

Innovation in Steel Erection

BY ALAN T. (TED) SHEPPARD, P.E.

Coming up with a different way of doing things can boost efficiency and *esprit de corps*.

IN TODAY'S MARKETPLACE competition tends to drive prices down. One solution to having a lower cost to meet the lower prices demanded by the market is innovation. We all thought we were getting smarter when we could just get a bigger crane to do our work. This may be true and even helpful at times, but bigger cranes can be expensive. What we should be doing is finding new ways to use older, owned equipment.

If we have to place a heavy load in a small isolated space, we could try to convert an existing crane boom or, even better, an old derrick boom into a gin pole or a Chicago boom. You could also build a wheeled buggy to carry your load into the confined area. Think about it. Maybe it won't work, but then again, maybe it will.

When I was with Tri State Steel Construction, we had a project where we had to install steel grating for a bridge deck. The Engineer of Record would not permit us to use a crane or any heavy lifting equipment that ran on the grating before the concrete was poured. We decided to design and build a jinniwink. This was a vertical column with a horizontal beam across the top. It was secured to a moveable frame, and its load falls came from an air hoist on the frame.

We were short on work at the time; so we had four of our foremen build it in the yard. They decided to add bracing here and there until it looked like a prehistoric bird. We called it the Pterodactyl. We put that name on the drawing submitted to the state for approval. The general contractor and all of the workers liked the name and used it throughout the job. We moved the frame with another air hoist. We also designed a buggy, moved by the air hoist, to take the grating sections out to the Pterodactyl. It was inexpensive to build, it met the engineer's requirements, and lo and behold, we made money.

I have built gin poles out of wood with rope falls for load and foot guys. Now that is really inexpensive. When I was with Bethlehem Steel we designed and built out of pipe a one-ton guy derrick. Also with Bethlehem we had a building to erect that was a guy derrick job, but it was so narrow that the back guys would be overstressed when we went to the street. We

took the upper rotating assembly of a 20-ton Lorain truck crane and put it on a moveable frame in the center bay of the building. We moved it back and forth in the long direction and used air motors and four of the next tier's columns to jump the crane two floors at a time. When we got to the top, we turned the wheels around, moved it to the edge of the building, and dismantled it with a truck crane on the ground.

This was not a new idea. Our project manager had seen a similar arrangement in Pittsburgh being used by another erector. Our project was in Detroit. Evidently our competitors had not been to Pittsburgh at the right time. Innovation does not mean it has to be your idea. You just have to be willing to implement another's ideas.

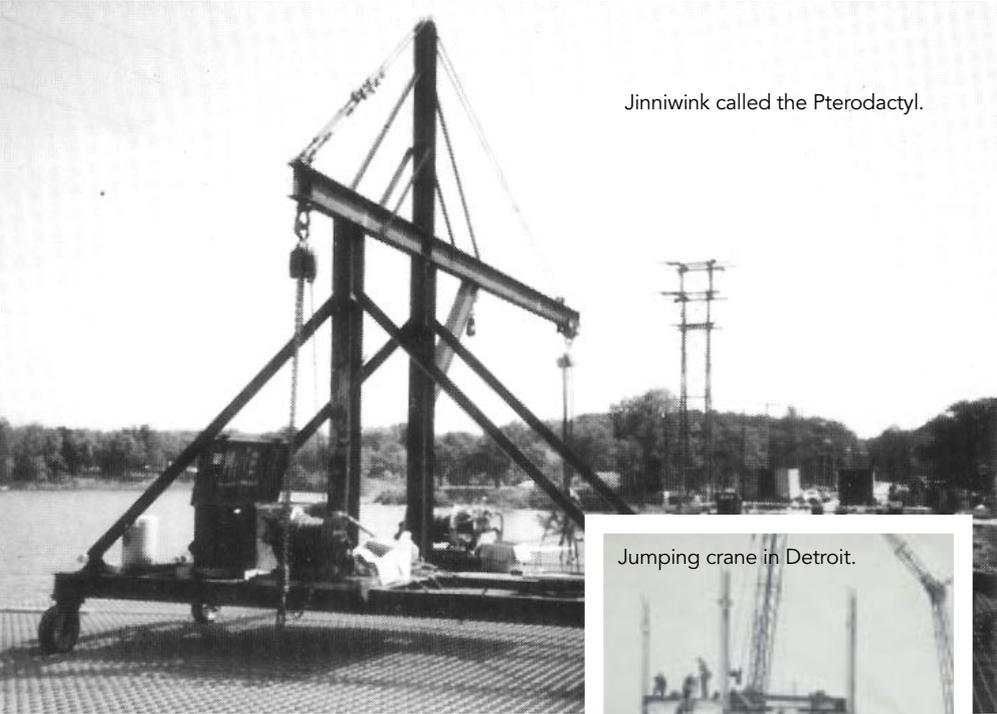
I have been fortunate in having worked with a lot of unusual equipment arrangements. I worked on a blast furnace that was built from the ground up between two other blast furnaces. Space was at a premium. The main erecting equipment was a 35-ton stiff leg derrick on a square tower. In order to find the main hoisting engine, you had to follow the cables through a maze of piping and ductwork. On each of the two forward legs of the tower was a Chicago boom. There was a Chicago boom on a stove that erected the dust catcher and helped the stiff leg with the main section of down comer. The stack was erected with a stack rig inside the stiff leg's tower. We did have a truck crane for the erection of the cast house.

Innovation is not limited to special equipment. Different ways of doing things also help your cause. If you are using

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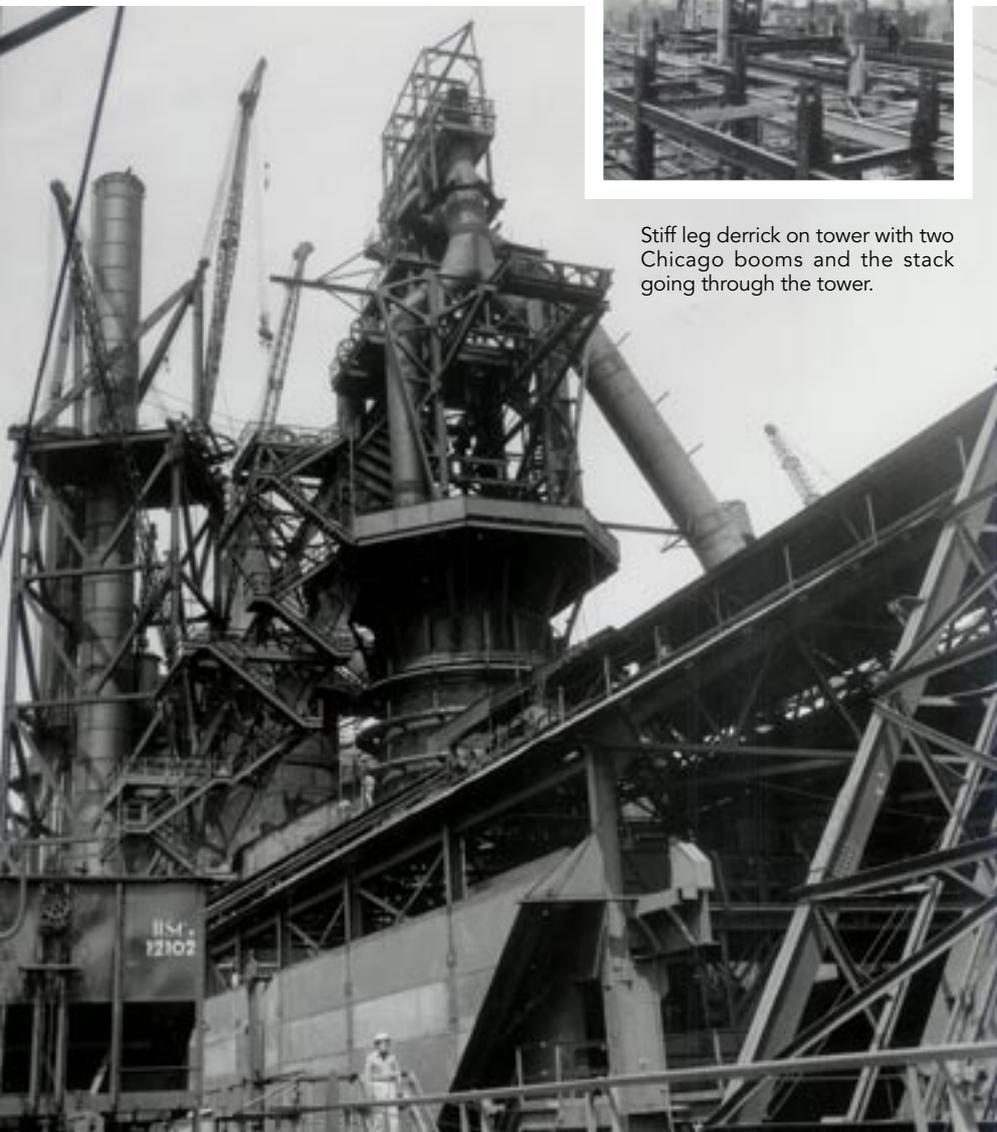


Have an opinion you'd like to share in "Topping Out"? Send your feedback to Tom Klemens, senior editor, at klemens@modernsteel.com.



Jinniwink called the Pterodactyl.

Jumping crane in Detroit.



Stiff leg derrick on tower with two Chicago booms and the stack going through the tower.

a Chicago boom on an exterior column of a building to remove other equipment or materials, tilt the boom base so that the loaded boom swings outboard on its own and you only have to pull back (by hand) an empty boom. If you want to have a lifting beam made out of pipe with a cable bridle for hoisting, and you only want compression in the pipe (no bending), offset the bridle hitch from the load hitch so that the bending moments cancel each other. This makes the pipe smaller and more efficient.

If you want to use a building's beam to support a temporary load, and that beam will not take it, shore it from the beam below, distribute the load to each beam in accordance with each I/L ratio (moment of inertia over length) and check the shore for the amount of load to be transferred. Usually a 6-in. by 6-in. timber will suffice. Don't go to the trouble of reinforcing the existing beam. There are a lot of these things to use.

You know a lot of them. Put on your thinking cap and work on your memory. Most of the ideas you have had in the past can be used again.

When you work in industrial plants where you cannot disrupt production, or places like Disney where you cannot disrupt the movement of the customers, innovation really comes into play. When you have to rehab an existing structure, look for different ways to lift or move the elements of the structure; old stuff out and new stuff in. You can build low-capacity guy derricks, stiff leg derricks, Chicago booms and gin poles out of timbers, say 6-in. by 6-in. or 8-in. by 8-in., and pipe of various diameters. These can be very cost effective. You will find that your workers like the idea of working with something different, and their productivity will go up. There is a great deal of personal satisfaction, too, when you feel that you really have built a better mousetrap.

Like all erection schemes innovation is a combination of engineering and common sense. Once you build something, do not throw it away. It can be used again, or it can be modified to use again. Each time this is done, your cost exposure goes down.

I am sure that my crane rental friends are miffed about this. My last piece of advice is that if all else fails, rent a big crane.

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