

# THE EVOLUTION OF **BALL JOINT & TIE ROD** DESIGN



**SEALED FOR  
LIFE**

**TRW**

# SEALED FOR LIFE

There's always more than one way to do something - but at ZF Aftermarket we use more than 100 years of experience, engineering expertise and technical know-how to determine the best way. And by the best way, we mean truly understanding the part in relation to the system in which it operates. This way, we can choose the best materials and combine them with the best manufacturing process to offer the best solution.

## **WE BELIEVE THAT THE BEST BALL JOINTS AND TIE RODS ARE 'SEALED FOR LIFE'**

We use the highest quality grease during the manufacturing process of our 'Sealed for life' joints. This means we offer optimal performance for the life of the TRW branded joint - which has been reported in the region of 10 years or 150k miles.

## **OPTIMAL PERFORMANCE – WITHOUT THE FUSS**

These joints take care of themselves: No fuss, no constant monitoring and no chance of contamination. In a busy world, it's the simple things that make all the difference.

## **FEWER OE WARRANTY CLAIMS**

In addition, our OE customers have seen a reduction in warranty claims once they switched to 'Sealed for Life' joints because research has shown many customers were simply not maintaining their vehicles, even while still under warranty.

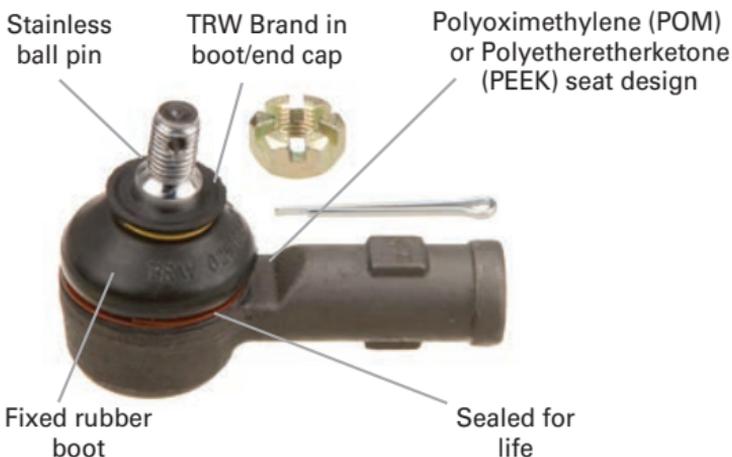
A TRW SYSTEM



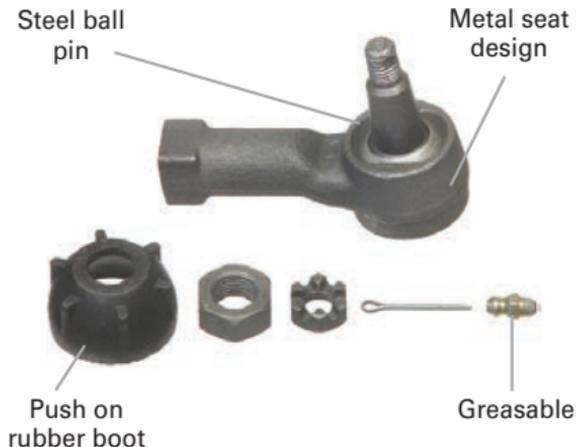
## 'SEALED FOR LIFE' VS 'GREASABLE' JOINTS

Some competitors offer ball joints to which grease can be added. This will work well only if the joint is consistently and routinely greased. But even then, once a path has been created for the grease to egress, a path has also been created for the ingress of elements such as water, road salt and grit; which cause contamination leading to premature wear.

### TRW OE DESIGN



### COMPETITOR AFTERMARKET DESIGN



**WE'RE MARKET LEADERS IN  
AUTOMOTIVE SAFETY ALL  
OVER THE WORLD**

## LOW FRICTION TECHNOLOGY

TRW's state-of-the-art tie rod and ball joint program includes the latest, high performance designs which incorporate the following features and resultant benefits:

**Housing** - The outer housing is manufactured using forged or cold formed steel for additional strength and reliability under the harshest of conditions.

**Stud** - The full ball metal stud is highly polished and encapsulated within a high strength polymer bearing for smooth articulation. This low-friction allows for free range of motion and provides smooth steering and suspension which restores the vehicle to original operating performance. The ball pin is either stainless steel or geo-met or similar coated for corrosion-free performance.

**Polymer Bearing** - Unlike competitors who use metal, we utilize a high strength and resilient, low-friction glass fiber reinforced polymer bearing. This enhances road shock damping and provides smooth movement.

Our bearings are made from either standard polymer (poloximethylene) known as the POM design, or high temperature polymer (polyetheretherketone), known as the PEEK design.

The strength of the polymer bearing can absorb the toughest road shocks and retract back to the original shape without loss of steering or suspension feel.



## TESTED AND TRUSTED

TRW a brand of ZF Aftermarket sets the standard within the Aftermarket, with a testing program that goes beyond the ordinary to ensure every chassis part produced is in line with the Original Equipment (OE) specification.

We utilize on the road tests and the most advanced test machines, so you can be sure that TRW parts are tested for your safety and longevity.

## TESTED FOR SAFETY, TESTED FOR DURABILITY

Every TRW part has four levels of testing/technical/audit review before approval is given.

- Independent endurance testing (500k cycles) at LBFTest institute in Germany
- Full measurement/drawing technical review by TRW engineering
- In-house testing for Rotational & Articulation Torque and Pull/Push out test
- Independent factory audits to ensure all processes are being followed

In addition to the above, we also do:

- Acoustic measurements to ensure driver comfort
- Environmental resistance tests for all weather conditions
- Road testing at TRW tracks around the world

## Tech Hotline

**800-321-0784**

[www.trwaftermarket.com/steeringlinkages](http://www.trwaftermarket.com/steeringlinkages)

A TRW SYSTEM





## PRODUCT EVOLUTION

The original ball joint and tie rod designs, used throughout the 1970s were metal-on-metal and required regular grease maintenance.

In the early 1980s, vehicle manufacturers shifted in favor of low friction technology which consisted of a highly polished ball stud, high strength and resilient lower polymer bearing and an exclusionary seal to lock out contaminants.

Modern vehicles are highly complex systems in which all components mutually affect each other. The components work together to provide very specific handling characteristics in a vehicle. Modern electric steering racks require low friction linkages to ensure proper function. A sealed-for-life design ensures a constant low friction linkage to keep the vehicle operating as intended.

Modern electric steering (predicted to be used in 50% of vehicles by 2020) requires low friction linkages to ensure proper function of the steering system. Sealed-for-life designs ensure a consistent low friction linkage over the operating life of the vehicle.



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