LEAD INDUSTRIES ASSOCIATION

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METALLIC LEAD PRODUCTS DIVISION

CHEMICAL BULLETIN NO. 54

SUBJECT: NEW TOOL SPEEDS LEAD LINING ERECTION

SUMMARY:

A new method for fastening strapped lead linings has been perfected and field tested which substantially cuts down the cost of such an installation and in other ways makes a strapped lead lining more desirable.

Here is a description of the method. This same information, along with illustrations, will appear in the February, 1954, issue of "Chemical Engineering."

BACKGROUND OF DEVELOPMENT:

Strapped lead linings have long been recognized as an important method of utilizing lead for handling corrosive liquids or fumes and any developments making such installations easier or more economical are especially significant.

The latest of such developments is a method that makes use of a cartridge powered tool or "stud driver." It is used for securely anchoring steel straps to a lead lined steel vessel without drilling and matching bolt holes or for fastening sheet lead to concrete without the time-consuming and expensive process of drilling holes in the concrete. It has also been used with marked success and great cost savings in X-ray room lining operations for fastening sheet lead to cinder block walls and then covering the heads with small patches of sheet lead to form a radiation-proof shield. If desirable, wood studding can be anchored to concrete, steel or cinder block with the stud driver and the sheet lead then anchored to the studding.

Pioneering in the application of the cartridge powered stud driver, the Remington Arms Company, Inc., in cooperation with the Lead Industries Association, arranged with a number of lead fabricators to test the new device under actual service conditions. Equipment erected with the aid of the stud driver now having been in service for two years, the results of the program indicate that the tool is a pronounced success.

SPECIFIC COST SAVINGS:

In general, the cost reductions involved over customary fastening techniques have been about 60 percent; a saving largely the result of lowered labor costs. For example, a lead lining in a 35-ft. high tank was recently installed without having to erect scaffolding on the outside, an expensive and time-consuming operation. With the stud driver all the work was done from the inside in less than half the time normally involved. On another job, 500 hours for drilling and bolting of straps were estimated but by using the stud driver it was possible to reduce this time to only 150 hours.

Soon to receive its first field trial is a unique stud driver application. Wherever the lead lining in a steel vessel is to be strapped, a strip of 16-lb. lead, 5 in. wide is first laid down on the lead lining. On this is centered a steel strap 2 in. wide and 3/16 in. thick. The whole "sandwich" is flattened at the point of fastening and a stud driven every 4 ft. on center. The lead strip is then turned up over the steel strap and joined by welding thus sealing the steel away from contact with corrosives. This method not only is considerably faster than the conventional method of covering straps but cuts the number of lead welded seams, and thus the cost of lead welding, in half.

SPECIFICATIONS:

The maximum thickness of strapped lead lining thus far successfully fastened with the stud driver is through 1/4 in. steel strap, plus 1/4 in. lead lining, plus 1/4 in. steel shell. There is evidence that the thickness of the lead is more or less inconsequential inasmuch as it behaves more as a lubricant for the steel stud rather than as an impediment.

The studs as now produced by Remington are hardened steel with a Rockwell C of 51 to 55. They obviously are not recommended for penetrating cast iron or specially hardened steel.

OPERATION OF THE STUD DRIVER:

Operation of the stud driver is extremely simple and safe and does not require a skilled operator. After selecting the proper stud for the job (simple nail-type, break-off head type, or threaded - all in various lengths) and inserting it in the end of the cartridge (six different cartridges are available depending upon power or driving force required), the assembled stud and cartridge is then inserted in the chamber of the portable driver. The tool is pressed in position against the steel strap, safety lever depressed, and the trigger pulled, leaving the strap firmly secured to the steel shell with the lead lining held tightly in between. Tests on the strength of the stud have shown that the normal nail-type stud will continue to hold long after a 1/4 in. mild steel nut and bolt would have failed by shearing.

Depending upon the thickness involved and the type of stud employed, oftentimes the point of the stud will protrude through the outer vessel's shell. In this case the points may be shorn with a properly hardened bolt cutter or by whipping off with a soft cutting torch flame or an electric arc.

TIME SAVINGS:

In a typical strapped sheet lead lined steel vessel, the use of the stud driver eliminates the drilling of the strap and shell, an operation requiring about 12 minutes after marking, and the set-up operation which takes about 2 minutes, making a total of 14 minutes for each hole. Set-up applies to the erection of the necessary staging and equipment so that the operators can have proper leverage for drilling. Stud driving, on the other hand, takes approximately 2 minutes per hole for loading the gun and shooting the stud after the set-up, making a total of only 4 minutes per hole, a time saving of more than 70 percent. Furthermore, marking time can be cut down considerably because in driving studs it would not be necessary to adhere to a specific spacing. Studs could be driven virtually at random.

CONCLUSION:

From the foregoing, it can be seen that the use of the automatic stud driver in the erection of sheet lead linings, whether for radiation protection or corrosives handling equipment, does offer very real advantages in cutting down the labor costs of such work, shortening the time required and improving the quality of the work produced.

Developments such as these, and more important, their recognition, should help much in maintaining lead's position as a modern material of construction