

Back Country Times

Volume 10 Issue III

March 2011

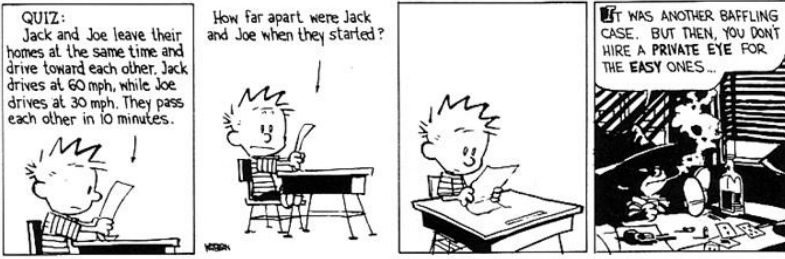
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This Issue....

- ~ Meeting of the Minds
- ~ Seriously
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- ~ Trail Runs
- ~ Tech Ramblings

Schedule of Events

- * **March 8th** ~ General Meeting @
7:00pm, Arby's on Mt. Rushmore
- * **March 22nd** ~ Board Meeting @
7:00pm, Arby's on Mt. Rushmore

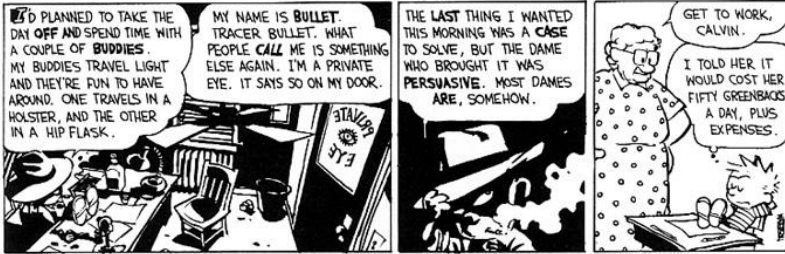


Meeting of the Minds

Some important issues from last meeting:

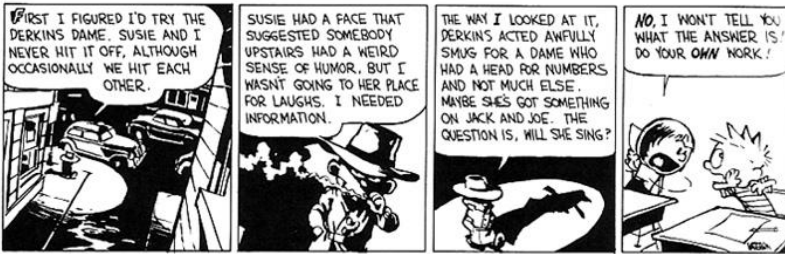
1. Second reading to set aside \$5,000 dollars to use towards a Forest Service Project. There is no project in mind and this is just so the funds will be available if the opportunity presents itself. It will allow us to simple spend up to that amount of a project.

2. We have decided to allow every good standing member to receive a club coat. Anyone that has paid their dues can receive one coat. There are two style available, first is a fleece outer jacket and the second is a Red Kap work type jacket. Names, styles and sizes will be taken at the next meeting. If you cannot attend then get ahold of Todd and give him your information. The coats are black in color, and will have a small chest logo on the front. Details are on the forum and will be reviewed during the meeting.



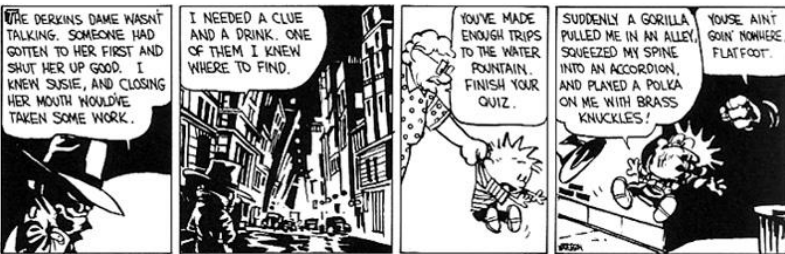
Land Use:

It would be good to think of various work projects that we should do this summer. One of my personal ideas is to post signage at each of the trail heads. The FS won't do this and don't have a clue what to post if they were going to so I think it's up to us.



Come May the forest is going to be a bit crazy and by not getting information on the trails out, since the FS dropped the ball, we are going to shoot ourselves in both feet.

Next is just an observation from one of the last trail ride. Noticed a lot of empty beer cans around the trail. It seemed odd since that majority of people in this area are wheelers so why in the world are their beer cans on the trail?



I thought we were the responsible ones and left no trace? It's disappointing to think that some people would leave their trash behind but even worse that how many people have drove by and not bother to pick it up.



Trail Runs:

Well there were two runs this month. The first was a snow run lead by Brad Riggins. Snow was super deep and it was a great snow wheeling day. The big tired guys spend all day running up the power line hill and back down the hill only to get into some 6 foot plus snow that had no bottom and it was getting deeper the last 150 yards to the plowed road. One the way out I noticed the snow bank where we were supposed to come out was easily 10 foot. I think everyone was glad they turned around.



The rest of us left early on to find something more manageable. Terry took us to a trail they had run earlier in the month and it turned out great. Lots of snow that kept the progress.



Second run was backwards through Bikini and T-Back. It was a good run but cold out. Had more issues with jack knifing trailers and trucks getting up the FS road due to ice then on the trail. Some pics from the day including a sweet reverse two wheeling sami save.



Tech Ramblings:

After running through the bolt strength I think something should be said about proper bolt torque. One of the better written articles that I refer to a lot is the following from David Potter on Rockcrawler.com. No sense in rewriting the wheel so here is some information on the determining proper bolt torque. How do you know what to torque the fastener to so you can take advantage of its strength? Some hardware installation instructions include torque specifications, but unfortunately most do not, which leaves you hanging by a fastener thread (pun intended).

Some people take a wild guess at what torque they should use and others don't even use a torque wrench. They just go by feel. (What most people say they "feel" is actually the yield point of the bolt, which is just past where we want to torque the bolt to gain maximum clamping force, more on this below) You can under-torque or over-torque fasteners. Under-torquing a fastener is just as bad as over-torquing it. If the fastener is under-torqued, that will cause it to cycle many more times than normal and eventually shorten the fatigue life drastically, which in turn leads to an early failure.

Over-torquing risks shearing the fastener head off (break out the EZ out) or, even worse, it will actually yield the fastener. If the fastener yields, then there is NO preload on the fastener. No preload means the nut will most likely fall off due to vibration along with whatever it was supposed to hold on your vehicle. Now, hopefully, you can see how important it is to torque the fastener to the correct level.

There is way to determine how much to torque a fastener. It mainly comes down to bolt preload/fastener tension. When you're applying torque to a fastener, you are essentially stretching or preloading the fastener. This is done to prevent the fastener from relaxing too much and the nut from coming loose - or even worse, falling off. The big question is "how much preload do I need?" Where I work, the basic rule we use is that for structural applications, the fastener preload should be 67% of the yield strength. This value was chosen because a fastener (i.e. bolt) has a proof load value for each grade and diameter. The proof load is usually 90 percent of the yield strength. The proof load guarantees that the fastener will not permanently yield or stretch. If it did, you will lose your preload and the fastener will eventually fail or fall out.

So now you are probably asking yourself right now then why don't we just use the proof load level for establishing the preload. You don't because of a little something called friction. For example, the coefficient of friction between a bolt and nut can vary tremendously. Fastener coefficients of friction (CoF) vary as much as +/-20% of nominal. Therefore, if we used a value close to the proof load (i.e. 80%) and had a high variance in CoF (+18%) from our nominal calculation, we would end up going beyond the proof load and yielding the fastener, thus applying no preload. The CoF for a dry fasteners is typically 0.20 and for a fastener that is lubed with dry film lube, loctite, etc a CoF of 0.09 typical.

Basic torque formula and a few examples:

$T = K \times U \times D \times P$ where K is a constant that equals 1.33

U is the coefficient of friction

D is the basic diameter of the fastener(inches)

P is the preload (lbs)

T is the torque required (inch-lbs)

Example 1: Grade 8, ½ inch diameter, unlubricated bolt - D = 0.500 inch, U = 0.20, K = 1.33, P=?

To determine P we remember that a grade 8 bolt has a yield strength of ~130,000psi. Note the yield strength is in lbs per square inch and the preload is in pounds.

So taking yield strength x area of the fastener x 0.67 = Preload in lbs: $130,000\text{psi} \times 0.1599\text{ in}^2 = 20,787\text{ lbs} \times 0.67 = 13,927\text{lbs}$

Inputting this into the above equation gives us:

$$T = 1.33 \times 0.20 \times 0.50\text{ inch} \times 13,927\text{ lb} \Rightarrow T = 1852\text{ inch-lbs or } 154\text{ ft-lbs}$$

Example 2: Same bolt but this time we will use a lubricated fastener or U = 0.09

$$\text{So } T = 1.33 \times 0.09 \times 0.50\text{ inch} \times 13,927\text{lb} \Rightarrow T = 834\text{ inch-lbs or } 70\text{ FT-LBS}$$

Notice that the torque required for a lubricated fastener is LESS THAN HALF that of an unlubricated fastener for the same PRELOAD. The CoF is very important when torquing fastener and lube should always be used unless specified otherwise. Of course there are charts that give torque spec guidelines but they don't cover every bolt strength or are not always handy. So grab your torque wrench and get cranking, just don't go nuts. And fyi incase it comes up it does not matter if you turn the nut and hold the bolt or visa-versa. This will be posted to the forum for further discussion, thoughts and or questions.