Slurry Mixer

For Teledyne Isco Syringe Pumps

Teledyne Isco, Inc. USA

Syringe Pump Application Note
AN25

Overview

Pumping slurries in a laboratory environment is dependent upon even distribution and suspension of particulates. Laboratory tests demonstrated mixing capabilities using the Isco slurry mixer package, which can be installed on Teledyne Isco pump models 1000D and 500D. A comparison of particle suspension with and without the slurry mixer demonstrated the benefits of the mixer.

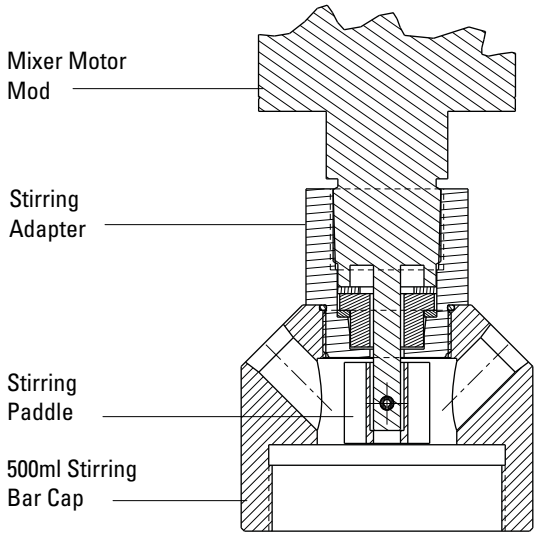

Figure 1: Syringe pump stirring cap
(Cross-section)

Laboratory Setup

In the laboratory at Teledyne Isco, Inc., slurry mixtures with specific weight-weight ratios were pumped through an Isco Syringe Pump system.

The pump system consisted of a controller and 500D pump module with air ball valve package, clear polycarbonate cylinder for visibility (not a standard part), mixer motor, and stirring cylinder cap, as shown in Figure 2. The Isco slurry mixer package includes a stirring cap at the top of the cylinder that evenly mixes the slurry throughout the length of the cylinder. The cylinder cap contains the inlet and outlet ports, as well as a circular paddle for stirring (Figure .3).

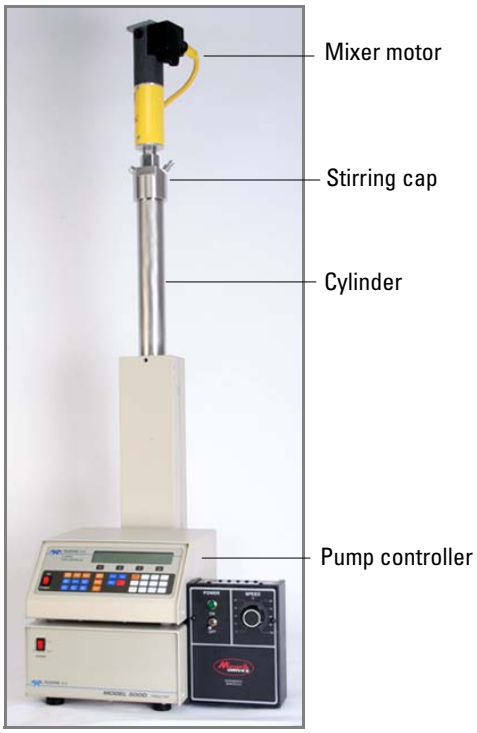

Figure 2: Slurry Mixer package installed On an Isco model 500D pump

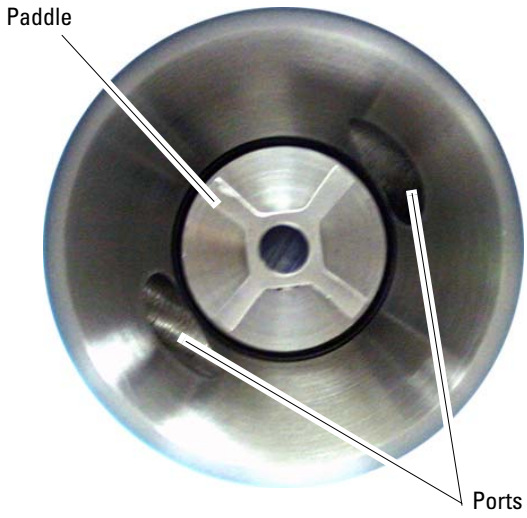

Figure 3: Stirring Paddle
(As seen from inside the cylinder shaft)

Experiment 1: Distribution

A 20% weight-weight combination of cornstarch and water was drawn into the syringe pump cylinder and mixed with the slurry mixer apparatus.

With the mixture in suspension, 1 mL of blue dye was injected into the inlet port, and the slurry mixer turned on. Total distribution was achieved in under eleven seconds, as seen in Figure 4.

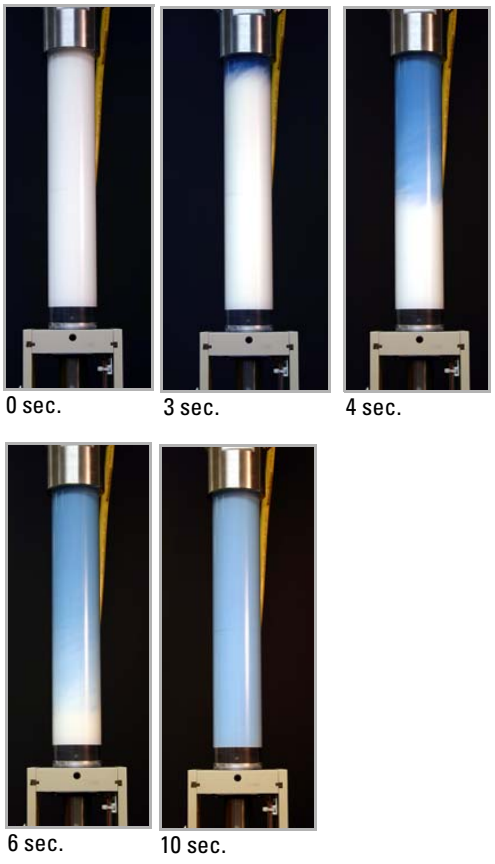

Figure 4: Distribution time: Blue dye + 20% w-w cornstarch slurry

> ☑ ***Note***
>
> All experiments were performed using a clear polycarbonate cylinder for visibility. The standard Isco pump cylinder is made of nitronic or hastelloy.

Experiment 2: Suspension

The purpose of this experiment was to observe the duration and particle suspension of each solution throughout the length of the pump cylinder, over the duration of a full pumping cycle, the goal being to maintain a homogeneous mix from the top of the cylinder to the bottom.

Results

The results confirmed that the homogeneity of the slurry was not sustainable for an adequate time without running the slurry mixer to maintain particle suspension. The cornstarch in the slurry mixture settled over time, separating from the water so that the mixture was no longer evenly distributed, while the Isco slurry mixer package maintained even particle suspension over the same amount of time, as seen in Figure 5.

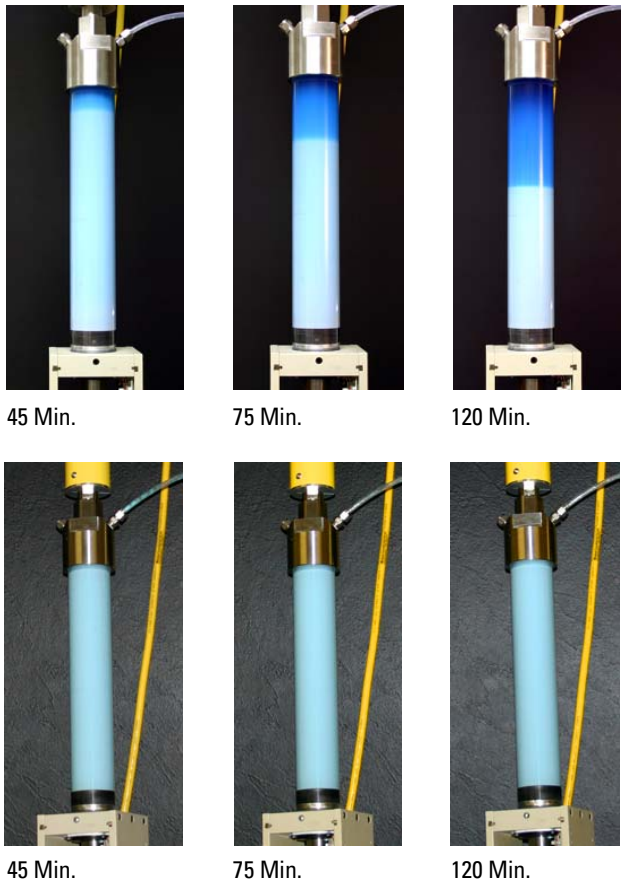

Figure 5: Slurry Settling Over Time (top) Compared with slurry mixer running continuously (bottom)

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