



# Secure Cloud Manufacturing

## Routing Plan

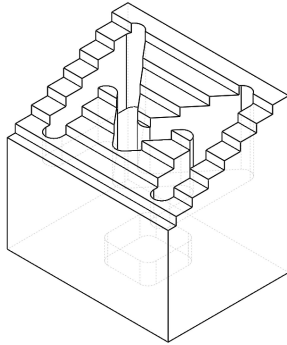
Fall 2017



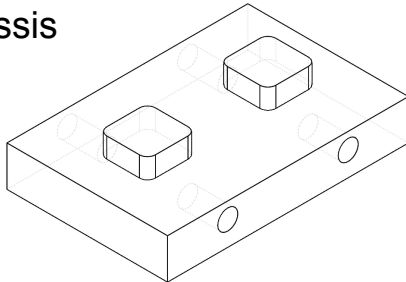


# Assembly and individual parts

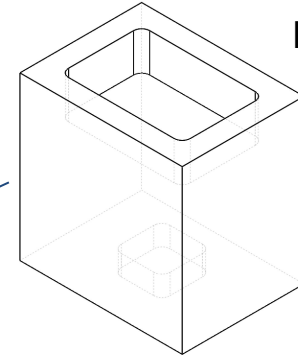
Part 2 - Cabin



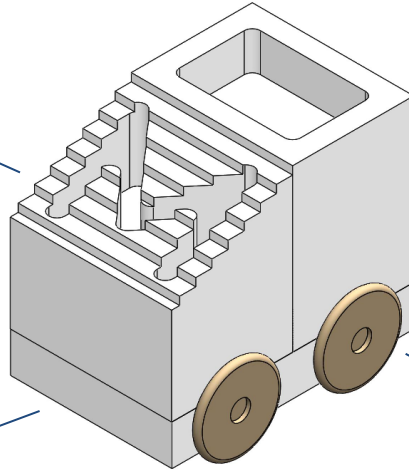
Part 1 - Chassis



Part 3 - Trunk



Wheels



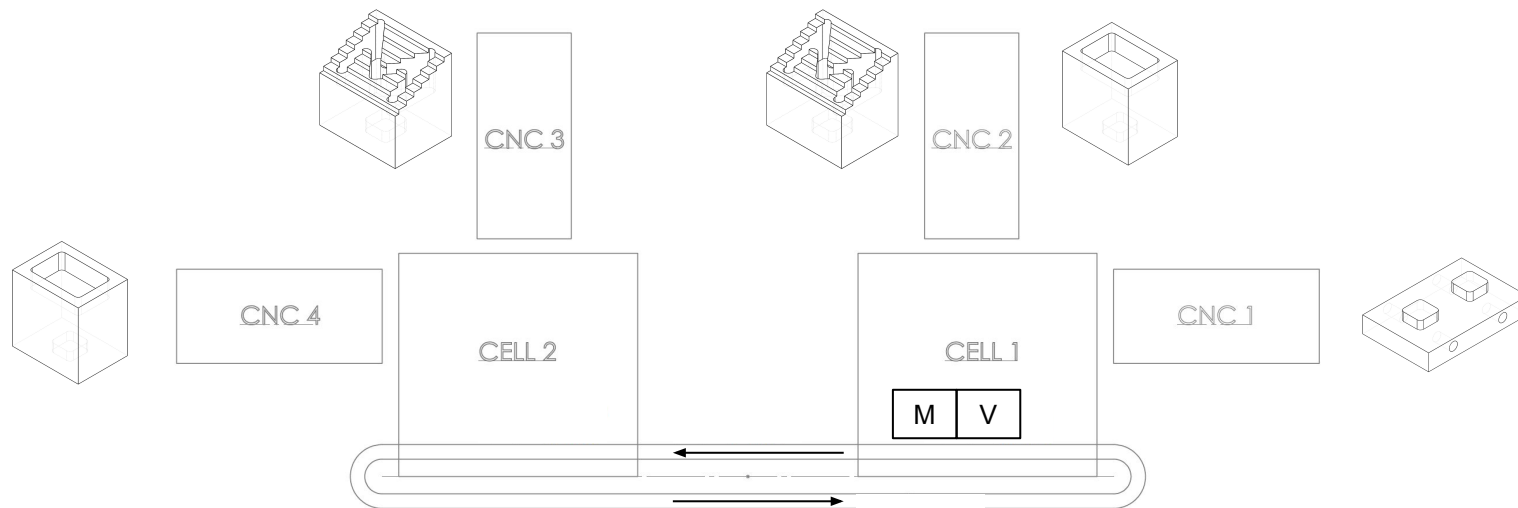


# Testbed floor plan

## LEGEND

M - Mechanical gripper

C - Vacuum gripper





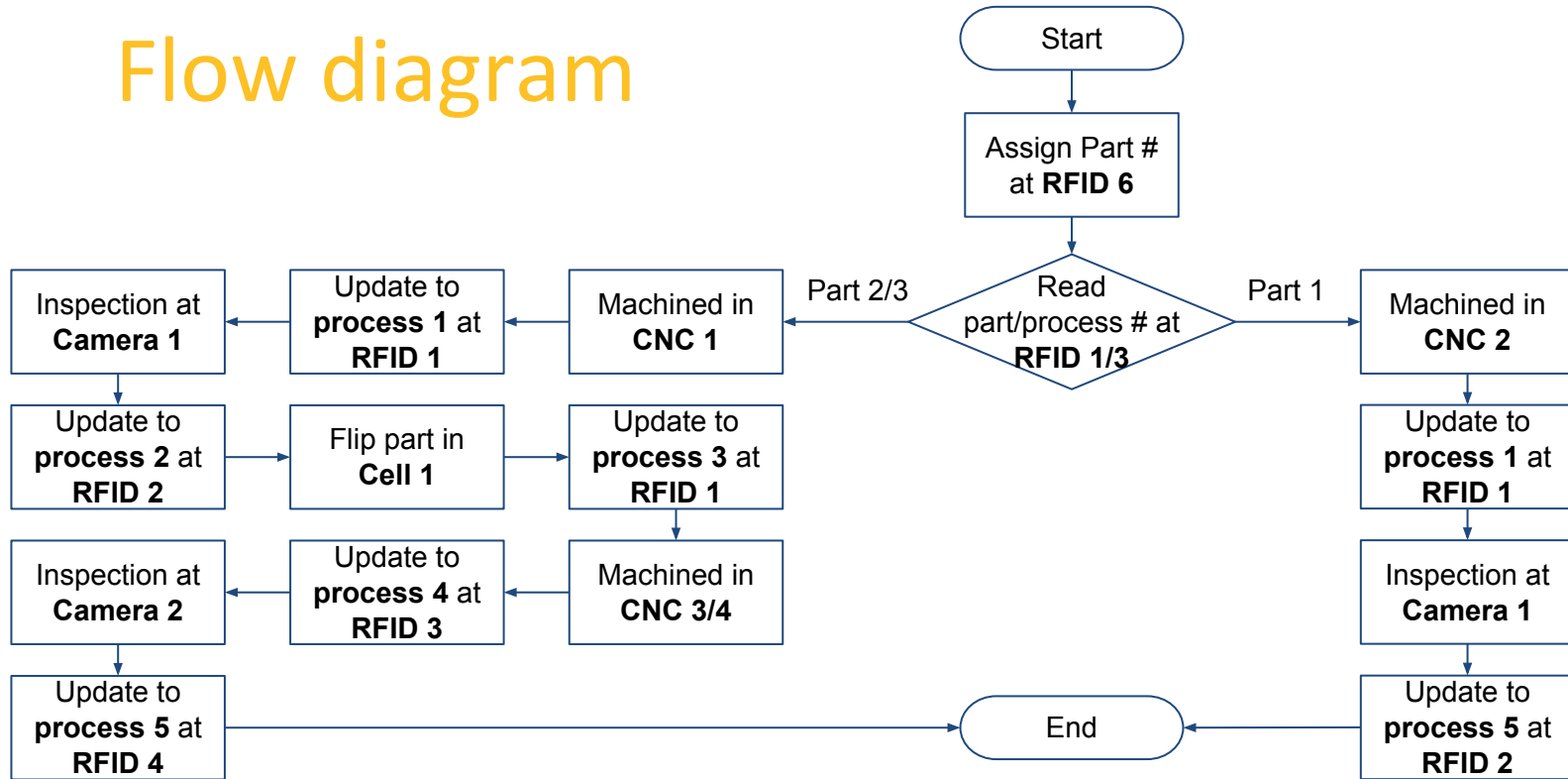
# Parts and process numbers

<u>Process #</u>	<u>Part 1 - Chassis</u>	<u>Part 2 - Cabin</u>	<u>Part 3 - Trunk</u>
0	Raw material	Raw material	Raw material
1	Machined top (CNC1 – Vacuum)	Machined bottom (CNC2 – Mechanical)	Machined bottom (CNC2 – Mechanical)
2	N/A	Inspected	Inspected
3	N/A	Flipped	Flipped
4	N/A	Machined top (CNC3)	Machined top (CNC4)
5	Inspected (finished)	Inspected (finished)	Inspected (finished)





## Flow diagram



## Machining: Part 1 - Chassis

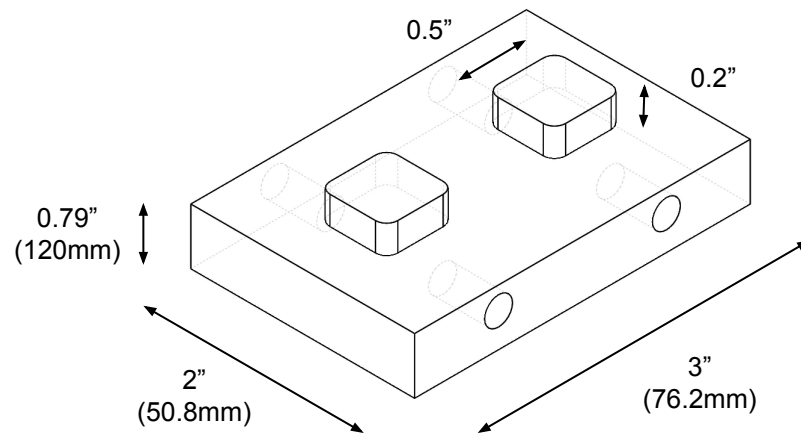
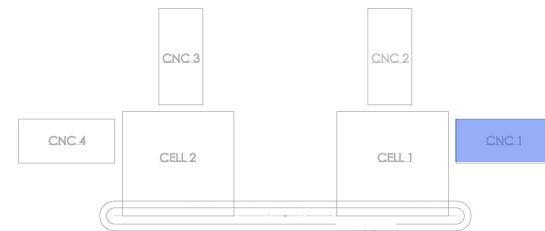
Process #	
0	Raw material
1	<b>Machined top</b>
2	N/A
3	N/A
4	N/A
5	Inspected (finished)

- Process #1: top surface face milling**

- Vacuum gripper to CNC 1
- Tool: 1/4" end mill
- Process: 1) 0.25mm Facing 2) 0.2" deep passes Area Milling
- Time: 1 + 20 minutes

- Post processing: wheel holes drilling**

- Manual
- Tool: 1/4" drill
- Process: 4 x 0.5" holes
- Time: 4 x 2 minutes

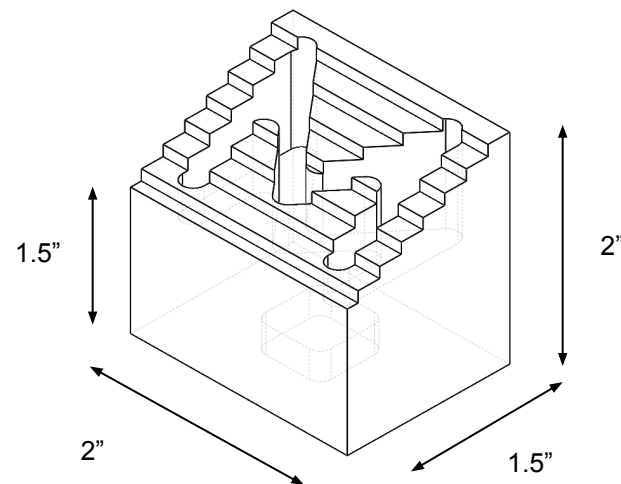
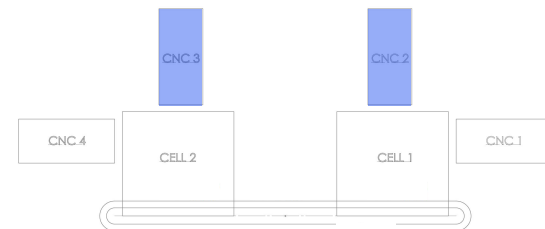




## Machining: Part 2 - Cabin

Process #	
0	Raw material
1	<b>Machined bottom</b>
2	Inspected
3	Flipped
4	<b>Machined top</b>
5	Inspected (finished)

- **Process #1: bottom surface pocketing**
  - Mechanical gripper to CNC 2
  - Tool: 1/8" end mill
  - Process: 5mm deep rectangular cut
  - Time: 1 minute
- **Process #4: top surface stepped face milling**
  - CNC 3
  - Tool: 5/16" drill
  - Process: 1/8" deep passes
  - Time: 20 minutes





## Machining: Part 3 - Trunk

Process #	
0	Raw material
1	<b>Machined bottom</b>
2	Inspected
3	Flipped
4	<b>Machined top</b>
5	Inspected (finished)

- **Process #1: bottom surface pocketing**
  - Mechanical gripper to CNC 2
  - Tool: 5/16" end mill
  - Process: 5mm deep rectangular cut
  - Time: 1 minute
- **Process #4: top surface pocketing**
  - CNC 4
  - Tool: 1/4" drill
  - Process: 12mm deep rectangular cut
  - Time: 20 minutes

