

Project Deliverable D Conceptual Design

Group 1

GNG 1103 – Engineering Design

Faculty of Engineering – University of Ottawa

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Table of Contents

Light + Camera End-effector Design.....	Page 1
Figure 1. Design of Light + Camera End-effector Design.....	Page 1
Table 1. Decision matrix of Light + Camera End-effector.....	Page 1
Cleaning + Painting End Effector.....	Page 4
Figure 2. Abrasive delivery system for Sandblaster end effector.....	Page 4
Figure 3. Paint delivery system for Airbrush end effector.....	Page 4
Figure 4. Pressurized air delivery system.....	Page 5
Table 2. Decision matrix for Sandblaster and Airbrush end effectors...	Page 6
Figure 5. Box/ Tree Diagram.....	Page 7

Figure 1 below is the design for the camera and light end-effector. It consists of a small camera surrounded by LED lights that will illuminate areas for the camera when needed.

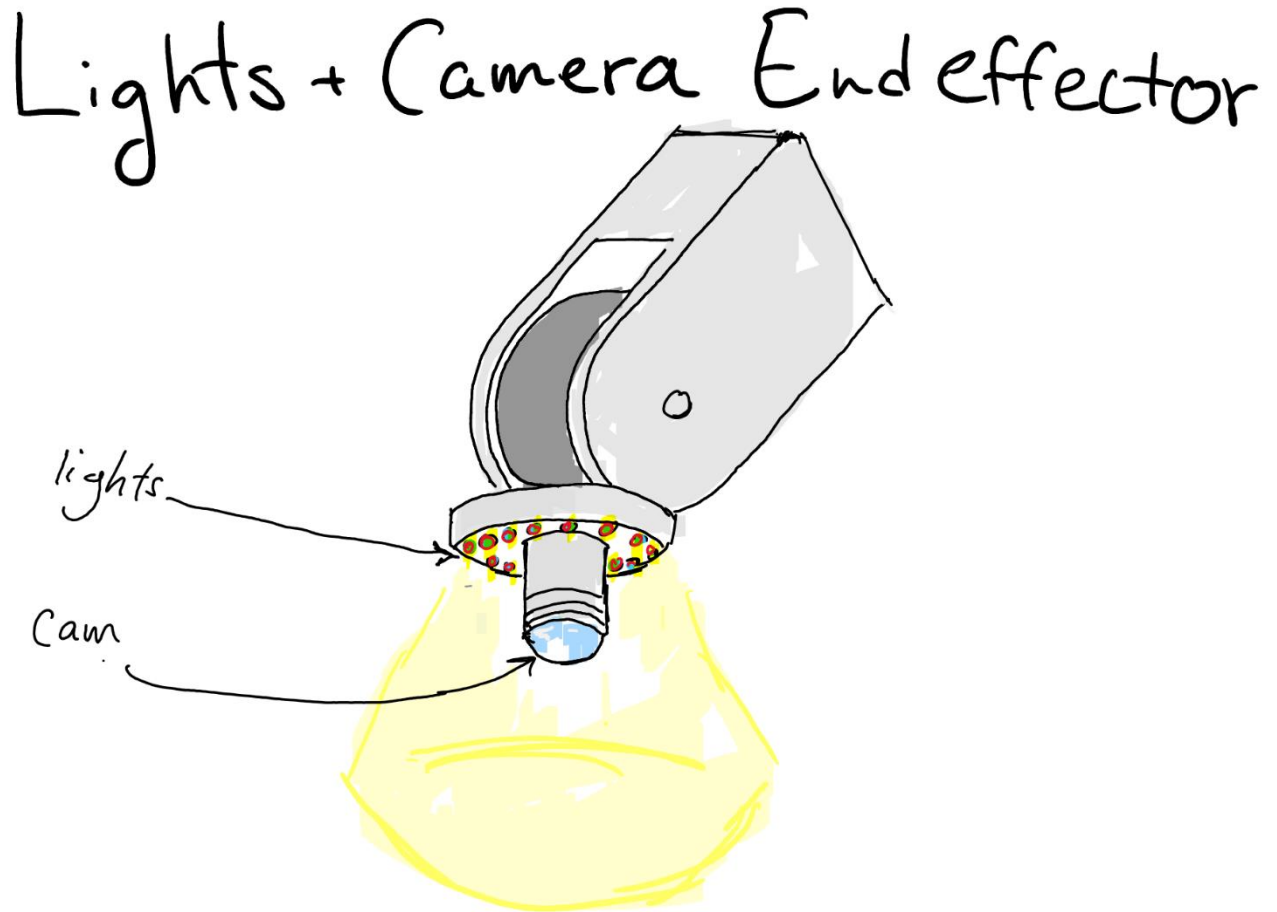


Figure 1: Lights and Camera End-effector design.

We decided to go with this design because it simultaneously executes two tasks, the lighting and camera. So now we do not need two designs for a camera and a light. This in turn is more cost effective since we save money on material. Aside from cost this will also save us a lot of time by tackling two objects with one end-effector.

Table 1: Decision Matrix

Characteristics	Ratings	Comments
Multipurpose	4	Tackles two objectives (light and visual inspection) with one end effector
Cost	3	Since the camera will be smaller yet still maintain high enough resolution, the price may be a little more expensive, however this balances out because we are saving money by making a multipurpose design

Maneuverability	4	Due to the compact nature, it will be able to move through various spaces.
Ease of use	5	Lights and camera move's at once, this makes it easy for the operator since he/she is using both functions with one set of instructions. E
Feasibility	5	This design is simple yet very effective
Size	5	We chose this design as it uses a smaller camera which can be used in tighter spaces

Figures 2, 3 and 4 below show the sandblaster and airbrush end-effectors.

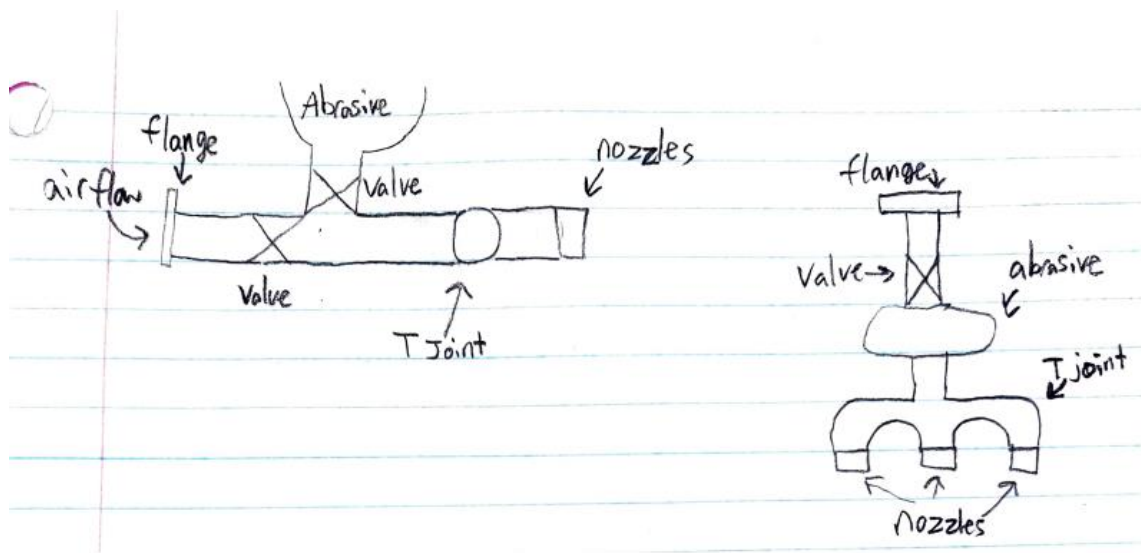


Figure 2: Abrasive delivery system for Sandblaster end effector

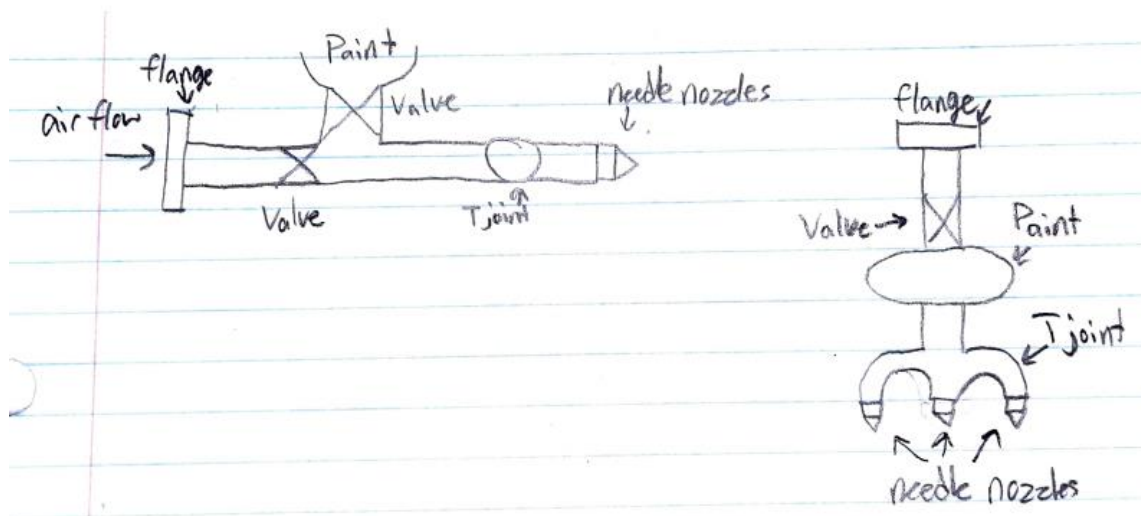
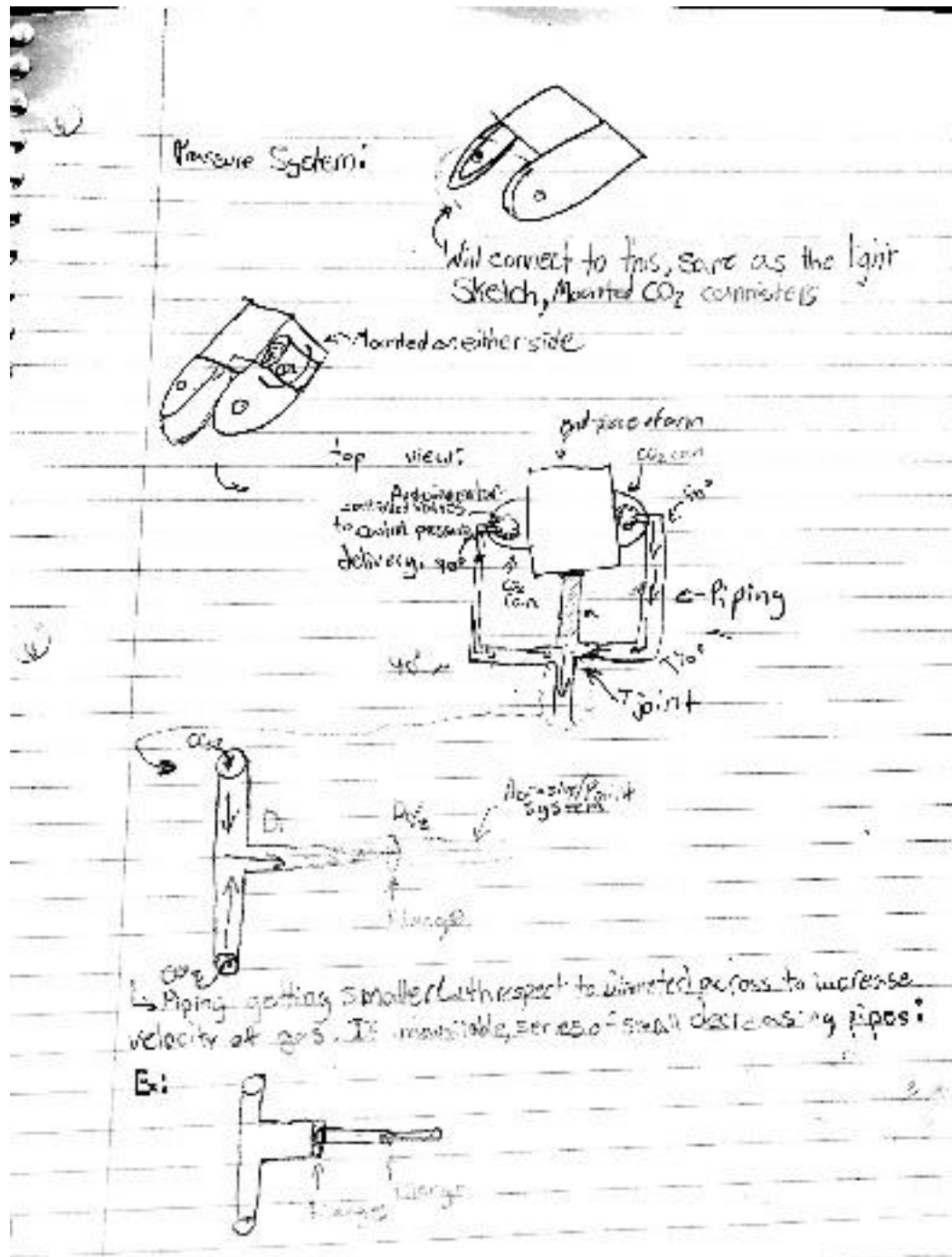


Figure 3: Paint delivery system for Airbrush end effector



Scanned with CamScanner

Figure 4: Pressurized air delivery system

These designs allow both end effectors to be connected to one pressurized air delivery system, they can both be connected to one because both sandblasters and airbrushes use similar air delivery systems to operate. This will save money on the creation of two separate pressure systems and will allow for nozzles and pipes to be cleaned much easier as abrasive will not interact with paint within the end effectors creating blockages. This dual system also allows for the different nozzle styles to be used, the sandblaster nozzle is large and circular allowing for the abrasive to escape, and the airbrush nozzle is a needle which causes paint vaporization. This dual system will make it quick and easy for an operator to manually switch end effectors.

Table 2: Decision matrix for Sandblaster and Airbrush end effectors

Characteristics	Rating (0-5)	Comments
Ease of use	4	Will be very easy to connect nozzles to air system thanks to the flanges that will be screwed together
Cost	3	Combining the pressure systems will allow one to be created instead of 2 which will reduce the cost of manufacturing
Safety	5	There will be fewer blockages which will allow for less pressure build up and chance of explosion
Reliability	5	The end effectors will need less maintenance due to them being operated separately and only one pressure system needs to be maintained
Feasibility	4	This design should be simple to manufacture and prototype
Size	3	The nozzle system will be slightly large due to there being multiple nozzles to spray a large area with each pass

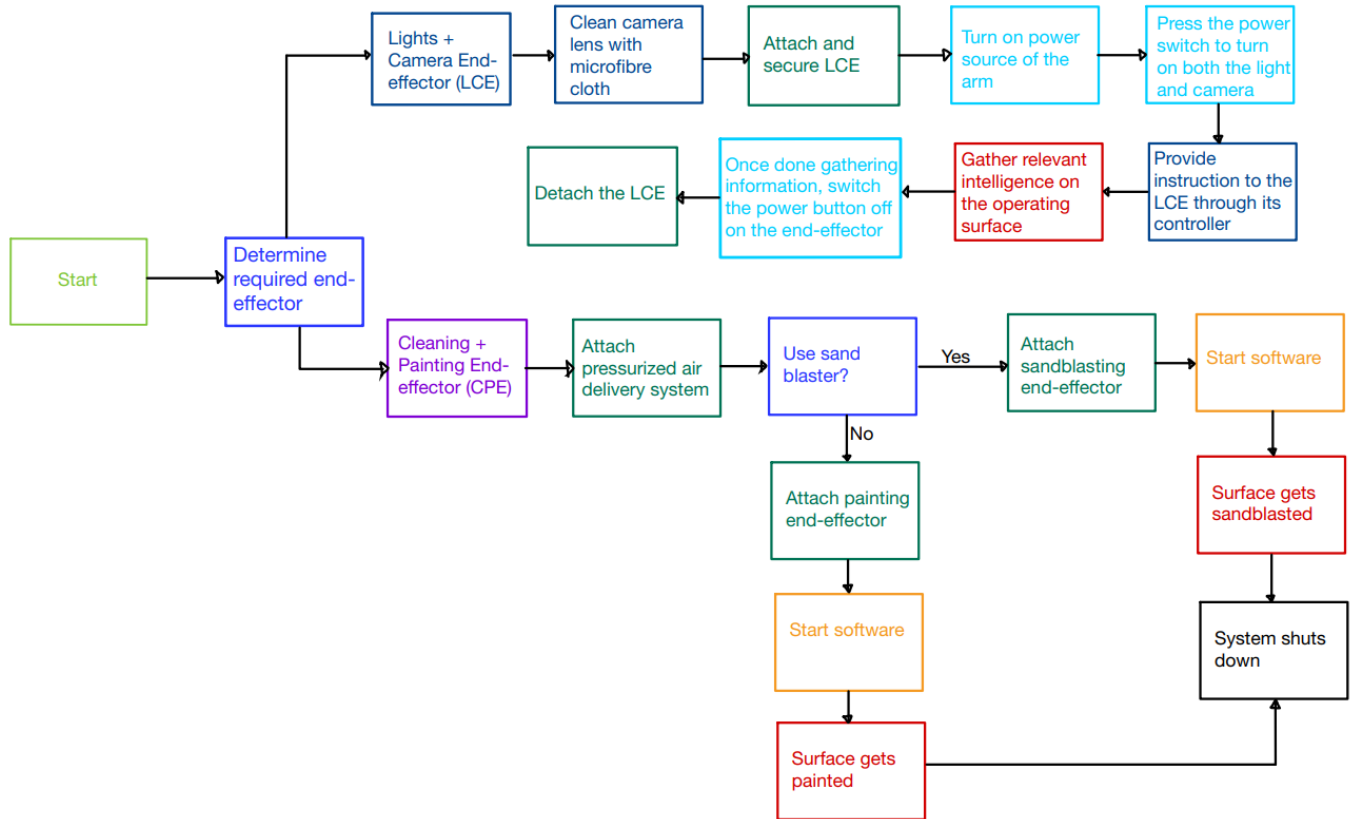


Figure 5. Box/Tree Diagram