4th Year Project: Soldering Machine

James Glanville

11th June 2013

1 Existing Solutions

There are a number of hobbyist solutions to deal with SMD parts:

- Solder paste + heat:
  - Solder stencils: Expensive setup costs, very quick to use. Not suitable for this project.
  - Manual solder paste application: Mostly expensive dispenser, or with a syringe.
  - Hot air gun: Can be relatively difficult to get the right temperature profile.
  - Converted toaster over: seems quite common.

2 Mechanics

2.1 X/Y axes

The X/Y axes have the same requirements. 0.5mm pitch smd devices common - 0.05mm repeatability reasonable target?

- Toothed belts + pulleys + stepper motors: Simple, as used in repraps. Can be run open loop very easily. Requires: stepper motor + driver, belt, pulley.
- Threaded rod + stepper motors: Cheap, slower but probably fast enough. M3-5 easy to couple to motor shafts (http://www.thingiverse.com/thing:9622).
- Closed loop: dc motors + feedback. Linear potentiometers: relatively expensive, and potential issues with electrical noise. Rotary encoders: cheap, accurate (m4 pitch is 0.5mm, not much travel/turn.)

2.2 Z axis

The Z axis will not require as much precision as the X and Y. Potential mechanisms:

- Micro servos: cheap (2 on ebay). Require no drivers, and simple to drive. Z axis potentially does not need to be linear (UP/DOWN only?) so rotary-¿linear mechanism simpler.