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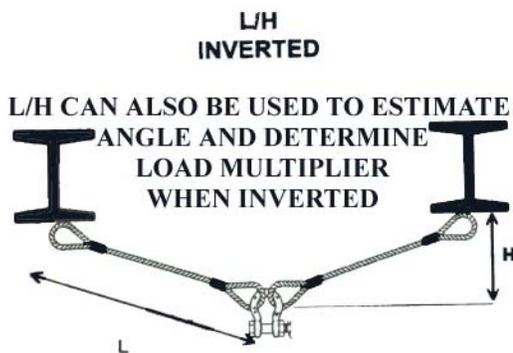
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Rigging with Riggitt Tony

I did a rigging seminar for a customer recently. During some of the advanced training we covered the topic of sling angles. The load multiplier formula can be applied to other situations, like this one:

The customer had a conveyor system weighing approximately 6000 lbs. It was placed between two roof trusses. Since there was no overhead crane in place to lift and maintain the conveyor when it jammed or broke down, the maintenance department made the decision to rig from the roof trusses. For our example we will assume the conveyor was in the middle between the two trusses. The drawing below will give you an idea as to how it was set up.



Well, during the lift to maintain the conveyor it was observed that the roof trusses were bending toward the center. I asked them what they did to stop this "little" problem. They chained the truss that was bending to the next one over. While their heart was in the right place the execution to solve the problem was not.

We see this sort of situation a lot around the area. This type of rigging may not be limited to just a maintenance situation. We have seen entire monorail hoist systems and overhead bridge crane structures suspended from a roof truss system that was not designed to accept the load.

Lets look a little closer at this problem and do a few calculations. Lets try to answer a few questions:

1. Was the roof truss structure designed to have rigging suspended or attached to it? Was the roof truss designed to have any kind of hoist system suspended from it?
2. What forces are being exposed to the roof truss?
3. Why was the truss bending?

The first question was the truss designed to accept the load that was being lifted. **The answer would be NO!!!!** Your first clue would be the truss bending. Most metal building truss systems are designed for a static snow load. This snow load is based on the area of the country you live and work. In the Albany area it's around 45-50 lbs/sq. ft. Out in Syracuse or up north in Glens Falls this loading will go up. While this may sound like a lot it is not. This loading is based on a static load evenly loaded across the truss. When you weld a pick point or add a monorail you are no longer evenly loading the truss and can now be suspending a load to a single point. This is a whole different bag of worms and the capacity of the truss is calculated differently.

So, do not think you can rig of a roof structure and be safe? You may have been doing it for years and just been lucky, but this could also be like playing Russian roulette with an automatic weapon.

What are the forces? Lets look at the example in the figure in the previous column. Lets say the distance between the trusses is 234". We have a headroom problem so we pull two slings out of our rigging box that are 120" long. We will be lifting a 6000 lbs. load off of the shackle. This would put the shackle pick point at 117" from each side. You can figure the H dimension by using the old favorite formula the Pythagorean theorem $H^2+B^2=L^2$, and you guys thought you would never use you high school geometry and algebra.

$$H^2 + 117^2 = 120^2 \quad H^2 + 13689 = 14400$$

$$H^2 = 14400 - 13689 \quad H^2 = 711$$

$$H = 27 \text{ (rounded)}$$

Based on what we know the dimension H and find can out how much tension is in the sling (L) and therefore what load is being applied to the anchor points on the truss.

The formula will use is L/H to calculate the load multiplier.

$$L=120" \quad H=27" \quad 120/27=4.44$$

4.44 is now our load multiplier. The share of the 6000 lbs. load on each truss is **3000 lbs x 4.44= 13,320 lbs. of force on each sling and the anchor points** on the truss.

I will ask the question again: Was the roof truss structure designed to have rigging suspended or attached to it? And why was the truss bending? Or put another way will a truss designed for a 45 lbs./sq. ft. snow load accept a 13,320 lbs. side pull?

The answer should be a **resounding NO!!!!** If you don't come to this conclusion please see Riggitt Tony after class.

In closing please be careful, and understand that the load applied to a sling at angles increases as the angle decreases and the anchor points will see the same load. **Watch those anchor points!!!**