Plastic Application and It's Various Uses in the Oil Field

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Plastic coatings have become a vital part of the Oil Industry for protection against corrosion in tubular goods, oil field storage tanks, and miscellaneous equipment. And for the protection against paraffin clogged flow lines and tubing.

With oil field equipment being as expensive as it is and the need for the production of more oil ever present, it is easy to see the feasebility of a coating that will offer protection and prolong the life of this equipment twice it's normal life span. Giving complete satisfaction in performance.

Plastic coating is being used in drill pipe to stop corrosion fatigue. When we define corrosion fatigue, we find it to be cracks resulting from the notch effect created in the bottom of minute corrosion pits caused by electrolytic action. This action concentrates the stresses of operation at the base of the notch and reduces the maximum number of stress reversals available before commencement of failure. With a plastic coating properly applied, we find this type corrosion is controlled. Drill pipe will last twice it's normal life span. Case history; String # 32, coated in 1947 for a major oil company has drilled over two hundred thousand feet with out a costly failure or twist off. This string is inspected periodically and joints that show 10% of the plastic coating gone are recoated. This string in ten years of operation has lost only thirty-two joints.

Line pipe, tubing and casing are coated to prevent corrosion attacts and the collection of paraffin. The most common elements causing corrosion are sour crude, salt water, hydrogen sulphide gas and sulphur. In areas where any of these elements are very dense the corrosion problem becomes a real one. In a very short period of time corrosion will begin it's work of destroying, which is accomplished in short order.

The problem of paraffin is a bothersome, aggravating thing. Causing clogged lines and in many cases a complete stoppage of the flow of oil. It's an expensive problem too. There are several ways to reduce this problem, by such methods as hot oiling, steaming and scraping. However, these methods are far from solving the problem because in a short while the paraffin will have a build up large enough to start giving trouble again. When tubing and flow lines are coated with a plastic coating, the collection of paraffin stops. The smooth surface formed by the plastic coating prevents the paraffin from taking hold on the sides of the pipe. The porosity is practically nil. The paraffin is pushed along the line with the oil and does not have an opportunity to clog the line. Field experience shows lines having to be steamed or hot oiled on an average of every six weeks have been in operation two to three years without giving trouble. Production is increased and man hours for maintenance are reduced to a minimum.

Plastic coating protection for oil field storage tanks is the most feasible method of protection in use today. Records show coated tanks have as much as eleven years of service. Inspection of many of these tanks indicate they are still in excellent condition. The coating system works equally well on bolted tanks and welded tanks.

We have discussed the uses in general for a protective plastic coating. There are many other uses for it. All miscellaneous equipment is benefitted greatly by being thus protected. Many drilling concerns have found plastic coating has paid off in protection for their drilling rigs. Oil field haulers have had the same experience with their big trucks. There are a million uses for plastic coating.

There are many brands of plastic, but they generally fall into two categories. These are vinyl and epoxy. Both of these plastics are resins. Talking as a class the difference lies in their make-up.

Vinyls are chemically complete when the applicator receives the plastic for application. As soon as the plastic is sprayed and the solvent dries out and the plastic film dries the coating is complete. Vinyls were the first plastics used in the oil field for protection against corrosion and paraffin. They are the older in terms of use and field experience.

Epoxies are not chemically complete when the applicator receives the plastic for application. Another chemical has to be added on the job, just before they are sprayed. Solvents evaporate after spraying and the chemical action starts and has to cure out. Epoxies do not have as many years field service as vinyls but in cases of a high content of hydrogen sulphide gas, excessive high temperatures and abrasive wear they have proven superior.

Preparation of the metal to receive a coat of plastic is most important. And the responsibility lies with the plastic applicator to do this job properly. The metal must be completely free from all foreign matter. All rust, dirt, scale, oil, et cetera must be cleaned off. Sandblasting is the accepted method for cleaning the metal. A medium grade of sand should be used. Homogeneity is desired, a surface free from inclusions and other imperfections. The ultimate protection offered by plastic coating is dependent on the amount of plastic which covers the peak of a surface anchor. The use of abrasive and blasting techniques which produce a coarse anchor pattern should be avoided. Sandblasting, if not properly done may produce badly scorched or oxidized areas. For a six mil coverage the anchor pattern should not exceed two mils. By using a 30 to 50 mesh sand with approximately a hundred pounds of pressure, will produce an anchor pattern of one and one-half mils.

If the vinyl coat system is being used, two coats of primer are applied, adhereing to the necessary drying time between coats, which is from two to three hours, depending on weather conditions. The primer bonds to the metal and in effect becomes a part of the metal. Four finish coats are applied to build up a thickness of five to six mils. A minimum of twenty-four hours drying time is required before the coated surface should be put into service.

The epoxy coat system requires one primer coat and two finish coats to produce a five to six mil thickness. It is more difficult to apply than vinyl coatings. Requiring more drying time between coats, from eight to twelve hours. This material is not to be applied when temperatures are below forty degrees. As mentioned before, epoxies must be allowed to cure out, a mimimum of thirty-six hours drying time should be adhered to before putting this coating into service.

There is much to be said for the application of plastic coatings and it should be stressed that the success of the coating depends on the efficiency of the applicator. Plastic manufacturers look for reputable applicators to use their

materials. Approximately 85% of any coating job is dependent on the knowledge and efficiency of the applicator.

In applying plastic to the interior of pipe, a special spray nozzle, giving a perfect 360 degree spray action is used. This nozzle distributes the plastic evenly over the surface of the pipe.

In coating tanks an entirely different spray action is used. A hand gun is standard equipment for this application. The plastic is applied with a straight uniform stroke, moving backwards and forwards across the surface in such a way that the spray pattern overlaps the previous stroke by 50%. If the gun is held too close to the tank, the deposit of plastic will be too heavy and will cause runs and sags. While on the other hand, if the gun is held too far from the surface it will cause dry spray and excessive feathering. Usually, when the spray gun is adjusted correctly, six to eight inches is the right distance from the tank wall.

In addition to sandblasting the metal in a tank to be plastic coated, the surface after being sandblasted must be thoroughly cleaned. A vacumn cleaner designed for this heavy work is the most desirable method in accomplishing this. All cracks and crevices must be free of any sand or dust.

After coating is complete and given the required drying time, a Holiday Detector is run over the entire surface to check for pin holes in the plastic coated wall. Pin holes are caused by solvents escaping from the materials. It is most important that these minute pin holes be repaired. Thru these holes start the first attact of corrosion on the tank metal. Also, a mil gauge is run over the entire coated surface to check for a five to six mil coating thickness, the minimum coating coverage for the utmost protection against corrosion.

To receive the benefits expected from plastic coatings it is most important to know the problem at hand. The coating should be selected and applied with the job it is expected to accomplish in mind. Never for convenience sake or ease of application but for the sake of performance. One single type of plastic is not a cure-all, which makes each job an individual problem, requiring special attention. A job should never be short changed on the amount of materials needed to produce a five to six mil thickness or should the importance of the preparation of the metal be under estimated. A poor application will result in failure.

To summarize: Plastic coatings will meet every corrosion and paraffin problem. The problem at hand must be considered and the correct type of plastic selected for this particular need. The metal to be coated must be prepared correctly and the plastic coating applied, abiding by the rules set forth in this paper. The applicator selected to do the work must be reputable and have sufficient experience in the field of coatings to do a first class job. When these requirements have been met the operator will have a coating job that will make the problem of producing black gold comparably easy from the corrosion and paraffin angle.