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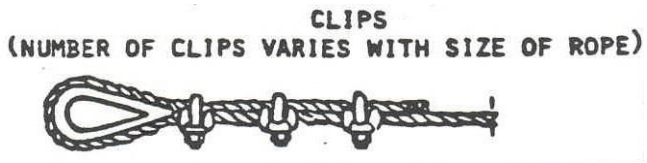
20 December 2018

BUSINESS CARDS

In my early years as a rigging engineer, I started saving business cards from different vendors, i.e., representatives from crane manufactures; representatives from rigging gear manufactures, field servicemen, etc. Also other rigging engineers, riggers, crane operators, etc. Over the years I have had good reason to call quite a few of those on my list when I had questions or problems. I guess I was on several lists also as I have received calls from several rigging people over the years. I want to tell you about one person on my list that I called several times with wonderful results. I am glad I kept his business card.

This experience starts in 1985 when I attended an equipment show in Houston. It was similar to but much smaller than ConExpo held in Las Vegas, NV. I was there mainly to visit American Hoist and Derrick's exhibit where they were show casing their new American 11310 Super Sky Horse. While there I meet Charles Lucas, who was the Vice President of Engineering for The Crosby Group. He gave me his business card and told me if there was ever anything that he could do for me, no matter what day of the week or time of day or night, just to call him. Little did he know that I would do so several times over the years.

Fast forward to June 1991, where I was working on the Millstone Nuclear Power Plant project where Fluor had a contract to change out the two Steam Generators for Unit 2. During a two week outage (the big 60 day outage would be in July 1992 when the steam generators would actually be changed out), one of the rigging operations called for hooking a 1" ϕ wire rope to a lug that was welded to the underside of the steel roof of the containment building. The connection was made by turning the wire rope 180° around a thimble and using 5 Crosby cable clamps (known as clips in the rigging industry) to connect it to itself. See the drawing below for a similar layout but with only 3 clips shown.



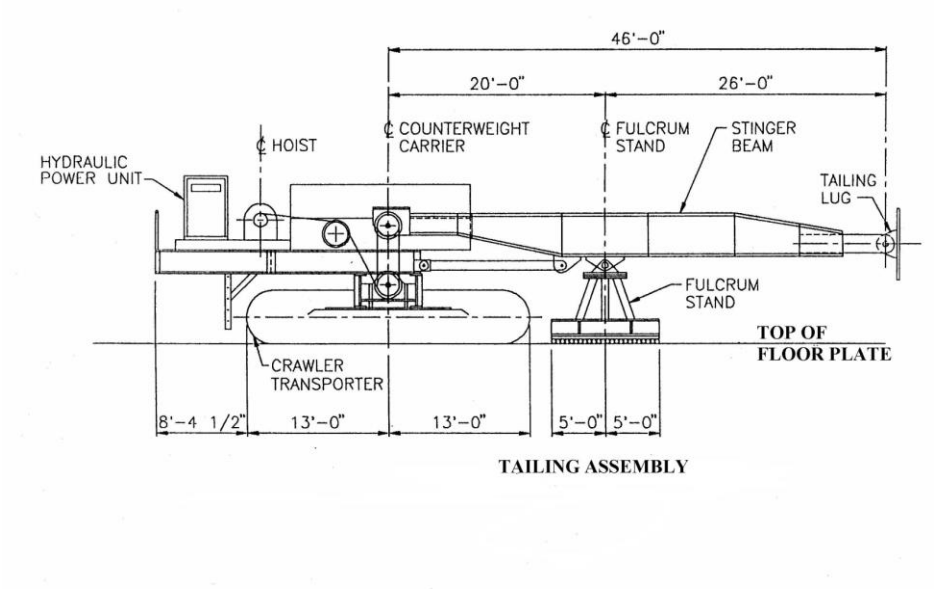
As our head room was very small, I pointed out on the rigging hookup drawing to install the cable clamps next to each other without any spacing between them. The rigging hook up drawing was issued to the rigging engineering department for the Northeast Utility (NU) for their review and comments days before the operation took place. The scaffold crew spent 4 hours erecting a scaffold on top of the block house, the riggers took 1 hour hooking up the 1"ϕ cable to

the lug using shackles and the scaffold crew took 3 hours removing the scaffold. The next day on a Saturday morning, we hooked up the 1"ϕ wire rope to the other rigging. When we were about to start the lift, the NU rigging engineers stopped us and pointed out that we were violating Crosby's instructions when we installed the clips side by side with no spacing in between. I told them that Crosby had said that the spacing was just to make sure there was enough room for wrench clearance in tightening the nuts on the clips. NU said they needed to see it in writing. Now we should have been working together to make the outage a success, but they seemed to glory in finding ways to stop or slow down our work. They should have pointed out this concern of theirs before we started scaffolding and installing the 1" ϕ wire rope.

As it was about 11:00 am, I told the rigging foreman to go ahead and let the crew have lunch. I got out of my protective clothing and went to my office. I looked up Charles Lucas's phone number and called him in Tulsa. He was in the middle of a barbecue in his back yard with his grandkids, but he listened to my problem and agreed with me. He said he had Crosby's letterhead paper there at home and he would fax me a letter in 15 minutes stating that the spacing was not a concern. Sure enough, in 15 minutes a fax came thru. I took it to the office of the NU rigging engineers (I felt like throwing it down on their desk but didn't) and then went back into the containment building where we finished the lift.

Not only did Charles save us 8 hours of work in not having to change the spacing on the clips, but the 8 hours would have put us out side of the two week window of the outage. This would have caused Fluor serious financial implications as all Utility owners demand to start their plants on time or the contractor pays a hefty monetary penalty. The NU rigging engineers and the Fluor Construction Manager could not believe that I got an official answer from Crosby on a Saturday afternoon. It was a good thing that I kept Charles Lucas's business card handy.

About 6 months later, as were designing a tailing assemble for removing/installing the steam generators, we found that we needed 25 sheaves with a tread ϕ of 30" grooved for a 1-1/8" ϕ hoist line. See the drawing below that shows 24 of the sheaves were used at the center of the counterweight carrier and one as a deflector sheave.



TAILING ASSEMBLY

I looked in the Crosby catalog and found the sheave that I wanted. I called the engineering department of The Crosby Group in Tulsa and explained what I needed and gave them the Crosby number from their catalog. The engineer confirmed the information contained in the catalog was still good, that the sheaves were in stock and gave me an approximate cost. He said he would fax a detailed drawing of the sheave to me.

After receiving the drawing, I attached it to a Request For Quote (RFQ) and gave it to the purchasing department and asked them to purchase the sheaves from Crosby. They sent the RFQ to the local Crosby dealer. About two weeks later, they received a bid from Crosby and an unsolicited bid from a local fabricator. In looking at the bid from the local fabricated, we notice that he had included a drawing that was identical to the Crosby drawing only the title block had been changed. Their bid was $3,000 lower than the Crosby bid.

I went to the Construction Manager and showed him the two bids and asked him if he would approve the Crosby bid instead of the other one. He said that he did not approve of the actions of the Crosby dealer in trying to under bid his own company. Plus he was very appreciative of the help Charles Lucas had given us on the clips. So he gave approval to purchase the sheaves direct from Crosby in Tulsa. I then called Charles Lucas and told him what had transpired. He was not too happy with his dealer and said he would deal with him and asked us to keep dealing directly with Crosby in Tulsa.

Fast forward to 1995 where Fluor was construction an oil refinery for the Shell Oil Corporation in Rayong, Thailand. The construction was at the stage where most of the units were complete and the 300' tall free standing flare stack structure had been erected. The next step was to erect the flare tip using a self-erecting system comprised of a 50 ton winch with a 40,000 lb. line pull and 100,000 lb. holding tension and two 60 ton 4 sheave construction blocks.

The top construction block was attached to a weldment on the vertical face of the flare structure about 50' from ground level. The erection sequence would start out with a 48" ϕ x 30' section of pipe upended at ground level next to the vertical face of the flare structure and then the flare tip would be mounted on top of it. The bottom construction block would then be lowered down to ground level and hooked to the bottom of the pipe. This section of pipe with the flare tip mounted on top would then be hoisted up until another 30'section of pipe could be upended under it and both were bolted together. The rigging would be changed so that the lower 60 ton construction block would again be lowered and hooked to the bottom of the newly upended section. The two sections would then be hoisted up until another 30' section of pipe could be upended under them and both were bolted together. The sequence would continue until the flare tip was above the top of the 300' high flare stack structure.

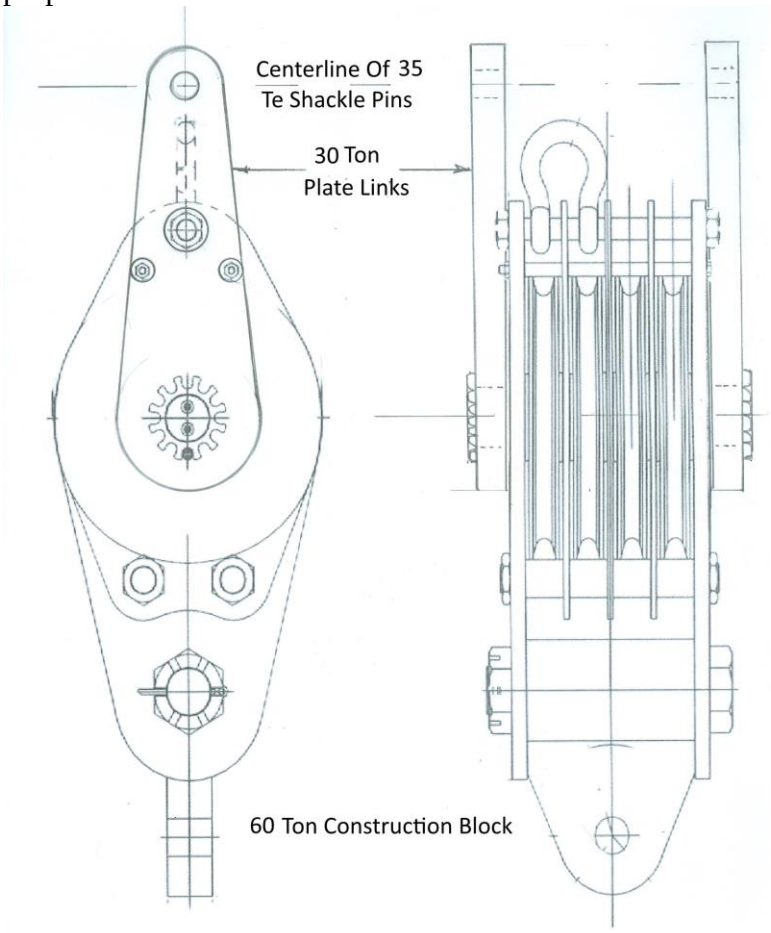
See the photo with the 48"ϕ pipe attached to the vertical side of the flare structure with the burning flare tip on top.

But, as the first section of pipe with the flare tip mounted on it was pulled up and held by the winch, Shell stopped the work and said it was not safe to rely on the winch to hold up to 9 sections of 30' pipe plus the flare tip with Ironworkers working under them. The total weight was approximately 35 ton. They said safety cables should have been furnished by the flare stack manufacture as a backup in case of winch failure. The capacity of the winch and the construction blocks were over designed so Shell should not have been concerned. The maximum line pull to the winch was 10,000 lb. which gave the winch a safety factor of 4:1 in pulling and a 10:1 in holding. The Fluor Construction Manager called me and I flew to Rayong and studied the rigging layout to see if there was some way to provide the safety that Shell wanted. We wanted to make them comfortable with the self erection system. We had a full crew and equipment waiting so time was of the essence. Also, the erection of the flare structure and flare tip was behind schedule and needed to go online as soon as possible.

As the pipe sections were to be lifted or erected using two 60 ton 4 sheave construction blocks, I decided that a quick solution to the problem was to attach a plate link to each side of the lower construction block. Each link would have a hole at one end large enough to snuggly fit over the center shaft of the construction block and have holes at the top for the bolt heads that held the block together and for a 35 Te shackle. This way the block would be held in place with two safety slings, one on either side of the construction block and going on up to pad eyes welded to the weldment above that held the top 60 ton construction block. I made a drawing of the proposed change showing the links in place and the worst case loadings involved. I then faxed it to Charles Lucas and asked him if it was possible for his engineers to analyze the forces and see if a new shaft, long enough to go thru the block, the two links and the nuts on either side, would be over stressed. He answered the next morning and said that the proposed change would be approved if a new shaft of the same material as the old one was used. I checked with the fabricator in Bangkok and found that the proposed shaft was made of the same material. I emailed Charles with the information and he faxed the drawing back to me stamped and signed showing that Crosby approved the design change. See the photo of a 60 ton construction block with the shackle at the bottom that hooked to the lower section of pipe. Note that only a 3 sheave block is shown for illustrative purposes.

With Shackle

See the marked up drawing below that show the changes to the 60 ton construction block that we proposed.



We made the design changes to the lower 60 ton construction block and erected the flare tip as planned.

Back up to 1994 where Crosby issued a WARNINGS AND APPLICATION INSTUCTIONS which stated that if two or more slings are used in a hook, a master link or shackle must be used to attach the legs of the sling to the hook.

The above instructions imposed a real hardship on any lift where large slings (+2" in diameter) were involved. Master links with capacity enough to support four 2" diameter slings are not available. Even using a large shackle is a hassle.

So, late in 1998, I sent a proposal to Charles Lucas and asked him to consider two different hook ups, 1) a three legged hook up and 2) a four legged hook up. The proposal included meeting certain criteria for each hook up such as keeping all sling angles (with the horizontal) greater than 60 degrees, etc.

In April of 1999, he agreed to the two hook ups with certain restrictions. See the 3 page letter below with his answer, restrictions and drawings.

the Crosby group inc.

Group Engineering Department
Mailing: P.O. Box 3128 (74101-3128)
Shipping: 2857 Dawson Road (74110-5040)
Tulsa, Oklahoma
Phone: (918) 834-4611
Direct: (918) 835-0612 + Extension
Engineering Facsimile: (918) 834-9447

Facsimile

TO: **Kent Goodman**	DATE: **April 8, 1999**
COMPANY: **Flour Daniel**	FROM: **Charles Lucas** TITLE: **Vice President Engineering**
FAX NUMBER: **1-949-975-5492**	NUMBER OF PAGES: **3**
REFERENCE: **Hook Loading**	

If transmission problems occur, please call Julie Wilson at (918) 832-5376

I brought this information to ConExpo, hoping to meet you in person. Please look over our recommendations, and then lets talk about them.

Three (3) or Four (4) Leg Slings in Crosby Shank Hooks

Three (3) and four (4) Leg Slings can be collected in the bowl of a Crosby Shank Hooks for Engineered Lifts with the following restrictions:

I. All legs must be collected within 30° either side of the center line of the hook bowl as illustrated in Figure 1 and 2 of the "Hook Up Drawing"

II Four (4) Leg Slings (Fig.2 - Hook Up Drawing)

1. All legs must be loaded equally with symmetrical angles about the vertical centerline of the hook
2. The sum of the vertical components must not exceed the WLL of the system and/or the hook
3. The horizontal sling angle of the legs must be 60° or greater.

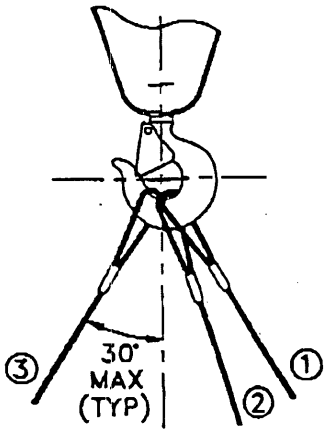
III. Three (3) Leg Slings (Fig. 1 - "Hook Up Drawing")

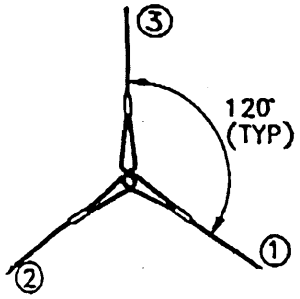
1. The vertical plane * of the hook should be parallel with the plane of the sheaves
2. The horizontal sling angle of the legs must be 60° or greater
3. The single leg must be on the point side, and the double legs on the back side of the hook throat
4. The sum of vertical components must not exceed the WLL of the system and/or the hook
5. The included angle between the sling legs must be 120° as shown in the top view of Figure 1 in the "Hook Up Drawing."

IV. All other loading conditions must be analyzed by a qualified person, and the WLL reduced such that the combined hook shank stresses (bending & tensile) do not exceed the original shank tensile stress at the rated WLL.

**** The vertical plane bisects the hook through the center line of the shank and point.***

HOOK UP DRAWING



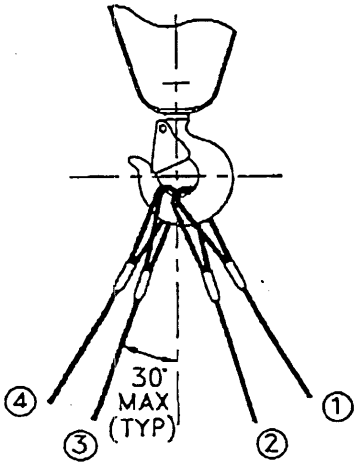


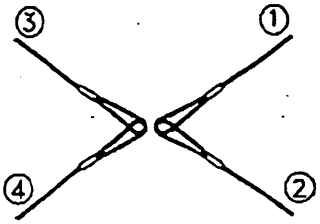
TOP VIEW

(CRANE HOOK NOT SHOWN FOR CLARITY)

FIGURE 1

3 SLING HOOKUP





TOP VIEW

(CRANE HOOK NOT SHOWN FOR CLARITY)

FIGURE 2

4 SLING HOOKUP

HOOK UP DRAWING

In summation, I am very thankful that I met Charles Lucas in Houston and kept his business card close by. As you can see it has served me well. I have thanked him repeatedly for all of the help that he gave me and Fluor over the years, and especially for his friendship.

The example listed above is only one of many times my rigging contacts have helped me over the years. So, young rigging engineers, start saving your business cards as you will find them as valuable and useful as I have.

THE END