



Mr. Know-It-All



"How To" Articles By Vic Krause

Article # 11 How To Totally Understand Chain Tensile Strength

"Why bother learning this"...You ask?

You won't get an honorary degree in Mechanical Engineering by mastering these technicalities of chain tensile strength but you will be a significantly more competent buyer when you are picking out a chain for your bike or quad. Plus, you will save yourself some bucks in the process. Today's marketplace offers a wide variety of chain grades based on metallurgy, physical design of the components (pins, bushings, bearings, and rollers) and techniques of construction/assembly. All these factors contribute to the overall durability of the chain and its capacity to perform its job of reliably transferring power from the engine to the wheel(s) under some pretty adverse conditions. It's unrealistic to try to compare all these individual engineering details between the brands of chain you are considering. Going through that kind of technical analysis would get you a degree in engineering. The simplest way to evaluate the overall performance and suitability of different chains is to compare their Tensile Strength ratings. This one simple number is a true measure of any chains expected life, durability and performance

Tensile Strength...What it is an how it's measured

Tensile Strength (calculated in pounds or kilograms) is the maximum, sustained load the chain can withstand before undergoing permanent deformation, elongation or STRETCH. The way T.S. is measured is simple: Capture the chain to be tested on opposite ends and exert an increasing, pulling effort while measuring the force and determining the point at which the chain deforms permanently. The force (in pounds or kilos) applied at that point is the chains Tensile Strength. By comparison, the tensile strength of bubble gum is almost zero. The tensile of a solid bar of titanium could be higher than 350,000 pounds. The T.S. for a typical motorcycle/ATV chain ranges from 3,000 pounds up to 17,000 pounds. This tensile number doesn't tell you everything but it is the most important indicator you can use when comparing chains or selecting the best chain to use for your Bike/ATV.

Let's bust a myth and popular misconception about tensile strength right now. Some think that because a chain's tensile

strength is rated in pounds that a higher number will mean the chain is heavier and weighs more. This is FALSE. A 7,000 pound T.S. chain could weigh more than a 12,000 pound tensile strength chain. Typically the lower tensile strength chains use heavier mild steel in their construction where higher tensile strength chains employ lighter materials such as chromoly.

Tensile Strength...What's in it for you?

You may have already noticed that the higher the tensile strength rating of a chain, the progressively higher price tag it carries. That has to do with the costs of the component raw materials used in the chain, the manufacturing costs, heat-treating processes, the price of a barrel of Arabian crude oil, etc., etc., etc. The real question is...

“Why should you pay for a higher Tensile Strength chain?”

Here are the Main Benefits of Higher T.S.....

The useful life of any chain directly relates to the tensile strength number. The higher the number, the longer the chain will last, under the same conditions.

The higher the tensile rating, the less the chain will stretch and consequently, the less maintenance required to adjust out the resulting slack.

The greater the tensile strength the more ability the chain has to resist damage caused by shock loads imposed by hi-impact events in the drive train such as dumping the clutch at 12,000 rpm....landing full power-on from a triple...operating the drive system with excessive chain slack or loose sprocket bolts.

Here is the most overlooked, hidden benefit of high tensile: If you ride off-road, the eventual day will come when a rock of just the right size and shape finds its way in between a chain roller and a sprocket tooth. The higher the chains' tensile, the better your odds that the rock loses the contest and gets pulverized. You won't even know it happened. A lower tensile chain has a greater probability of losing the battle to the rock and the chain breaks apart.

So....What should you buy?

The three charts below present my M.R.T.S. (Minimum Recommended Tensile Strength) based on engine displacement and type of machine. The real questions you should be asking yourself.....and answer.....are.....

How long are you keeping your Bike/ATV?

Do you like regularly adjusting greasy drive chains?

Do you enjoy gambling on unexpected breakdowns due to chain failure?

Category “One” Rider / Mechanic

If you are selling your machine soon, don't mind the hassle of constant chain adjustments or consider trailside emergency repairs a fun adventure...then your choice will be the lowest T.S. chain which will also be the cheapest to buy. However, it may prove much more expensive if it fails and takes out the motor cases or rear hub. But you have to be willing to take that gamble in the first place.

Category “Two” Rider / Mechanic

If you are keeping your bike for years; harbor a true disdain for adjusting chains; or prefer to limit your risks to Friday night poker or the madman next to you in a tight turn at speed...then your choice is clear...purchase well above the recommended minimum and get the highest T.S. chain you can fit into your budget...CASE CLOSED

Dirt Bike Minimum Recommended Tensile Strength (M.R.T.S.) Chart

	90cc	125cc	200cc	250cc	350- 450cc	500cc	600c	650-750cc
Minimum	3,000	4,000	4,000	7,000	10,000	12,000	12,000	16,000
Medium	5,000	7,000	7,000	10,000	12,000	12,000	16,000	16,000
Best	7,000	9,000	10,000	12,000	16,000	16,000	16,000	16,000

ATV Minimum Recommended Tensile Strength (M.R.T.S.) Chart

	90cc	125cc	200cc	250cc	350- 450cc	500cc	600c	650-750cc
Minimum	3,000	4,000	4,000	7,000	10,000	12,000	12,000	16,000
Medium	5,000	7,000	7,000	10,000	12,000	12,000	16,000	16,000
Best	7,000	9,000	10,000	12,000	16,000	16,000	16,000	16,000

Street Bike Minimum Recommended Tensile Strength (M.R.T.S.) Chart

	90cc	125cc	200-350cc	400-450cc	500cc	600cc	650cc	700-750cc	850-950cc	1000cc	1100cc	1200-1300cc
Minimum	3,000	3,000	4,000	5,000	7,000	7,000	7,000	9,000	10,000	12,000	12,000	16,000
Medium	4,000	4,000	6,000	7,000	9,000	9,000	10,000	10,000	12,000	12,000	16,000	16,000
Best	5,000	6,000	8,000	9,000	10,000	12,000	12,000	12,000	14,000	16,000	16,000	16,000

Supplemental Notes

Tensile strength also directly correlates to the pitch of the chain. Pitch is a standardized way of designating the physical dimensions of the chain components. Look for an upcoming Primer from Mr. Know-It-All on “How-To” Understand Metric Chain Pitch Specs due for release July 1, 2008 See Mr. Know-It-All's “Coming Attractions” for a complete list of Planned Articles

You may notice in the Recommended Minimum Tensile Tables that the number for an ATV might differ from an off-road motorcycle or street machine with the same displacement. These differences take into account the weight of the vehicles and the risk factors that are greater for ATV drive systems because of more exposure to environmental hazards.

“You Should Have Known”