

# Petroleum Applications for MagniFlo Products

The theories of Magneto hydrodynamics for controlling mineral scale in *water* are manifest in the treatment of crude oil. Petroleum production problems, however, are considerably more complex than those associated with water. With water, magnetic treatment may be permitted to begin at any point in the system and perform consistently and correctly. In crude oil the primary problem centers on the fact that to discourage the accumulation of paraffin the treatment must be initiated in a number of different methods & designs.

The state of the art designs of paraffin and scale control tools for petroleum usage must be capable of entering the tubing string itself at depths consistent with paraffin or scale formation. At the same time these tools must permit passage of wire line instrumentation and, in the case of sucker rod pumping, passage of the rod string freely through the tubing, or in other words, a full bore design with unrestricted passage & no internal protrusions.

The divergent designs of flowing and artificial lift systems require these tools be designed with the structural and dimensional characteristics associated with each type:

**1. Sucker Rod Pumping:** This type of artificial lift design requires the tool(s) either be located below the rod pump and/or in the tubing. In wells with paraffin deposition at the surface several designs are available, as full bore and structural requirements are critical.

However, in wells having paraffin problems at less than the entire depth, as noted above, these tools must be designed with a clean bore for rod implementation and be structurally assembled of materials consistent to the tubing itself. This greatly reduces the market options.

**2. Gas Lift:** This design requires that the tool(s) is located inside the tubing unless sufficient space is available between the tool and the casing. With sufficient space, tools used in sucker rod pumping can also be used here. If restrictions are present, the tool(s) must be manufactured to meet the 0.0, to 1.0, requirements as set forth by the industry and the well operator. It should be noted here that the well's gas-lift design may need review do to the choke effect of this tool design.

**3. Submersible Electric & Subsurface Hydraulic Pumping:** The restrictions and conditions in these two types of lift are similar to those faced in gas lift pumping and would necessitate like tooling requirements.

**4. Flowing Wells:** These wells are suited to all types of tools. However, those wells, in operation where temporarily shutting-in the well is not acceptable, may require tools be located or suspended within the tubing. Tooling requirements here are similar to those of gas lift systems.

Surface applications such as flow and trunk lines, where structural and O.D. dimensions are usually of limited or no concern, permit simpler design. In many instances, the strap-on units may be utilized, however, as these units are easily attached, so are they easily removed,

In-line designs where outside dimensions are of little or no concern, tools can be structured of materials consistent with the subject problem equipment. Regardless of the application, with proper handling, and as there are no moving parts within the tools themselves, maximum performance should continue indefinitely, and in all likelihood outlive the well itself.

## **Other Applications**

Although this paper is primarily concerned with the uses of MHD in the Petroleum Industry, some thought must be accorded the various water applications, as water usage in the oilfield suffers under parallel conditions.

Probably the greatest usage, certainly the largest marketing area, is in residential, commercial & industrial applications. These applications range from the hot water heater & the dishwasher in your home to the cooling tower & boilers at schools, hospitals or office buildings.

Commercial & industrial applications include not only cooling towers & boilers, but tube sheets, heat exchangers, compressor & engine water jackets.

Because of the strength & endurance of the MagniFlo magnetic design, we are able to design devices that require no plumbing or system shut-in for installation, but are merely strapped around the exterior of the lines.

Those industrial applications where the use of water is required for cooling or heating in the manufacturing process, scale and the resultant corrosion are serious and expensive problems.

Whether the conditions exist in closed circuit systems such as boilers, cooling towers, compressors or engine water jackets, or in single pass systems such as tube sheets, heat exchangers or pumps, the proper magnetic system can reduce, control or eliminate mineral scale and corrosion.

The power of the magnetic field is so strong that MagniFlo devices do not require any plumbing or equipment shutdown for installation.

## **MagniFlo**