POURING SYSTEMS & LADLE INSTALLATION PROJECTS

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ARTICLE TAKEAWAYS:

1. Difference between Full installation & Site Supervision
2. Bolt-on trunnions versus welded trunnions

Although Acetarc supplies a range of molten metal pouring and handling equipment; first and foremost we design and manufacture foundry ladles. What I've found is that ladle and pouring systems installation work typically falls into two main categories: full installation projects and site supervision projects.

Full Installation Projects

Full installation projects are projects whereby we send our own team, usually during a shutdown period and take responsibility for the entire installation, often of a molten metal pouring system or monorail handling system. We provide our own tools and lifting equipment etc. Sometimes the nature of the project means that we work in isolation and at other times we are working along side other companies; with each company supplying its own specialized equipment, and contributing to the success of the complete project. Although there is obviously a need to coordinate with the foundry and any other companies who we may be working alongside, typically we are left to get on with the installation, retaining direct control of our part of the project. The foundry's concerns being that the work is completed as desired, safely and to a high standard in the allotted time.

Site Supervision Projects

The second main category, site supervision, tends to arise with regard to ladles and is when the foundry effectively retains control and that the installing engineer is there in an advisory role only. While both the foundry and the engineer are still working to the same successful conclusion, it does put a completely different spin on the working relationship.

Site supervision mostly occurs when ladles have been shipped dismantled and the foundry requests our supervision for the reassembly of the equipment. We send a senior technical engineer to the foundry, where he will instruct a foundry's own maintenance team on how to reassemble the equipment, with all tools and lifting equipment etc., being provided by the foundry.

Acetarc ladles are based on two main types; the medium duty Westminster design and the heavy-duty Workhorse design. The Westminster ladle design only goes up to 4400 lb capacity therefore, shipping a fully assembled Westminster ladle is seldom an issue. However, the Workhorse ladle design goes up to 130,000 lb capacity and once we start getting around the 10,000 -15,000 lb capacity, transporting a fully assembled ladle can become a problem and/or very expensive.

This is why our Workhorse ladles are designed to be easily disassembled and re-assembled. A long time ago we determined that that it is to nobody except the shipper's advantage to transport large capacity ladles fully assembled. Shipping fresh air is expensive especially if the shipping dimensions mean that the ladle cannot be shipped using standard transportation methods.

Therefore our Workhorse ladles are designed so that they can be dismantled and re-built without the need for special tools and without the need to have to strip down and rebuild the ladle gearbox.

The key to this is our use of "bolt-on" trunnions. Other ladle manufacturers weld the trunnions to the ladle shell. While it is cheaper and

quicker for the ladle manufacturer to do this, it does have a number of disadvantages, both to the foundry and ironically, to the ladle manufacturer.

Bolt-on Trunnions

What do we mean by bolt-on trunnions? The ladle shell has machined trunnion mounting pads, faced and bored for accuracy, and the trunnions fix to these pads. Each trunnion has a large diameter machined spigot that locates in a matching hole in the pad, which takes the shear load, and the trunnion plate is then bolted, using high tensile bolts, to the machined trunnion mounting pad.

The big advantage to the foundry is if a trunnion gets damaged at some later date (collision of the ladle with an inanimate object being a popular choice), it is relatively simple for the foundry to replace the trunnion, using its own maintenance crew and without the need to send the ladle to a machine shop (which would be the case when replacing a welded on trunnion). Having the machined trunnion mounting pad means that accuracy and alignment of the replacement bolt-on trunnions is automatically maintained.

A secondary advantage to the foundry is that the trunnion mounting pads are set off the ladle shell, creating an air gap behind the trunnions and greatly reducing heat transference from the ladle to the sidearms and gearbox assembly.

The big advantage to having bolt-on trunnions, as I've mentioned, that it makes it easy to transport ladles dismantled, knowing that the foundry's own maintenance crew can easily reassemble them.

Therefore, if a ladle needs to be dismantled for transport it will be typically shipped with both the side arms and the lifting bail removed, each as complete assemblies. The trunnions are kept mounted in the side arms and the gearbox is fully assembled and attached to the geared sidearm. So reassembly is just a case of putting the trunnions back onto the ladle and then refitting the lifting bail assembly.

This begs the question then why would it be necessary with regard to ladles to send for an engineer to supervise the installation, and, in most cases, it isn't. However sometimes either, due to the size and design of the ladle or due to the nature of the customer, site supervision is requested.

Case Study 50-65 Ton Ladles

We supplied a 50 ton capacity motor drive ladle to the Rolls Royce Naval Marine facilty in Mississippi and two 65 ton capacity ladles to the Naval Foundry and Propeller Center in Philadelphia.

In both cases, although dismantled, due to size they had to be transported using special carriers.

While both customers were more than capable of reassembling the ladles without supervision, they each wanted to ensure that there were no "grey areas." The ladles supplied to both facilities had motor driven gearboxes with radio remote control.

Radio remote control ladles was something new to both foundries, therefore they appreciated our presence for their maintenance crew to receive on-site training in the operation and maintenance of the new ladles.

As I've mentioned, with site supervision, you only get an engineer – equipped with all relevant manuals and drawings etc., but no tools.

Due to the difficulty in bringing tools, a list of tools and lifting equipment required for the re-assembly of the ladle, plus a set of instructions are sent in advance of the visit. While most of the tools are standard to any foundry, we do use metric fastenings and therefore need the necessary metric spanner sizes. Or, as experience has taught us, "Wrench sizes." (Yes, it's that language issue again.)

Open-end wrench = open ended spanner box wrench = ring spanner, socket wrench set = socket spanner set and monkey wrench = not something an engineer uses.

My time on-site is usually constricted by the need to fit in with a pre-arranged travel schedule. So I'm always keen to make best use of the time spent with the customer.

As usual communication is the key. Nobody will deliberately put obstacles in the way but, when priorities do differ, unintentional ones may arise and having a clear path of communication is the best way to deal with it, especially when the foundry is part of much larger organization.

With respect to both case studies, the ladles were reassembled and commissioned within the allotted time, giving me chance to carry out some sightseeing before having to fly back home.

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