Linear Chemical Dose Controller

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Abstract

The linear chemical dose controller, LCDC, is a key technology for AguaClara. The LCDC makes it possible for the plant operator to directly set the chemical dose for the chemical feeds without requiring any electricity. Creating a linear chemical dose controller that can be directly controlled by the plant flow rate has been a major accomplishment of the AguaClara team. This invention is now ready for deployment. To scale up it will be necessary to provide detailed instructions for obtaining parts, fabricating the components, placing the unit in a water treatment plant, calibrating the doser, and using the doser. The LCDC must be a fine instrument that performs very well and that is a point of pride of AguaClara plants.

- skills: fluid mechanics, fabrication, documentation

1 Introduction

We now have a system of equations for designing the doser. The designs have gotten more complicated with the need to use several different dosing tube diameters and a range of the number of dosing tubes. It would be very useful to review the designs and see if there are any ways to standardize the designs and reduce the number of different designs needed. A goal would be reduce the number of parts that need to be changed to accommodate different plant flow rates.

Tasks for the LCDC team are...

1. Test the entire system for chlorine resistance. The dosers that are used for chlorine all look terrible in Honduras because of small chlorine leaks. Propose improved plumbing connections that will completely eliminate leaks and be easy to clean and maintain.

2. Build a full scale prototype that uses all of the latest technologies including the long straight dosing tubes on a manifold.

3. Add the calibration device that connects the float to the lever arms. The calibration device can adjust the distance between the lever and the float to set levers level at zero flow.

4. Devise a method to generate labels for the lever arm using AutoCAD or some other method that can be automated and included with the design files (coordinate with the design team).

5. Test and document the calibration method of a new LCDC so that it produces the design chemical dosages on both chemical feeds.

6. Evaluate best methods of distributing the LCDC technology. Should the LCDC be built by a small company and distributed globally, built by small companies in global regions, or built by local implementation partners? We are currently exploring the option of having the LCDC built by AguaClara Inc.

7. Add branding to the LCDC. Include the logo and the website (AguaClara.Cornell.edu).

References

[1] A. K. Mohanty and S. B. L. Asthana, Journal of Fluid Mechanics / Volume 90 / Issue 03, pp 433 - 447, 1978. Published online: 19 April 2006 DOI:10.1017/S0022112079002330

[2] Zhou, Y., & Shah, S. (2006). New Friction-Factor Corrections for Non-Newtonian Fluid Flow in Coiled Tubing. SPE Drilling and Completion , 68-76 (DOI:10.1017/S0022112079002330).