

# WINNING ON DURABILITY

## Endurica User SPOTLIGHT

# TENNECO



## CLEVITE® ELASTOMERS

Tenneco is one of the world's leading designers, manufacturers and marketers of automotive products for original equipment and aftermarket customers with 71,000 team members at more than 260 sites worldwide. Tenneco's four business groups – Motorparts, Performance Solutions, Clean Air, and Powertrain – deliver technology solutions for diversified global markets, including light vehicle, commercial truck, off-highway, industrial motorsport and the aftermarket. Tenneco has won many awards, including General Motors Supplier of the Year (5 consecutive years); the automotive suppliers PACE award for superior innovation, technological advancement and business performance; and the PACCAR 10 PPM Quality Award for meeting the truck manufacturer's (Kenworth, Peterbilt and DAF) stringent quality standards.

### *Elastomeric Products Include:*

Suspension Bushings

Control Arms, Bars, and Links

Mounts: Body and Subframe, Engine and Transmission, Shock and Strut

Isolators: Suspension and Exhaust

Endurica's methods give us robust life-prediction capabilities and are really good tools to help us determine which design option is the best. We're using it up-front, during development, and during production – we're using it everywhere we can.

– Guy Smith  
Chief Engineer/CAE Manager  
Tenneco Clevite Elastomers

### *Endurica Value Add for Tenneco:*

- Shorten product development cycles
- Cost reduction and Lightweighting
- Increase quality, speed to market
- Product development risk reduction
- Leader in market development



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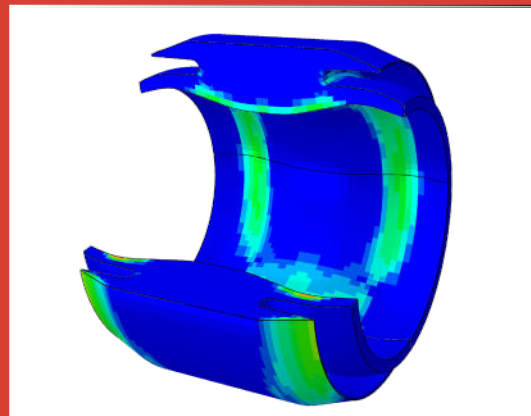
## CLIENT DURABILITY REQUIREMENT

Tenneco's OEM customers are challenging their suppliers to provide virtual validation of durability performance requirements. OEMs are reducing financial support for multiple iterations of time-consuming physical prototypes and testing while also expecting performance standards to be maintained. In new business proposals, OEMs are seeking earlier evidence to support durability targets. In ongoing development programs, they require rapid responsiveness to design changes. In production, they require strong forensic and troubleshooting capabilities to quickly resolve durability issues that may arise.

## SOLUTION APPROACH

Tenneco has used Endurica's workflows since 2010 to fully test 50+ compounds and perform 2,100+ Endurica fatigue simulations to meet their customer demands.

*Tenneco's material testing lab is equipped and qualified to measure in-house all of the material properties used in the Endurica durability simulations. Their testing capabilities include: hyperelastic stress/strain, critical tearing energy and fatigue threshold with the Coesfeld Intrinsic Strength Analyser ( $T_c$  and  $T_f$ ), fully relaxing and nonrelaxing fatigue crack growth rate, and crack nucleation/crack precursor size ( $c_0$ ).*



*Durability simulations are a key component of the engineering package Tenneco uses to win new business from their OEM clients. The ability to efficiently and accurately simulate road loads, block cycle schedules, and multiaxial, variable amplitude load inputs as part of routine production engineering workflows sets Tenneco apart from its competition.*

**Endurica has made it possible to test designs on durability prior to building prototypes. This cuts cost, time, and the number of iterations to get a design that works. Endurica has made our operations more efficient by saving on tooling, components, and raw materials. Customers now require virtual durability prediction in technical reviews. Without it a company cannot win new business. Tenneco has included Endurica results in numerous technical presentations shared with customers, and it has been used to win business.**

— Scott Braddock  
Principal FEA Engineer  
Clevite Elastomers

## **Endurica**

Get Durability Right®

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