First off, what the heck are "splines?" The dictionary definition is: Any of a series of projections on a shaft that fit into slots on a corresponding shaft, enabling both to rotate together.

In layman's terms that means some long gears on one rotating part that are paired with and fit into some corresponding grooves on another rotating part in order to transmit power.

From front to back, 2 valve K bikes have three sets of splines:

- Clutch/transmission
- Transmission/drive shaft
- Drive shaft/final drive

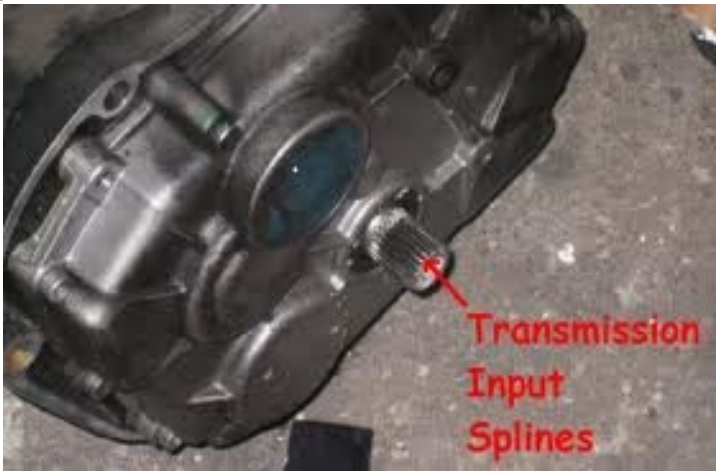
4 valve K bikes have four sets of splines:

- Clutch/transmission
- Transmission/ front half of drive shaft
- Front half of drive shaft/rear half of drive shaft
- Rear half of drive shaft/final drive

CLUTCH/TRANSMISSION INPUT SPLINES: This set of splines transmits power from the engine via the clutch to the transmission.

Clutch friction plate splines:

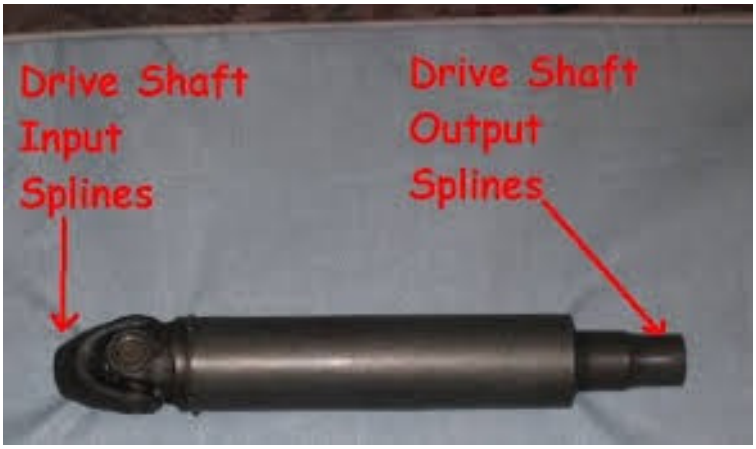
Transmission input splines:



TRANSMISSION OUTPUT/DRIVE SHAFT INPUT SPLINES: This set of splines transmits power from the transmission to the drive shaft which spins inside the swing arm.

Transmission output splines located at the right rear of the transmission:

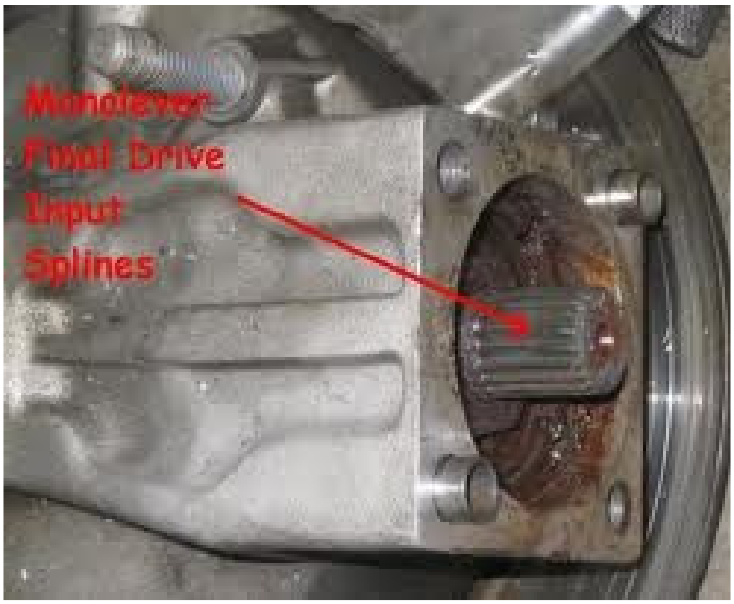
2 valve K bike drive shaft splines:



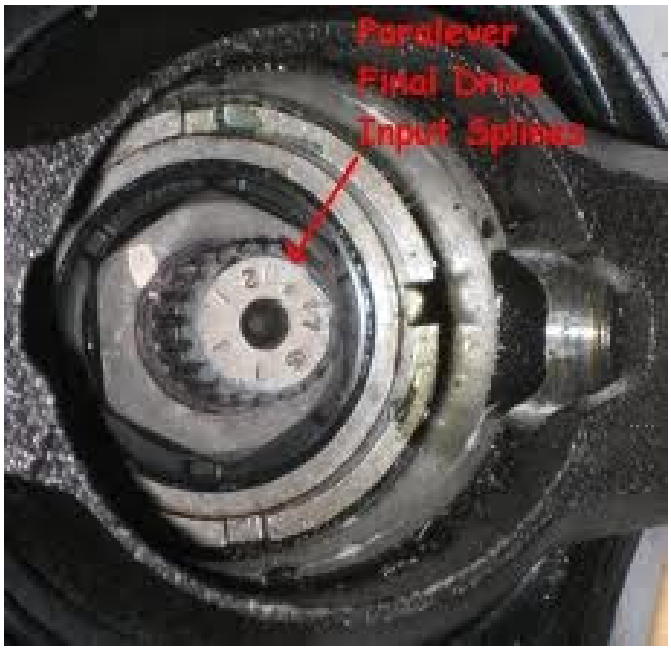
4 valve K bike drive shaft splines:

FINAL DRIVE INPUT SPLINES: The drive shaft output splines transmit power to the final drive via these splines.

2 valve K bike monolever final drive input splines:



4 Valve K bike paralever final drive input splines:



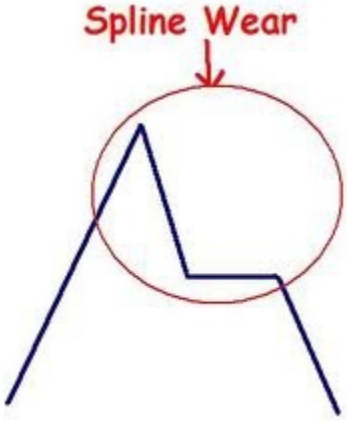
SPLINE WEAR: In general spline wear is caused by splines sliding back and forth against each other while under load. (While shifting for the clutch splines. While accelerating or engine braking for the drive shaft splines.) If not kept properly lubed then this wear occurs much more quickly due to metal to metal contact while sliding under load.

Here's some driveshaft output splines from a 52k bike that have been kept well-lubed and are in pretty good shape:

Here's some drive shaft output splines from a monolever 2 valve K bike that show lots of wear:

(Those aren't cobwebs. It's fibers from the paper towel I used to clean the grease off of the splines for the picture.)

The wear pattern is often referred to as "the mountain effect" because worn splines look like this:



WHICH SPLINES SHOULD I CARE ABOUT AND KEEP WELL_LUBED? Well, all of them really. However, the ones that are most susceptible to wear are the ones that slide under load.

For both 2 and 4 valve K bikes the clutch friction plate slides along the transmission input splines as you let the clutch out. Therefore, these splines are subject to wear and should be kept well-lubed. A common symptom of them requiring lubrication is difficulty downshifting or "false neutrals" (ending up in between gears) when downshifting, usually on 4➔3 or 3➔2 shifts. If you're new to riding K bikes then this symptom may be hard to recognize.

When lubing the transmission input splines be sure to take a close look at the clutch plate splines for the mountain effect. Usually those splines start to wear faster than the transmission input splines but when they start getting bad they also start to cause wear on the transmission input splines. Given how much effort it takes to get in there, if there's any significant mountain effect on the clutch splines then I'd recommend replacing the clutch friction plate with a new one while you have things apart.

For both 2 and 4 valve K bikes the drive shaft input splines are held in place on the transmission output splines by a circlip inside the splines so those rarely, if ever, wear out.

On 2 valve K bikes the monolever final drive design causes the drive shaft output splines to slide back and forth along the final drive input splines as the suspension travels up and down so these too are subject to wear if not kept properly lubricated. (Some people claim this is a "design defect" of the monolever rear end. However, since properly maintained final splines can last 100,000 miles or more I consider it more of a maintenance issue.) The only good way to detect wear on these is by visual inspection which requires removing the final drive.

On 4 valve K bikes, the drive shaft output splines have a circlip that holds them in place on the final drive so those are not as subject to wear and will usually last the bike's lifetime. The intermediate splines are robust and don't seem very prone to wear.

WHAT SHOULD I LUBE MY SPLINES WITH? Any lubricant containing a fair amount of molybdenum disulfide (a.k.a. "moly") is good for lubricating sliding metals. Here's a few of the more popular moly lubes favored by K bike owners:

Honda Moly 60 Paste: This is a "grease" containing 60% moly available at Honda car and motorcycle dealers as well as some other auto parts stores and Fleabay vendors. A 3 oz. tube of it costs <$10 and will last most people a lifetime. The Honda Part number is 08734-0001.

50/50 mix of Honda Moly 60 and Wurth SIG 3000 Spline Grease: This is one of the lubes recommended by one of the top BMW "gurus" in the country, Paul Glaves. The Honda provides the Moly and the Wurth 3000 is uber-sticky stuff which keeps the moly around longer so your splines stay well-lubed and you don't have to lube them as often. Based upon Glaves' recommendation on the MOA forum that's what I use these days. The only place I've found it for sale online is at mgcycle.com.

GD 525: This is a product from Texas-based Guard Dog Moly and is another recommendation from Paul Glaves. I haven't tried this but if Paul Glaves says it works that's good enough for me. It also doesn't require mixing like the Honda Moly 60/SIG 3000 lube.

HOW OFTEN SHOULD I LUBE MY SPLINES? There isn't a hard and fast answer to this one other than "enough to minimize the wear." You probably can't do it too often though.

2 valve K bike monolever final drive splines: Many owners recommend lubing these splines every time you replace the rear tire. Another approach would be to do them every 10,000 miles. That's what I do. When you remove the final drive without draining it it gets rather messy unless you keep it upright. I use Mobil 1 synthetic gear oil on 20,000 mile intervals so that way I'm sure the splines stay well-lubed but only have to do it once without draining the gear oil from the final drive.

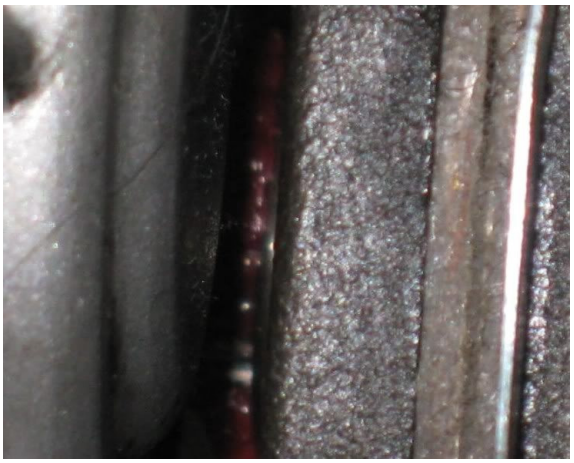
Clutch/transmission splines: BMW hardened the transmission input splines in 1990 and the recommended service interval was changed to every 40,000 miles. Before that it was annually I think but that's overkill if you're not logging a lot of miles. I don't have right answer but every 20-25,000 miles on a pre-90 bike and every 40,000 miles on later bikes sound reasonable to me. However, if you ever start experiencing sticky downshifting then I'd get it done soon because that sticky downshifting is caused by metal to metal contact. (On the first K bike I logged any miles on I didn't know about the downshifting thing and wrote it off to just being a klunky transmission. About 8,000 miles later I was left stranded when my splines stripped. It was an expensive learning experience.)

4 valve K bike paralever final drive and drive shaft splines: I do it every 20,000 miles when I change the final drive gear oil. That might be overkill though.

HOW MUCH SPLINE LUBE SHOULD I USE? On the drive shaft and final drive splines you can't use too much. Any excess will spin off harmlessly onto the interior of the swing arm.

There is the VERY mistaken notion about that you need to be sparing with the clutch plate/transmission spline lube because if you use too much it will spin off onto the clutch friction surface. This is only partially true. If the lube comes out of the front of the splines then it can indeed spin off onto the clutch friction surface. However, if it comes out the back of the splines then, due to the raised collar on the rear of the clutch friction plate then it will just spin off harmlessly onto the inside of the bellhousing. So the best approach is to clean all of the old grease out of both sets of splines and lube the hell out of **only** the transmission input splines before putting the transmission back on.

It this picture below I used Mobil 1 synthetic bearing grease for demonstration purposes only because it's red and more visible in the picture. It's a clutch plate assembly pushed onto transmission input splines. The very fact that you can see that excess lube from the side demonstrates that it is well behind the rear clutch plate friction surface and will just spin off onto the bellhousing.



And here's how much of the Honda/Wurth 50/50 lube that I used when assembling my K75F:

Finally, if you pull your bike apart and the splines appear to be rusty then don't be alarmed. It's probably just the old red spline grease that BMW used to use.

Thanks for reading,
Dr. L. Duck Hubbard

By the way, if you enjoyed this post then please go to Amazon.com and buy my book, ***Splyanetics***. It will teach you how to be a happy successful person and provide you with enough disposable income to own and ride a BMW K1600GTL.