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THE FACTS ON ROD ENDS

STORY BY JOHN MCCRORY
 PHOTOS BY DANA ERVIN

Refurbishing an older race car really requires you to question and evaluate every component on the car. Are parts worn, and how do you tell? Even if various parts do appear to be good, should they be replaced by newer, better performing parts anyway?

Rod ends are one of the many items that can cause headaches for the race car refurbisher. Here are a few tips to help you avoid a few of those headaches.

When evaluating the suspension rod ends on a race car, the first thing to do is to eliminate joints that don't belong on the suspension of a race car in the first place.

Joints with brass or bronze races or joints with plastic races should be eliminated right away. Races made of these materials have relatively low compressive strengths and do not take shock or vibratory loads very well. They tend to loosen up quite drastically under hard use. They are sometimes acceptable for secondary linkage applications, but really aren't up to the demands of race car suspension applications.

Two other immediate removals are rod ends with grease fittings and rod ends with hollow shanks. Both of these features are used for relubrication purposes on industrial rod ends, but ultimately compromise the mechanical performance of the parts.

Once you determine if the basic style of the rod ends you have is acceptable, the next step is to examine the joints you are thinking of reusing.

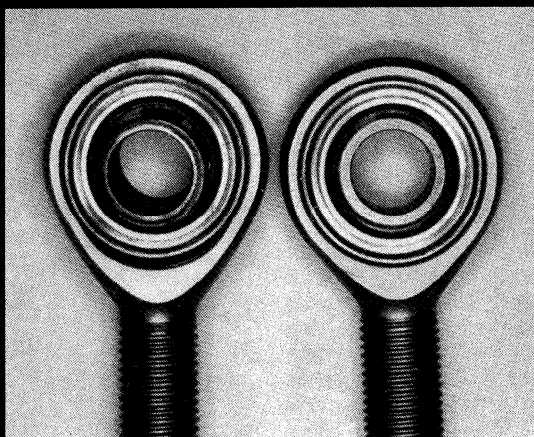
Start with the overall condition of the joint. Is the body bent? Are there signs of stretching on either the shank or head? Are there marks that indicate the part had ground against something else (maybe the track)? Does the outer face of the race have dents in it indicating over-misalignment, or is the race loose in the body or partially pushed out of the body? These are some indications that the joint has been abused,

possibly in an accident, and should be replaced. If the joint shows none of these signs of abuse, magnetic particle inspection (MagnaFlux testing) should be done to ensure there are no cracks in the unit that may have been missed in your visual inspection.

The next thing to do is to evaluate the amount of wear on the bearing portion of the joint (this will also apply to spherical bearings). Any play in these joints will be more noticeable when the car is all together. Shake each corner of the car and try to note any play relative to a joint and its mounting bolt. A finger touched to the joint and an adjacent surface should detect any relative movement.

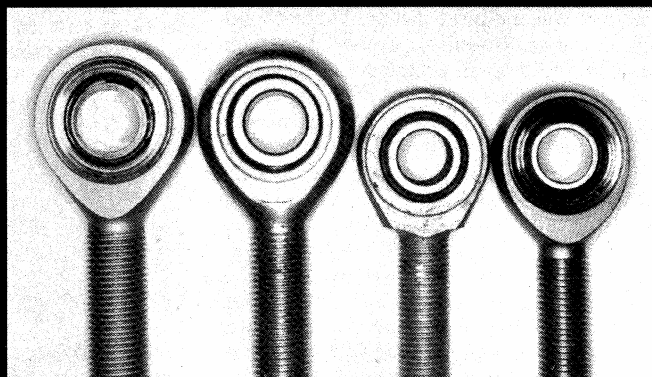
Wear can still be evaluated with the parts off the car. On a unit lined with a non stick surface material like Teflon (DuPont's trademarked name), low breakaway torque (the force required to move the ball) is not necessarily a sign of a worn-out joint, although it can be. This contradictory statement is rooted in the fact that different

manufacturers of bearings have different designs of PTFE (Teflon) liners. These different designs have different performance characteristics. One brand of bearing may start out with a very tight fit that gradually loosens up over its life until it reaches a zero torque fit just before it wears out. Others may start out tight, fall off quickly and then maintain a light fit for long periods of time. In either case, the



The joint at left has been stretched.

Two rod ends from the mid-'60s flanked by modern rod ends. Design and material advancements give today's rod ends much greater performance than was generally available 20 or more years ago.



important thing to look for is an absence of play either axially (side to side) or radially (along the direction of the shank).

Judging the wear on a metal-on-metal joint is a little more difficult as all metal-on-metal joints start life with a small amount of clearance. Comparing your used joints to a new one is a good place to start. An unscientific method is to hold the shank of the joint and give it a good shake. If it rattles, it's worn out.

Looking at it from another perspective, if you car's suspension now has metal-on-metal joints, why not replace them with PTFE-lined joints? Remember, lined joints are more precise because of their zero-clearance fit and they're also maintenance free. If you have a car that's approaching 20 years old or older and still has the original joints on it, they may be metal-on-metal joints. Even though aerospace companies such as Fabroid and Southwest Products produced excellent bearings, for the most part lined joints weren't as readily available or economical then as they are now.

These types of checks are about all a racer can do to evaluate used rod ends. Having said all that, however, there is one final thing for you to consider: the fatigue life of the rod end.

The body of a rod end will fail basically for one of two reasons. One is severe overload. Hit a curb, another car, or a wall too hard, and you can over-stress a joint to the point that it breaks. The physical checks you've performed may catch a joint that's been stressed to, or close to, the breaking point.

The other way the body typically fails is through fatigue. Rod ends are subject to metal fatigue, just as any other metal component. Unfortunately, there is no way to tell if a rod end that has passed your physical observation is at or near the end of its fatigue life. Because of this fact, now is the time to consider how and where the joint in question has been used. (Hopefully you've kept track of where each joint goes on the car.)

Rod ends can be loaded in many different ways. They can be loaded in straight tension or compression along the direction of the shank, as on a suspension pull rod or push rod. They can have a straight-line reversing load, as on a tie rod or radius rod. They can also have bending loads applied to the shank, as when a rod end is used as a ball joint. Or there can be a combination of loads in various directions. Each of these loads will affect the fatigue life of the joint.

So what do you do? The safest thing is to automatically replace all the old joints with appropriate new joints. The most realistic thing to do is to evaluate the physical condition of each joint, consider the stress put on the joint in its particular application, figure out what your budget will allow and what you can save now versus future costs if the joint fails.

Hopefully, now you have one less area of concern in the refurbishing of your race car.

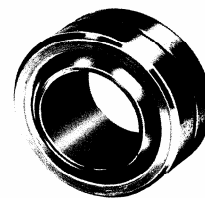
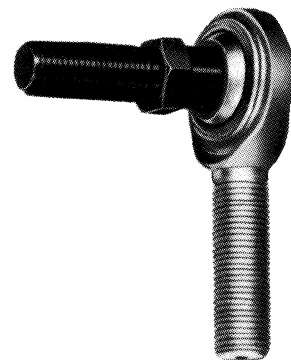
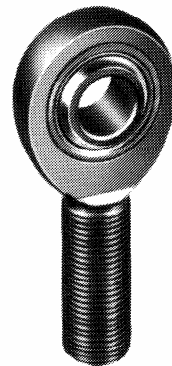
HISTORICAL ACCURACY VS. SAFETY AND PERFORMANCE

Rod ends have been used on race cars for more than 40 years. Some of the first types of cars to use rod ends instead of street-car-

derived ball joints were the West Coast Indy cars of the late '40s and early '50s produced by builders such as Frank Kurtis.

Just like those Indy cars, rod ends have changed a lot over the past 40 years. New construction techniques, new materials and refined design have led to joints that are much stronger and longer lasting at a relatively lower unit cost than when race cars first were built with rod ends. One result of this progress is that rod ends today look different than rod ends of 40, 30, or even 20 years ago. If you own an older race car and you're restoring it to run on a race track, reconcile yourself to the fact that today's rod ends may not look like ones that are period correct. Reusing old rod ends of questionable pedigree because they look "correct" is just asking for trouble. In the end, that correct look will mean nothing when an old, outdated joint fails.

John McCrory is with Aurora Bearing Company, one of the largest rod end suppliers in the free world.



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