

## **BUILDING FRAME FOR MINI PILOT PLANT**



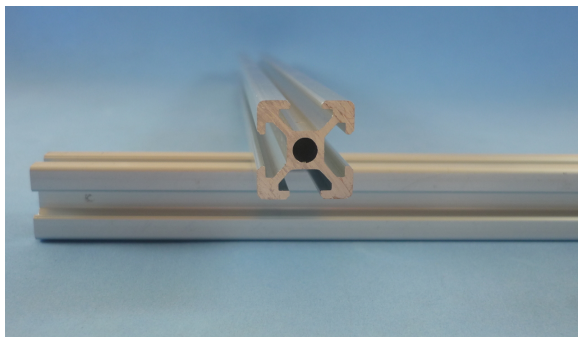
### **PILOT PLANTS**

The vast majority of pilot plants are experimental, this means they could be moved, some of their parts could be changed or modified, or being part of an educative kit and must be disassembled, stored or transported easily as a part of the learning process.

### **SLOTTED PROFILES**

To build a robust frame, but at the same time easy to disassemble, there is an available solution known as "modular aluminum structural system". This modular system is basically extruded slotted aluminum profiles with compatible accessories for fixation.

There are a lot of manufacturers like 80/20, MakerSlide, MiniTec, etc. Some of them are compatible with other systems, some of them no. Metric and inches profiles and accessories are available. These systems became very popular in the last years due to the DIY CNC and 3D printers boom.



## JOINING SLOTTED PROFILES

Basically, there are two methods for joining aluminum profiles: machining or without machining. machining method is mostly used in permanent (unchanged) structures, usually requires tools for drilling, cutting, etc.

The method that uses no machining offers great flexibility, untouched profiles could be disassembled and reused in another structure, also no other tool than Allen key is needed!

## PARTS NEEDED

Profiles:

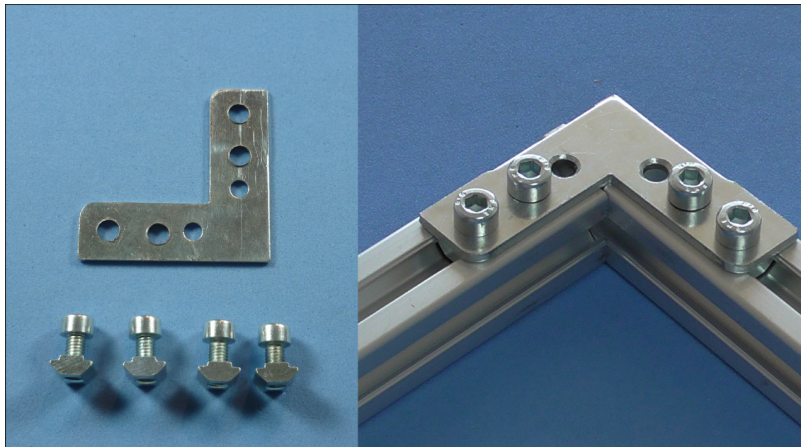
As mentioned earlier the structures are based on slotted profiles and connecting accessories. The best way is to seek for this stuff in local markets: specialized stores, hardware stores, DIY stores, etc. If there are no similar things in local markets, the next step is Internet to get the products. Being metallic objects of relative high weight, shipping costs from overseas are usually high. However, browsing a bit, sometimes there are pre-cut kits (usually to make DIY 3D printers) with a good price and free shipping worldwide !

Accessories:

The chosen accessories must be compatible with the corresponding slotted profile (T-slot, MicroRax, etc.) and the size of the profile, because are available in multiple sizes (10 series, 20 series, etc.). At this point there is a lot of flexibility because a lot of parts from local stores could be used. Here are some alternatives:

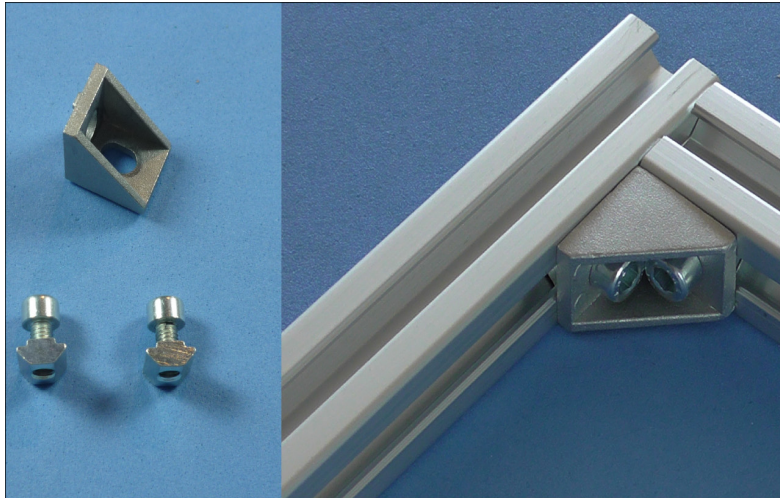
### L shaped plates, Allen screws and T sliding nuts

These plates are very common in hardware or home related stores, Allen screws are used and some sort of squared or T sliding nut compatible with the screw, and able to slide into the profile's slot. It's the least elegant solution aesthetically speaking, but the easiest to get.



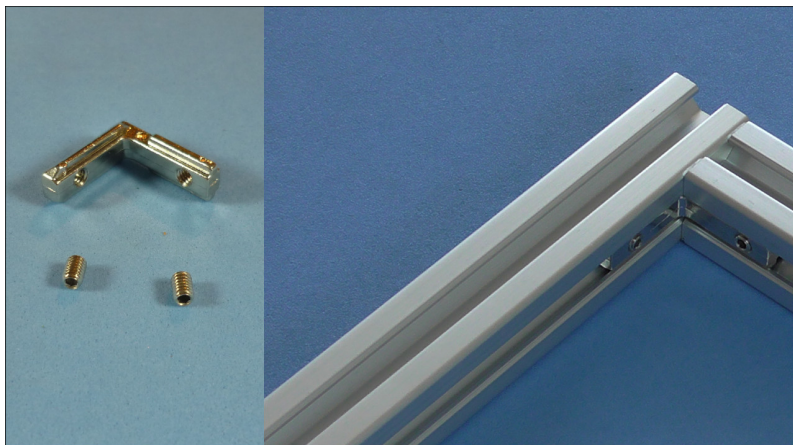
### **Corner bracket gussets , Allen screws and T sliding nuts**

This alternative could be explored if 90 degree metallic or hard plastic gussets are available, again Allen screws and T sliding nuts. Due to the dimensions of the gussets, screws with big heads can't be used.



### **Internal L shaped joint connector and headless Allen screws**

This last option uses pieces exclusively designed for this type of profiles, aren't common in local hardware stores, but could be bought on the Internet for a very good price. This is the best visual option, because union joints are practically invisible.



## ASSEMBLING TIPS

- Cut the profiles to the desired length as precise and clean as possible.
- Work on a hard surface
- Get the Allen key for the respective used screws
- Verify with a Set square the angles (should be 90), and verify there is no gap between the profiles
- Don't screw the bolts too tight initially, probably they have to loose slightly later to make adjustments

The model built was a cubic frame, using 12 aluminum profiles series 2020 (20 mm x 20 mm diameter). These profiles are from a 3D printer kit. Each kit contains four 400 mm length profiles and two 330 mm length profiles. With these parts a cube of max dimensions 400 mm x 400 mm x 330 mm could be assembled.

## LINKS

Video showing building process: <https://youtu.be/PY50zoZEvzM>

Six (series 2020) profile set: <http://s.click.aliexpress.com/e/EQ7UB2J6a>

Allen screws M5\* 8 mm: <http://s.click.aliexpress.com/e/j6aAieMnE>

T sliding nut for 2020 series profile: <http://s.click.aliexpress.com/e/r33R7IIaM>

Internal joint connector with headless allen screws: <http://s.click.aliexpress.com/e/miauvrFUn>