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Crowsfoot with torque wrench. What's the math?

+

I work in a small engine shop and I need some help. Does anyone know the math when it comes to using a crow foot on torque wrench? I have spent who knows how many hours on line looking and it seems that no one knows. Please help.

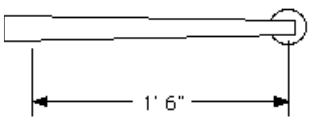
DAVID H [name deleted for privacy by editor]
- Tryon, North Carolina

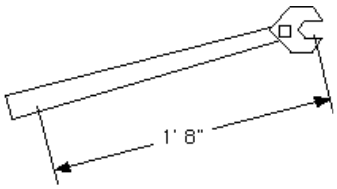
+

Torque is actually a pretty simple concept. It's the force times the perpendicular distance from the point of application of the force to the axis around which you are applying the force. A 3-ounce force applied at a length of 6 inches from the axis generates 18 inch-ounces of torque; a 200 pound force exerted at a distance of 3 feet generates 600 pound-feet of torque. A 50 pound child sitting on a see-saw 3 foot from the bar will balance a 75 pound child sitting 2 foot from the bar.

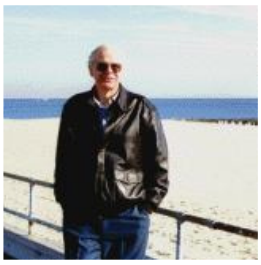
The complication with a crowsfoot 
on a torque wrench is that the scale is calibrated to its center of rotation (where you would normally put a socket), but the lever arm (the perpendicular distance from the center of the bolt to the hand grip on the wrench) will be longer or shorter than that depending on how you apply the crowsfoot. To make it just a bit more complicated, the more force you put on a torque wrench, the more it twists--this doesn't effect the length of the lever arm in normal application where a socket is centered on the rotation point, but when using a crowsfoot, the length of the lever arm could actually increase or decrease as the wrench starts twisting.

In the example shown below, if the wrench reads 100 foot-pounds torque, the actual torque with the crowsfoot is 100 x 20/18 = 111 foot-pounds.





Because of this complication, some auto manufacturers warn you to use their specialized torque tools rather than using a crow foot on a torque wrench.



Ted Mooney, P.E.
finishing.com
Brick, New Jersey

+

The torque wrench measures the torque or twist applied at the pivot point or where you would normally put on a socket which is centered on the pivot point. The crowsfoot

is about a 2 inch extension on the other side of the pivot point, so it torque reading on the wrench is not the same as applied to the nut or bolt.

A firm that does torque wrench calibration could give you a cheat sheet or reference sheet of corrections for the one crowsfoot supplied at that calibration. The 5/16" is not going to be exactly the same fudge factor as a 9/16". Probably close enough for most work.

The cheap way to do it yourself, is to use a second torque wrench and run the crowsfoot against the normal one with a bolt and double nut part to join them up. I have never seen two torque wrenches exactly the same, so which one is right if you really care?

James Watts
- Navarre, Florida

+

I ran across your question when searching for an inch lb torque wrench. I purchased a

Husky brand from Home Depot. The instruction sheet has the formula for calculating the torque with a crowsfoot. E- Effective length of extension - measured along the centerline of the torque wrench. L Lever length of the wrench - center of grip to center of drive. T(W) - Torque set on the wrench. T(E)- Torque applied by the extension to the fastener.

T(W) = T(E)* L/L+E
T(E) = T(W)* (L+E)/L

I'm not endorsing Husky or Home Depot - I just provided those for fyi.

Todd E [name deleted for privacy by editor]
- Glendora, California

++

If the crowsfoot is put on at a 90° angle and not at the end increasing the length, it will not effectively change the torque value. The overall length of the lever will be the same for the applied force.

Clayton R [name deleted for privacy by editor]
- Amarillo, Texas

That's an excellent point, Clayton. The length of the lever arm is not *exactly* the same but it's very very close.

Ted Mooney, P.E.
finishing.com
Brick, New Jersey

SOCKET EXTENSIONS

++++

Hi, This is concerning an extension added to the socket. The extension is 2". Will it apply the torque set at the handle? This is a standard socket set extension;tubular. I read in a related post that horizontal extension will change the torque so this one is about a vertical extension.

SIDEBAR

Thanks for the help.

Henry G [name deleted for privacy by editor]
- Houston, Texas

++++

Those extensions have no effect on the torque reading and require no adjustment.

Ted Mooney, P.E.
finishing.com
Brick, New Jersey

++++

Thanks Ted, guess I just missed the "click" on the one broke screw.... :)

Nice photo of you as well!

Happy New Year!

Henry G (returning)
- Houston, Texas

LOCTITE

+++++

Does anyone know what is the effect of the application of **Loctite 243** [linked by editor to product info at Amazon] on the torque value? Under normal circumstances, I apply a 100 ft-lb torque on a 1/2" diameter bolt. If I apply Loctite 243, how much torque reduction would I need?

Ceejay [name deleted for privacy by editor]
- Singapore

February 26, 2006

SIDEBAR

As a shipyard and home project worker I've used Blue on 1/2" fasteners,it is anaerobic(sets up in absence of oxygen).When set to required torque (35 Ft/Lbs, left for 15 minutes,checked for break to 8 ft/lbs and never found a break).For i 1/4"stud setting to standout and break check of 200 ft/lbs was always sat after 1 hour set time.

This product comes in several "strengths." The blue is the most commonly used. A "milder" purple is for very light holding or on very small screws less than #8. The stronger versions are not suitable for everyday use.
Use Blue and you can remove screws, bolts and nuts fairly easily ; but screws, bolts and nuts will not vibrate loose.You can even mount large bolts (over 3/4") subject to various amounts of vibration or saltwater exposure using blue with complete confidence.But...In excess heat over or continuous 240+ degrees...I recommend using mechanical (nylon locknuts, lockwashers or lockwire)devices.
.....
The Locktite Company info bit:
This general-purpose, medium strength threadlocker has improved oil tolerance for fasteners between 1/4" and 3/4" (6 to 20 mm) diameters. 10 ml and 50 ml bottles.
Color: Blue
Temperature range: -65 degree F to 300 degree F
Torque in lbs. (M10 steel nuts & bolts) break / prevail: 180 / 62
Typical use: Up to 3/4" bolts with light oil contamination
...Sounds like a good application for "Blue"...
Ernie

Ernest S [name deleted for privacy by editor]
- Norfolk, Virginia

+++++++

I have a question about calculating torque? I have heard a lot about horizontal systems but what about vertical ones. I have to calculate the torque required on a telescoping wrench that is attached to a motor. Torque would be applied vertically as opposed to horizontally. I'm pretty sure that torque is a directional quantity. I am however stuck on this. I used the standard equation that you would use for a crowsfoot but I think that is

incorrect.

Thanks,

Nadine C [name deleted for privacy by editor]
- Brampton, Ontario, Canada

+++++++

This topic has me wondering about something very similar to this. I my 2006 Harley service manual they mention using a Torque Adapter for tightening the rear axle nut. I'm sure this adapter was developed to keep from having to remove the right side muffler during belt tensioning. In the photo this adapter appears to be about 6" long, and they stress the point of it needing to be 90 deg. to the torque wrench centerline. The puzzling part is that they also specify the exact same torque reading as my 2003 service manual that does NOT have the torque wrench adapter. Does having the adapter at 90 deg keep the readings the same? Or is there some sort of calculation that should be done to provide the correct torque?

Ron R [name deleted for privacy by editor]
- Janesville, Wisconsin

+++++++

"Give me a lever long enough and a fulcrum on which to place it, and I shall move the world." -- Archimedes.

Torque is the product of force and the length of the lever arm, so it is essential that the length of the lever arm be right. The length of the lever arm is the perpendicular distance from the applied force to the center of rotation, and that will remain the same if the attachments are kept at 90 degrees.

Ted Mooney, P.E.
finishing.com
Brick, New Jersey

DOES TWISTING IN LONG EXTENSIONS AFFECT TORQUE

+++++++

I know in theory, that a socket extension should not affect the torque transmitted to the driven equipment (bolt, etc). However, on large bolts and nuts that we torque at our power plant, we have to add long socket extensions (~ 1.5 to 2 feet) to reach the bolt or nut. I am thinking that an extension this long will twist some, and that will reduce the amount of torque delivered to the load. Are there any tables or charts or even rules of thumb to account for this?

RANDY DEHART
Power Plant - Paducah, Kentucky

SIDEBAR

+++++++

Having a long extension will not affect the torque reading if the extension has twisted as much as it wants to twist for a particular applied torque.

Think of it this way. You're applying a torque at one end, and the bolt is applying a counter-torque at the other end. If the extension is not in the process of being twisted to a greater extent then it already has been, then the torques at both ends must be the same in magnitude but opposite in direction. (If the torques were not equal, the extension would be twisting more.) Then by Newton's third law (more or less), the torque being applied by the socket to the bolt is the same as (but opposite) as the counter-torque being applied by the bolt to the socket.

Jim Valasina
- Merrillville, Indiana

+++++++

I'm not sure if you ever got your question answered or not. Seemed that not everyone know what a "crows foot" wrench is. Go to ~~http://www.norbar.com/torquewrenchextensioncalculator.php~~ ^new address: ~~http://www.norbar.com/Calculators/tabid/57/Default.aspx~~^ new NEW address: see entry of Feb. 9, 2009 then enter the measurements that you are working with and it will make the calculations for you. The "crows foot" is simply an extension of the torque wrench. Try it out, it's pretty cool!

Dewey Harper
- Ozark, Missouri

+++++++

Here is the formula: M1 = M2 x L1 / L2

Where:

M1 is the torque setting of the wrench.

M2 is the actual torque applied to the nut

L1 is the normal length of the wrench

L2 is the extended length of the wrench (Length of wrench + length of adapter)

Example:
M1=torque wrench setting ?
M2=80 FT-LBS (Desired torque)
L1=18" (Length of torque wrench)
L2=22" (Total length of wrench with 4 inch extension added to wrench)
80x18/22=65.45 M1 therefore = 65.45; In other words if you want to torque a fastener to 80 FT-LBS using an 18 inch torque wrench with a 4 inch torque extender you will set the wrench to 65.45 FT-LBS

Richard D. Scherrer
airframe and powerplant mechanic - Kalispell, Montana

+++++++

I am attaching a housing using 10 capscrews. The required torque is 70 - 75 ft lbs. Two of the 10 bolts are hard to get to and require a swivel socket with a 4" extension. Do I need to increase or decrease the torque on the wrench to account for this difference in order to attain the final torque of 70 -75 ft lbs?

Thanks

Bob

Robert Emmendorfer
shop - Climax, Michigan

+++++++

Ron R,

Using a torque wrench adapter that is offset from the square drive at 90 degrees is not exactly a one-to-one reading with the torque wrench setting but is close enough that the difference is usually discounted. The longer the adapter the more the difference though! I believe the torque wrench offset adapter calculator at cncexpo.com/TorqueAdapter.aspx calculates the 90 degree angle correctly if your interested.

Bruce Jo
- Seattle, Washington

July 30, 2008

On-Line Torque Wrench Crowfoot Extension Calculator:

www.belknaptools.com/extcalc.asp

Ron North Webmaster / Application Engineer
- Wixom, Michigan

^ this reader rates this thread: Winner!

September 9, 2008

In thinking about this question, isn't the length of the torque wrench really not related? (I see that the calculators factor it in & everyone seems to include it in their calculations). Torque is a force over distance (usually lbs/inch or lbs/feet), which already has the distance component included. I'm thinking that if you had two torque wrenches, a 6" long torque wrench, and a 12" long torque wrench, and used them both to tighten bolts to 25 lbs/ft, the bolts are going to all be tightened the same. Yes, you have to pull harder on the 6" wrench than the 12" wrench, but the net resultant torque is the same if you tighten everything to 25 lbs/ft on the dial. Now if you put the same crows foot wrench on each torque wrench and make the calculated adjustment for each wrench (which factors in the wrench length) you will end up with a different indicated value to tighten to for each wrench. This doesn't seem right. What am I missing here?

Ned Lloyd
- North East, Connecticut

September 22, 2008

When we use an extension on a torque wrench, the torque wrench does not know the extension exists and therefore, cannot account for the extension. If your torque setting is 500 ft-lbs and the extension is as long as the torque wrench, the torque wrench will still think you are tightening to 500 ft-lbs. Meaning the resultant torque at the point where the torque wrench and extension are adjoined is 500 ft-lbs. But, since the extension is as long as the torque wrench, the resultant torque applied at the bolt is doubled or 1,000 ft-lbs.

But, what happens now when you use a multiplier that is say 6:1 and the extension? At first, you would think that the resultant torque at the bolt would be 6,000 ft-lbs. But, with this multiplier, the extension and the multiplier are always colinear. The torque wrench and multiplier are not. The torque wrench makes six revolutions for every one revolution of the multiplier and extension. We are tightening a B-lock and need to tighten the bolt such that the multiplier makes 90 degree increments. In order for this to happen, the torque wrench must rotate 540 degrees. When the torque wrench rotates 90°, it is at a 75° [90°-(90°/6)] angle with the extension. When the torque wrench rotates 180°, it is at a 150° angle with the extension. 270°-->225°, 360°-->300°, 450°-->375°, and finally when the torque wrench rotates 540°, it is at a 375° angle with the extension. So, if the torque setting on the torque wrench is 500 ft-lbs, the extension is as long as the torque wrench, and you are using a 6:1 multiplier, is the resultant torque on the bolt always 6,000 ft-lbs? Or does it change with the angle between the wrench and extension?

Brian Fritz
OEM - Saginaw, Michigan

September 26, 2008

This was an interesting thread which answered my search for crows foot extension calculations. However several posts refer to the use of a long extension bars along the axis of the bolt and question if this has an effect. When using a long bar it is necessary to apply an equal and opposite force to the direction you pull on the wrench. When using the socket directly, the bolt or stud provides this force but with the long extension the socket acts as a joint and allows the bar to lean. Providing you keep the extension bar in line with the bolt axis

the torque will be correct. If you allow the extension to lean towards the wrench you effectively extend the distance of the wrench from the bolt axis and this will increase the torque applied to the bolt or nut in the same way a crows foot extension does. For small misalignment angles this change will not make much difference but if a number of extensions are fixed together the offset from the bolt axis becomes significant and causes increase torque to be applied to the fixing. Unlike the crows foot this is difficult to calculate as the misalignment will vary.

Nick Carton
- Birmingham,West Midlands,UK

October 3, 2008

Richard is correct. The formula used to calculate a crowsfoot attachment mounted at 0 degrees is...

M1 = M2 x L1 / L2

M1 is the torque setting of the wrench.

M2 is the actual torque applied to the nut

L1 is the normal length of the wrench

L2 is the extended length of the wrench (Length of wrench + length of adapter)

Attaching the crowsfoot at 90 degrees on the torque wrench will not change the torque value enough to matter.

Using a "solid" extension will not change the torque value enough to matter. (Torque is still being applied in the same axial plane.)

Remember... Torque = Force x Radius

Justin Miller
wind turbine technician - Clear Lake, South Dakota

October 3, 2008

I prefer a simpler formula:

Wrench Torque = Required Torque / (1 + Extension Length)

Where Extension Length is the distance between wrench drive rotating axis to the the fastener rotating axis on the crowsfoot.

For example, to determine the torque to set on the wrench when a torque of 50 Nm is required on the fastener while a crowsfoot with extension length of 40 mm is used:

Wrench Torque = 50 Nm / (1 + 0.04 m)
Wrench Torque = 48.0769 Nm

Joe Blendford
- Dublin, Ireland

February 9, 2009

Thanks all for this informative thread! I am submitting what I believe is the reason why people write that 90-degree extensions have no appreciable effect on torque applied vs. torque setting:

If you have a 14" wrench and use a 2" extension at 90 degrees to the wrench (in my case so the wrench will clear the tire when I torque the lug nuts), the length of the lever is 14.14", a 1% difference and within the 3% error range of most torque wrenches in this size.

The wrench and the extension form two legs of a right triangle, and the (imaginary) hypotenuse is the effective length of the lever applying torque at the nut. Using the Pythagorean Theorem,
c = sqrt(14^2 + 2^2) = sqrt(200) = 14.14

I also wanted to report a broken link. One writer (*May -, 2007*) referred to a calculator, which has moved on the target website. A new link to all 3 of their calculators is:

www.norbar.com/Calculators/tabid/57/Default.aspx

Chris Niggeler
- Edgewood, New Mexico

April 29, 2009

Google "torque offset calculator". it will point to cncexpo which has several useful pages of different information.

Miles Thompson
- Selma, Alabama

May 1, 2009

Thanks, Miles. But the thread started with David's complaint that he was googling and following links and not learning much from all the time -- so could you summarize what he'll learn that is not here? Thanks.

Regards,

Ted Mooney, P.E.
finishing.com
Brick, New Jersey

October 2, 2009

Is there any change in torque readings when you use a crows foot with a torque screwdriver? There is no lever arm since you are twisting the driver handle. If there is a change in torque values, how do you calculate it?

Hadji Ling
student - Newark, New Jersey

December 23, 2009

To answer your question, use the following formula submitted by Joe Blendford on October 3, 2008. Using a torque screwdriver will not affect anything. Torque is a measure of force and its distance from the axis of rotation. For example; 50 in.lb. is always 50 in.lb.. The length of the torque wrench handle does not matter! 1 in.*50 lb., 2 in.*25 lb., 5 in.*10 lb. -- it is all 50 in.lb at the axis of rotation. Regardless of where you hold the handle and how hard you pull, the "neck" of the torque wrench will always "break" at 50 in.lb.. When using a torque screwdriver, the torque is the radius of the handle times the perpendicular force that is applied; still 50 in.lb at the axis of rotation. The only important dimension is the distance between wrench/screwdriver rotating axis and the fastener rotating axis on the crowsfoot.

Wrench Torque = Required Torque / (1 + Extension Length)

Where Extension Length is the distance between wrench drive rotating axis to the fastener rotating axis on the crowsfoot.
Also, this does not seem to be a practical question. For every complete rotation of the screwdriver, the crows foot will also make a complete rotation around the bolt. It would be quite tricky to turn the screwdriver as it simultaneously revolves around the bolt. If you have room to do this, then you probably don't even need to use a crows foot.

Andy Barker
Grand Rapids, Michigan

January 3, 2010

An easy way to figure it out is to use known values and apply the results. torque a bolt and then torque it again with whatever wrench adapter you need to use. If it's different figure it out, if it isn't "don't fix it".

Great thread, you guys are something else. You even make it easy enough for a guy like me to understand, thanks!

Gary Finn
- Weston, Ohio

January 29, 2010

It looks like your question has been answered as to the formula. However, here is a link to a calculator that will calculate the torque value for you at any angle.
www.CNCexpo.com/TorqueAdapter.aspx

Bruce Johanningmeier
- Seattle, Washington

February 16, 2010

Does anyone know the effect of crows foot on torque settings?

jared vann
workin on my boat - daytona beach Florida

Ed. note: I'll bet your teachers hated having you in their class back in school, Jared :-)

May 9, 2010

In response to Joe Blendford's and Andy Barker's suggestion to use the formula:

Wrench Torque = Required Torque / (1 + Extension Length)

Can anyone explain how this would be accurate, and why it results in a different value than the standard formula:

Wrench torque = Torque Spec * (Wrench length / Wrench + Extension Length)

I use the "standard formula" whenever necessary and believe it to be accurate. Not incorporating the wrench length into the formula dismisses the ratio of multiplication around the drive head. I can't see how this can be accurate.

Roger Delhomme
- Florence, Alabama

August 12, 2010

Back to the screwdriver with a crows foot...Or in my case a torque screw diver with a 1/4" socket end attached to a crows foot. (It is a click-type set at 15 in-lbs and distance from center point of screwdriver to center point of crows foot is about 1/2")I am pretty confident that since the center points are so close, the difference in "actual" torque value versus the 15 in-lbs setting will be minimal. My only concern is the actual mechanics of turning a

screw/bolt with a screwdriver that is "off center" with the crows foot attached.It seems like it would produce rotation similar to two gears turning in opposite directions. Picture the screw driver directly to the left of the screw/bolt with the crows foot engaging the left side of the fastener. If you apply a clockwise force to the driver, it seems to me that the crows foot would want to turn counter clockwise (like gears), almost "fighting" the rotation of the driver and wanting to bend in the center...Does this make sense?

Tony Stark
- Beverly Hills, Florida, USA

February 3, 2011

Just to clear up and summarize everything on this thread.

Torque = Force x Perpendicular Distance.

Think about it this way. Draw a dot on a piece of paper. Now draw another dot 1" to the right of the first dot. You have now moved 1" perpendicular to the original dot (done in real life with a crows foot wrench extension) and are now able to apply torque around the first dot. You can move as far into and out of the plane of the paper as you want (done in real life with a standard wrench extension) and it will not change the torque you apply with a given force because you have moved a parallel distance. However, if you move the second dot to 2" away from the first dot (as if you put on a longer crows wrench extension) you have doubled the perpendicular distance and thus the torque has doubled, assuming the same force was applied.

Thus, the distance that matters is not from the wrench down to the bolt (aka parallel distance), but from the turning axis of the nut/bolt to the turning axis of the wrench (aka perpendicular distance). In a normal application this distance is accounted for by the calibration of the torque wrench. Thus, a 6" torque wrench and a 12" torque wrench are both putting 75 ft/lbs on a bolt when they read 75 ft/lbs, it is just a lot easier to do with the 12" because the perpendicular distance is greater. The previous post about the hypotenuse and all of that is not correct. The perpendicular distance doesn't change with an extension, and thus neither does the torque.

Here is another way to think about it. If you are trying to turn in a screw with a screw driver, does it make it easier to grab a screwdriver with a larger handle or one that is twice as long? The one with the larger handle, because you have moved your hand a perpendicular distance away from the rotation point of the screwdriver. Getting a longer screwdriver will do nothing. If you don't believe me, go out and try it.

Back to the main point. A crows foot wrench is used to attach to an extension (or directly to the wrench) to turn the rotating force 90 degrees (or parallel to the plane of the wrench handle). Thus you have essentially made the wrench longer by a percentage. In this case the formula to use is as follows:

Wrench torque = Torque Spec * (Wrench length / (Wrench length + Crows foot extension length))

* People were forgetting the parenthesis. Without them and following PEMDAS (remember that from your childhood) you will get an incorrect answer. This also lead to another confusion, which I will address below.

The reason you need wrench length is because we need to figure out by what percentage the length has changed, and thus the torque reading is effected. A 3" crows foot extension will affect the torque reading of a 6" torque wrench much more than a 12", because the percentage increase is greater. Plug in the numbers and see.

The other confusion people were having is with the equation:

Wrench Torque = Required Torque / (1 + Extension Length)

This is an INCORRECT equation that took the equation shown above and tried to reduce it algebraically. However, it was done incorrectly and does not work. This can be seen easier by the parenthesis I added. If you write out the algebra you can clearly see where the mistake was made.

Hopefully this clears things up and I will summarize by saying that the correct equation the original poster wanted, which will give you the torque applied when using a crows foot extension is as follows:

Wrench torque = Torque Spec * (Wrench length / (Wrench length + Crows foot extension length))

Cameron Tusken
- Stilwell, Kansas USA

March 21, 2011

I just don't see how the length of a torque wrench can have any bearing on a calculation to adjust for an extention away from the pivot point that gives additional leverage. I do see that the measured torque wrench setting will be less with an extention and have to say when I sat down and thought about it I came to Torque(specified)= Torque(wrench)x (1+ Extension length in meters - which is the same as the simple formula you said was wrong.

My example is that I am trying to apply a torque of 50Nm to a nut but have to use a crow foot that moves the torque wrench 50mm away from the pivot. I figured that the torque wrench setting already took into account the maximum turning moment (ie the setting 50Nm)at the torque wrench socket, which means that it accounts for an infinite number of lengths and just means that the force applied at those lengths will vary so as to show when 50Nm is achieved at the socket.

Given the setting is in Newtons per metre, why can't I just add the additional distance from the socket to the pivot(in metres) to one metre? That way I would be applying 50N x (1m+ 0.05m) = 52.5Nm - Ops too much! Changing the expression around
Torque(wrench)= Torque(specified)/(1+ Extension length) to give a torque wrench setting of 47.6Nm seems right.

Am I missing something or is it really that simple?

Paul Cunninghame
- Auckland, New Zealand

May 27, 2011

Let's draw torque wrench, 'o' is the socket and '+' is the handle:

o=====+

Let's set 5Nm on the wrench. If length of the torque wrench '====' is 0.5m, we have to put 10N force on the handle to make the wrench to click:

wrench_length * force = torque
0.5m * 10N = 5Nm

Now add a 1m length extension '-----' and don't change 5Nm setting on the torque wrench:

8----------o=====+

Again, when we put 10N force on the handle '+' we get 5Nm at the point 'o' and the click. Torque on the end of extension '8' now is:

(1m + 0.5m) * 10N = 15Nm.

Now check equation "Wrench Torque = Required Torque / (1 + Extension Length)":
5 = 15 (1 + 1) wrong.

Check equation "Wrench torque = Torque Spec * (Wrench length / (Wrench length + Crows foot extension length))":
5 = 15 (0.5 / (0.5 + 1)) = 15 * 0.5 / 1.5 = 15 / 1.5 * 0.5 = 10 * 0.5 = 5 ok.

There is one interesting conclusion. Common construction of torque wrench is:

8 o======+-----x

where '8' is socket and '+-----x' is handle. The actual torque when wrench clicks depends on which place of handle we are pressing at. When we are pressing near '+' the actual torque is less than if we would press near the end 'x' of the handle.

Gediminas Markevicius
- Klaipeda, Lithuania

September 12, 2011

Just move the fist where you hold the Torque Wrench by the same amount.

Salim

Salim Shah
- Austin, Texas, USA

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