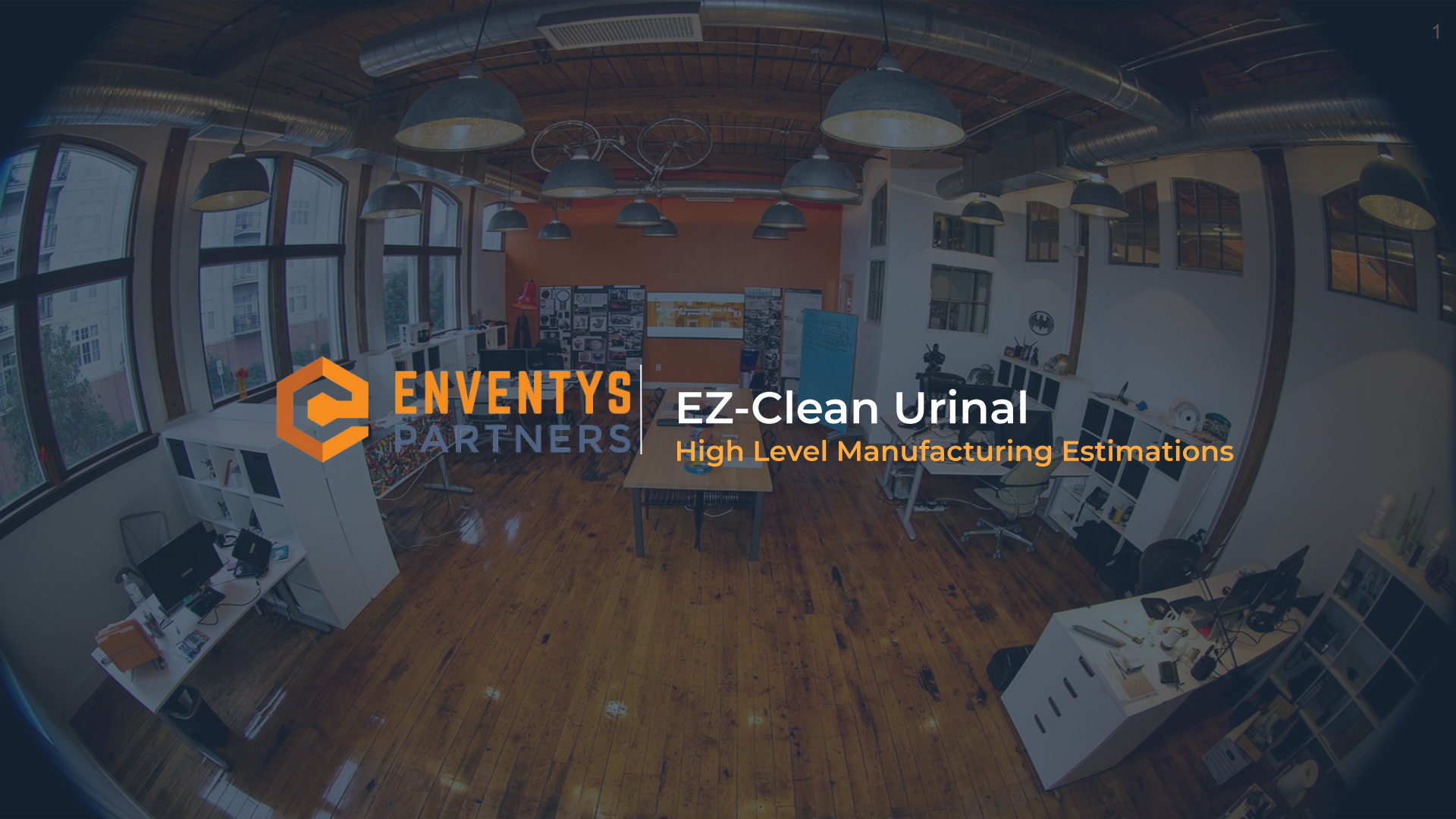


ENVENTYS PARTNERS

EZ-Clean Urinal

High Level Manufacturing Estimations

Background

In this short deck we aim to layout the expected relative costs of expected manufacturing options. Some of the major criteria we will focus on are listed below:

-Material Compatibility

-Mold Cost/Life

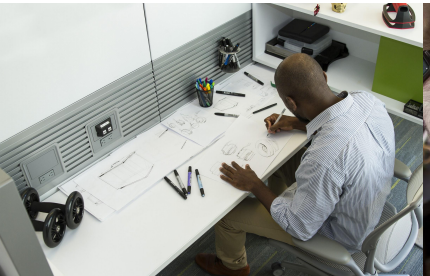
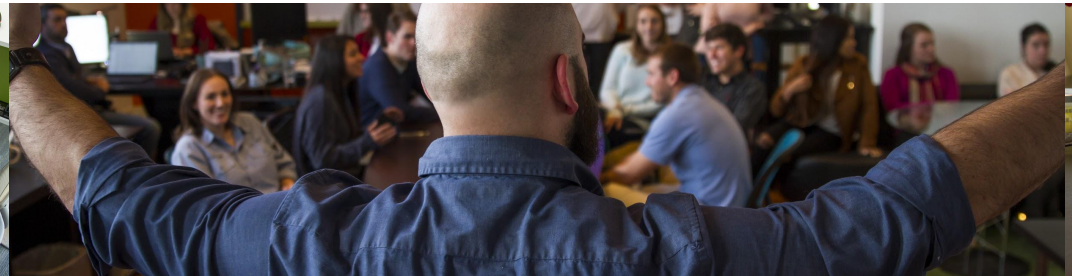
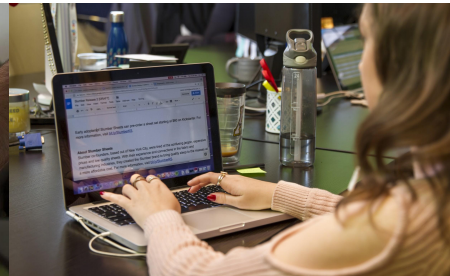
-Part Cost

-MOQ

-Surface Finish

-Feature Restrictions

-Part Properties

Background Assumptions

To make these evaluations, we are using a set of assumptions about the product. These assumptions are presented below:

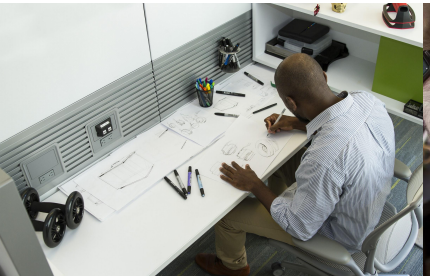
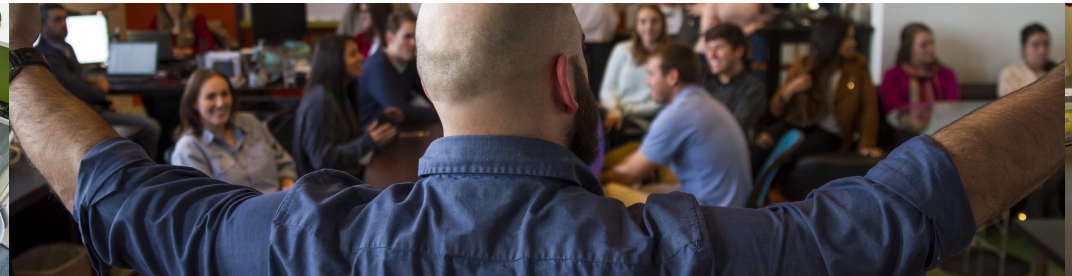
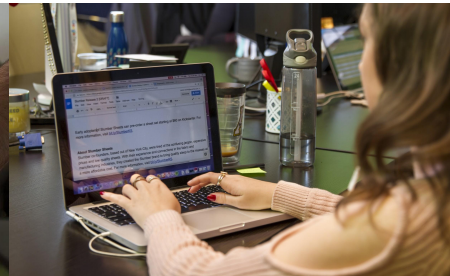
-PolyCarbonate or Similar

-High Polish A Surface

-B side features for mounting/plumbing

-B side support for platform

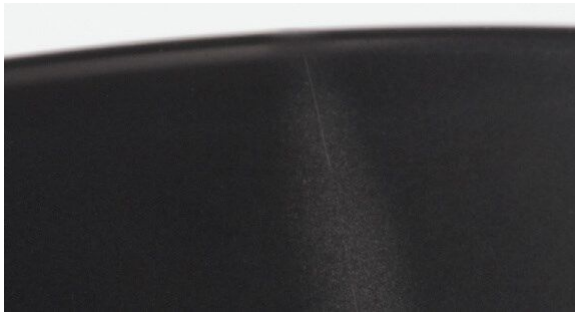
-Smooth A surface, no sink

Surface Finish deep dive

- Surface finish is very important for the urinal both functionally and aesthetically. Plastic parts are prone to a number of surface defects. Many of these defects become more apparent as part size increases

Sink



Knit Lines

- Traditionally texture is an effective tool to combat sink and knit, unfortunately this does not work for our application

Possible Methods

- Methods with potential for finished surface out of mold
  - Injection Molding (IM)
  - Pressure Forming

- Methods requiring secondary finishing
  - RIM Molding (Reaction in Mold)
  - Structural Foam Molding
  - Fiberglass

Possible Methods **Surface Characteristics**

- **Injection Molding (IM)**
  - **High mold polish achievable with good transfer**
  - **Potential for sink/knit lines**
- **Pressure Forming**
  - **High mold polish achievable with good transfer**
  - **Low potential for sink**
- **RIM Molding (Reaction in Mold)**
  - **Substantially reduced sink vs IM, prone to swirl appearance/uneven pigmentation**
  - **Painting step may be required, in mold process may be possible**
- **Structural Foam Molding**
  - **Substantial reduction in sink, surface is typically undesirable**
  - **Painting step likely required**
- **Fiberglass**
  - **Typically requires a gel coat**

Possible Methods **Mechanical Properties**

- **Injection Molding (IM)**
  - **Highest level of feature flexibility and control**
  - **Wall thickness limitations likely will require intricate ribbing (max wall ~3mm (⅛”)**
  - **Ribbing and B-side features are integral**
- **Pressure Forming**
  - **Wide range of part thickness possible ~1.5mm-12mm (1/16” -½”)**
  - **Parts must be largely constant thickness**
  - **Ribbing/B-side features are added as secondary operation**
- **RIM Molding (Reaction in Mold)**
  - **Good mechanical properties and wide thickness range (⅛”-½”)**
- **Structural Foam Molding**
  - **Good mechanical properties and wide thickness range (⅛”-½”)**
- **Fiberglass**
  - **Excellent mechanical properties, wall thickness not limited**

Possible Methods **B-Side Features**

- Injection Molding (IM)
  - Ribbing and B-side features are integral
  - Highest feature flexibility
- Pressure Forming
  - Ribbing/B-side features are added as secondary operation
  - Good flexibility due to multistep process
- RIM Molding (Reaction in Mold)
  - Similar to IM but slightly less feature flexibility
- Structural Foam Molding
  - Similar to IM but slightly less feature flexibility
- Fiberglass
  - Similar to pressure forming
  - Components can be added during layup

B-Side features are how the urinal is mounted to the wall/another unit, it is also where stiffening ribs live, lastly is it where other components such as plumbing would attach

Possible Methods **Tool Type**

- **Injection Molding (IM)**
  - **Two sided high pressure tooling, steel mold material**
  - **Tool life in high 10's of thousands or 100's of thousands**
- **Pressure Forming**
  - **One sided low pressure tooling, typically done with aluminum tooling**
  - **Tooling life in 100's of thousands**
- **RIM Molding (Reaction in Mold)**
  - **Two sided low pressure tooling, steel or aluminum may be used**
  - **Very good tool life**
- **Structural Foam Molding**
  - **Two sided low pressure tooling, aluminum typical**
  - **Good tool life**
- **Fiberglass**
  - **One sided tool, may be aluminum or composite**
  - **Tool life depends on material, life in the 10's or low 100's for composite, low thousands for aluminum**

Possible Methods **Tooling Cost, Part Cost, MOQ**

TOOLING

- Injection Molding (IM)
  - $$$$$
- Pressure Forming
  - $$
- RIM Molding (Reaction in Mold)
  - $$$
- Structural Foam Molding
  - $$$
- Fiberglass
  - $ (composite)
  - $$ (Aluminum)

Part Cost

- Injection Molding (IM)
  - $
- Pressure Forming
  - $$
- RIM Molding (Reaction in Mold)
  - $$
- Structural Foam Molding
  - $$
- Fiberglass
  - $$$

MOQ

- Injection Molding (IM)
  - 1,000-5,000
- Pressure Forming
  - 50-125
- RIM Molding (Reaction in Mold)
  - 1,000
- Structural Foam Molding
  - 1,000
- Fiberglass
  - 5-25

THANK YOU

CONTACT US

ENVENTYS PARTNERS NORTH CAROLINA
520 Elliot St. Charlotte, NC 28202

(704) 333-5335

info@enventyspartners.com

www.enventyspartners.com

ENVENTYS PARTNERS