

Fabrication

June 12, 2011

Abstract

The AguaClara philosophy of minimizing the use of materials that aren't locally available and also minimizing specialized proprietary components means that we need to develop fabrication techniques to assemble specialized components from generic materials. The components are generally assembled at the plant construction site using a small number of tools. The plant sites often do not have electricity available. The challenges are to improve the tools that are used for fabrication, design jigs for faster assembly of components, and to devise improved components.

students 2PT

skills fabrication,

1 Car battery connection for battery powered drill

The cordless drill used at AguaClara construction sites is a 12 V DeWalt. The run time for a single battery charge is variable, but at continuous full load the battery only lasts a few minutes. Given the frequent lack of electricity at construction sites it would be useful to have a power source that could run the drill for a full day of work. A car battery should be able to power a drill all day. The challenge is to create a safe method to connect the 12 V cordless drill to a car battery. The extension cord between the car battery and the drill will need to be able to provide 285 W at 12 V (Suggest a 12-gauge wire of 4-5 meters in length). The extension cord will need battery terminal clamps and a fuse installed near the battery to eliminate the risk of a dangerous short in the extension cord or drill. The connection between the extension cord and the drill can be made by acquiring a used battery back (perhaps from a battery recycle center), removing the battery cells, drilling a hole through the plastic battery cover for the extension cord, and attaching the extension cord ends to the battery terminals inside the battery pack. This will make it possible to easily switch between using car battery power and using the standard DeWalt batteries. The extension cord needs to have strain relief where it passes through the battery pack.



Figure 1: 12 V DeWalt drill used at AguaClara construction sites.

The challenge is to acquire the components, build this system, and test it prior to July 28 so that it can be shipped to Honduras this summer. Before acquiring the system, compare the cost with the cost of acquiring enough battery packs to make it through a day of work.

A related challenge is to identify a 12 V hammer drill (see for example Milwaukee 2411-22 Cordless Hammer Drill/Drivers 12V 3/8) that can be used for drilling holes in concrete. The hammer drill will need the same conversion to car battery power.

Note that it would be ideal if we could get a hammer drill and a standard drill from the same manufacturer with identical battery packs. Will DeWalt produce a 12 V hammer drill soon or should we switch to a different manufacturer?

The AguaClara/APP team has a portable data acquisition system with deep cycle batteries. Investigate the possibility of using those batteries and acquiring appropriate connectors for an extension cord.

2 Improved hole saw

The LFOM, Inlet Manifolds, Plate Settlers, and Floc Baffles all require creating large diameter holes in PVC pipe or in plastic sheets. The team in Honduras currently uses a hole saw to create these holes. The hole saw creates a rough hole and when the drilling operation is over the "hole" is inside the hole saw and must be removed. The entire process is time consuming. We need a better way to create these holes. The goal is to come up with improved methods of drill holes that can be tested at the Alauca plant that is being constructed now. Review the fabrication team recommendations from spring 2011 and acquire a better hole saw for the team in Honduras.

3 Plate Settler Modules

Plate settler spacing may be reduced to 1 cm or even 0.5 cm in the near future. In any case we would like to be able to build plate settler modules with reduced spacing to test their effectiveness in a full scale plant (perhaps at Cuatro Comunidades). We need a method to fabricate plate settler modules with very small spacings between plates. It may be possible to use the same fabrication technique as we are using currently or there may be an easier method. The fabrication team from spring 2011 invented a guide to position the plate settlers. Test this method and assemble a few modules to see if you can invent further improvements.