.c-p-i.com](http://www.c-p-i.com)

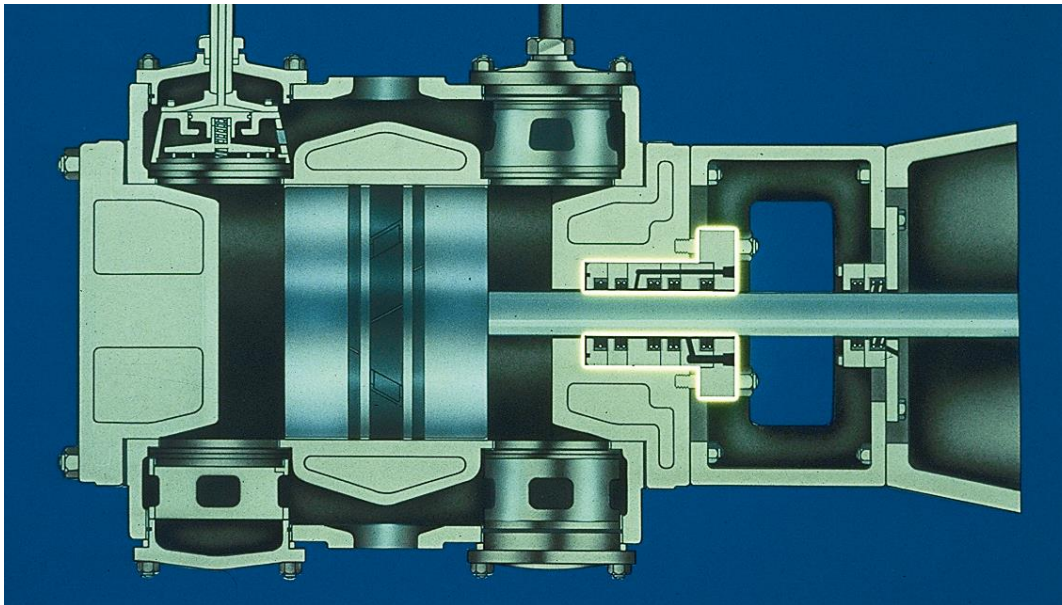


Proven Solutions for the Global Compression Industry™

# ..... Rod Packing Discussion

## Overview

- Packing ring system
- New low emission packing ring technology
- New static seal technology
- New lubrication system control technology
- Maintenance best practices





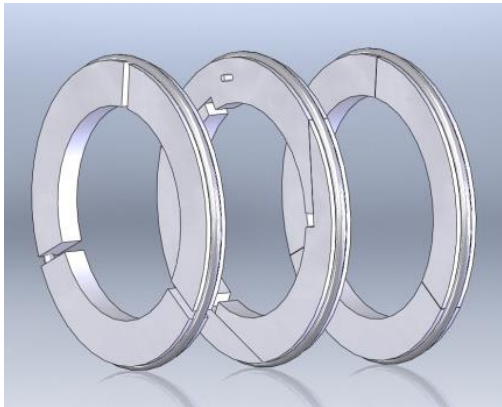
# Packing Rings – Traditional Ring Designs

## Packing Performance - Dynamic

- Free floating, segmental, wear compensating
- Pressure actuated
- Multiple ring combinations

## Opportunities for improvement

- Leakage performance
- New ring combinations and geometries
- Materials



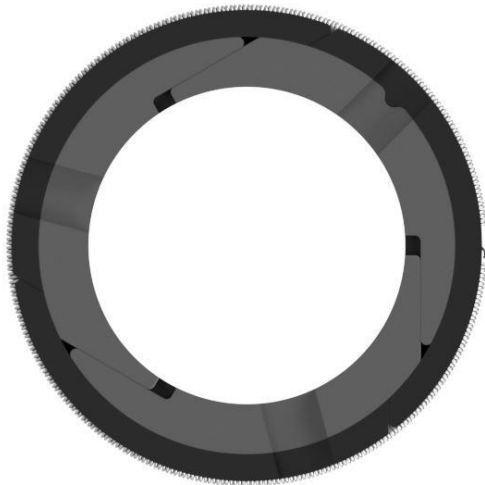
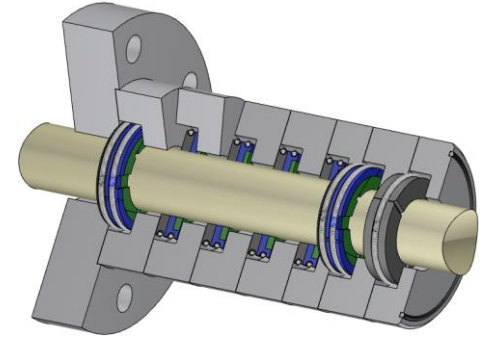
**Traditional Radial-Tangent-Backup Ring Set**



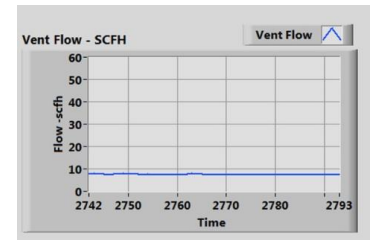
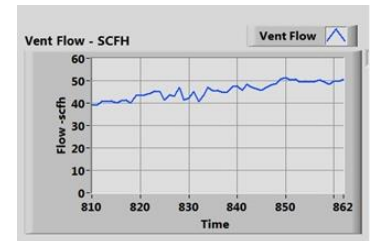
# Packing Rings – New Ring Technology

## New Design Evolution

- New ring geometries
- Improved sealing performance
- Reduced rod loading
- Advanced material options



**New TR<sup>2</sup> Low Emissions Packing Ring**





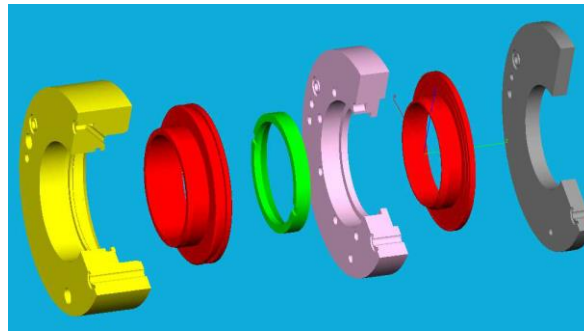
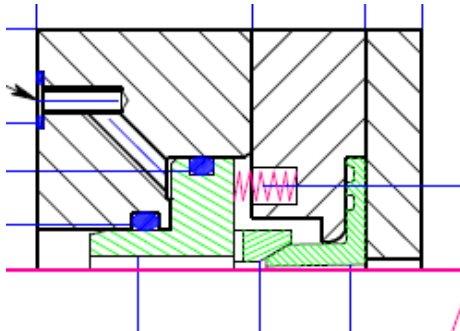
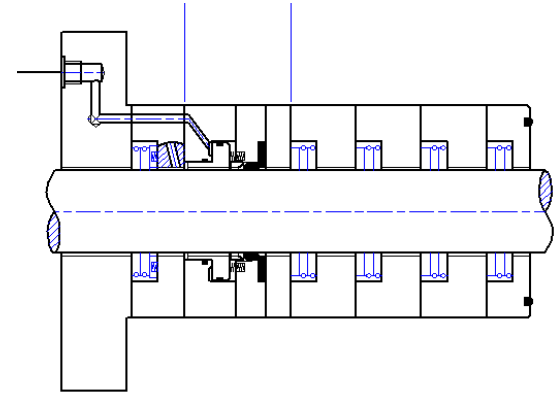
# Static Packing – Traditional Designs

## Packing Performance - Static/Pressurized

- Applications where cylinders remain pressurized after shutdown
- Seal upstream of the vent
- Standard packing and actuated lip seal designs

## Opportunities for Improvement

- Improved sealing performance
- Long term durability
- Conversion space issues

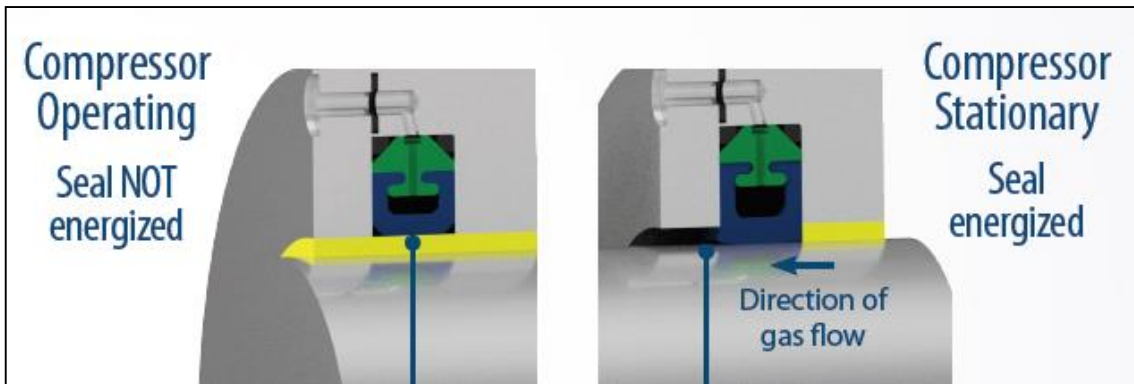
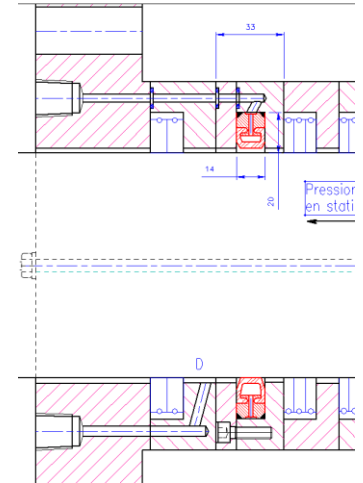


Traditional Lip Seal

# Static Packing – New Seal Technology

## New Design Evolution

- New seal design - better leakage performance
- More reliable seal life over time
- Compact design
- Control/actuation options



New ES<sup>3</sup> Static Seal and Controls



# Packing Lubrication – Traditional Designs

## Packing Performance - Lubrication

- Positive - Reduces friction, reduces wear, provides cooling
- Negative - Too much hinders performance, impacts ring leakage and part life

## Opportunities for Improvement

- Focus on proper lube rates
- Continuous monitoring of feed rates
- Automatic adjustment



Traditional Lube Pump and Monitoring Devices

# Packing Lubrication – New Technology

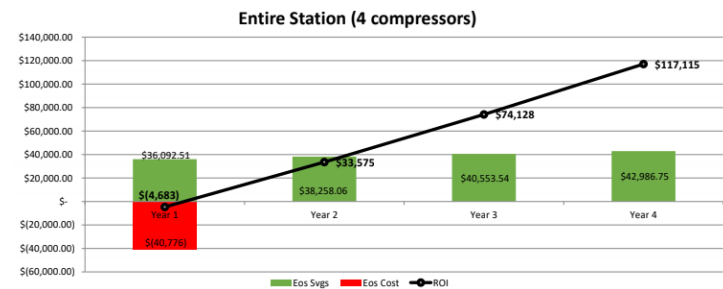
## New Design Evolution

- Programmable supply for automatic adjustment
- Continuous monitoring of supply rates
- Continuous adjustment over the life of the pump
- Lower and stable rates for better ring sealing and life
- Significant oil cost savings opportunities



New EOS Lube Pump Controller

## ROI

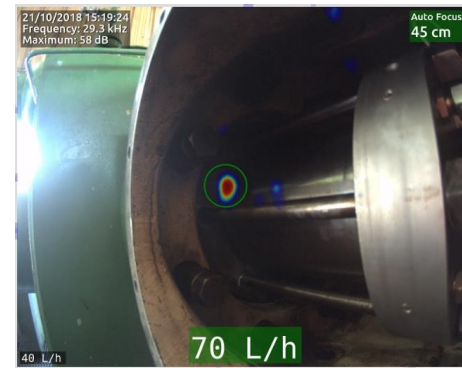




# Rod Packing – Maintenance Best Practices

To minimizing leakage and improve life

- Packing cases - proper reconditioning, gasket upgrades
- Piston rods - inspection of surface conditions, coatings
- Installation practices - ring assembly, alignment, torque
- Maintenance - based on monitoring leakage



Example: STAR Program  
Industry Best Practices

**Lessons Learned**  
from Natural Gas STAR Partners

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Natural Gas  
AN ENERGY SOLUTION

### Reducing Methane Emissions From Compressor Rod Packing Systems

**Executive Summary**

More than 51,000 reciprocating compressors are operating in the U.S. natural gas industry, each with an average of four cylinders, representing over 200,000 piston rod packing systems in service. These systems contribute over 72.4 Bcf per year of methane emissions to the atmosphere, one of the largest sources of emissions at natural gas.

**Technology Background**

Reciprocating compressors in the natural gas industry leak natural gas during normal operation. Areas of high leak frequency include flanges, valves, and fittings located on compressors. The highest volume of gas loss, however, is associated with piston rod packing systems.

# New Technologies for Reducing Rod Packing Fugitive Emissions



2019 Gas/Electric Partnership Conference  
Reducing Fugitive Emissions from Compressors  
February 6-7, 2019

David Schroeder - VP Technology  
[www.c-p-i.com](http://www.c-p-i.com)



Proven Solutions for the Global Compression Industry™