



## Concept Generation

Concept generation is a process in which the team collaborated to idealize possible solutions for our design problem. The team was tasked with generating 100 ideas. This was done in order to stimulate new perspectives on how to best solve the engineering problem brought forth by Corning. A variety of methods were used to generate ideas.

### Concept Generation Tools

The team utilized a few concept generation tools to branch new ideas while completing the 100 design concepts. Using biomimicry, the team analyzed the movements and activities of animals and discussed how these properties could be applied. For example, concept 22 is a bird wing inspired gate mechanism. Crapshoot was utilized to produce out of the box ideas based on the different functions we needed out of the design. The team also utilized a lot of brainstorming to inspire each other and branch off our individual thoughts.

### Medium Fidelity Concepts

Five medium fidelity concepts were selected out of the 100 design concepts. These medium fidelity concepts achieve most of the necessary goals, but due to conflicting opinions the team is unsure of their overall success.

*Table 1: Medium Fidelity*

Concept #	Description
8	Self-nesting T's
42	Have Swedish wheels moving mechanically in opposite direction
45	Add 2 long poles on sides of V's

50	Pressure sensor gate between V's
72	Add sandbag weights to pallet

### High Fidelity Concepts

Three high fidelity concepts were selected out of the 100 design concepts. The team is highly confident these designs will satisfy the needs and have very high chances at being successful. The medium and high-fidelity concepts will be compared against each other throughout the concept selection process.

*Table 2: High Fidelity*

Concept #	Description
5	Four bar mechanical system with an overhang where needed
34	Weight-activated pincers
65	Magnetic locking swivel

### High Fidelity Concept #5

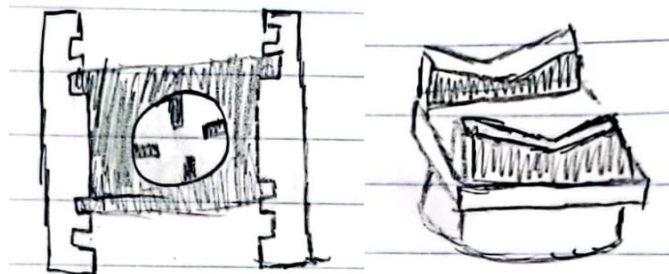




Figure 2: High Fidelity Concept #5

### High Fidelity Concept #34

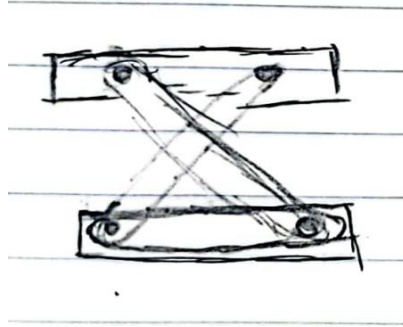


Figure 3: High Fidelity Concept #34

### High Fidelity Concept #65

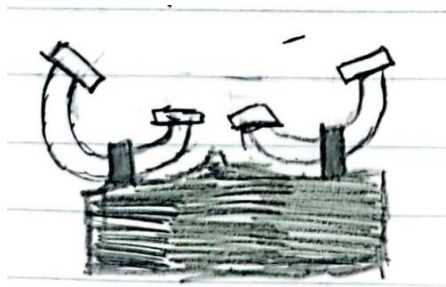


Figure 2: High Fidelity Concept #65



## Concept Generation (100 Concepts)

1. Robot Arm to remove T's
2. Add springs in chucks
3. Tension-Based Mechanical System
4. Coded Lift Gate
5. Four bar mechanical system with an overhang where needed
6. Inflatable barriers on sides of faces
7. Rubber friction on V-chucks
8. Spring loaded T-self nesting
9. Change v-chuck angle
10. Make v-chuck circular
11. Electro mechanical Side clamps
12. Strap around the ceramic
13. T-hinged (Hinges on Ts)
14. Camshaft leverage mechanism
15. Actuator on chuck to Release T-pin and T's lay down
16. Drones flying over to pick up T's
17. Rail to ceiling to wrap around ceramic and follow conveyor
18. Bumps on conveyor to eject T's
19. Pinball punchout T's
20. Rod-slide mechanism
21. Drop down walls
22. Bird wing inspired open and close flaps



23. Slap-bracelet style brace
24. Foam dampener in v-chuck
25. Overhang to click the spring up/down like a pen
26. Vibration offset machine
27. Electro mechanical shock absorbers on chucks (self adjusting)
28. Extend v-chucks inward
29. Extend v-chuck using spring (fold out)
30. Net on outside of conveyor
31. Add a heavyweight onto pallet
32. Add PTFE layer on bottom of pallet
33. Bridge between V's made of foam
34. Weight-activated pincer
35. Rollers on face of V's
36. Swedish wheels on V
37. Lay ceramic flat on face and change the direction of the imaging system
38. Lay ceramic flat on face and add more mirrors in the imaging system
39. Add net to V to hold the ceramic
40. Lay ceramic flat on the face and add robot arm to move ceramic on chucks for  
imaging
41. Spray ceramic with sticky coating then wash and dry
42. Have Swedish wheels moving mechanically in opposite direction
43. Have Swedish wheels moving electro-mechanical in opposite direction
44. Add bumpy surface to V's to ad friction



45. Add 2 long poles on sides of V's
46. Make V's thicker to account for all length ceramics
47. Make V's thicker to account for all length ceramics and add material to close off hole
48. Sorbothane V's
49. Add safety net between V's
50. Pressure sensor gate between V's
51. Have the robot hit the switch for the closure of lift gate
52. Have the robot hit switch camshaft leverage
53. Roller to brace ceramics (dumbbell shape)
54. Strap with magnetic connectors
55. Magnetic V's and magnetic spray ceramics
56. Gyroscope V
57. Get rid of V's and make a hammock out of elastic material to hold ceramics
58. Make the V's hover by attaching to poles and elastic band
59. Add IMU inside V's
60. Change T material to make it allow for imaging
61. Hydraulic shocks
62. Mechanical swivel mechanism to chucks
63. Add velcro to ceramics and V's
64. Electro-Mechanical swivel
65. Magnetic locking swivel
66. Combined swivel and gyroscope



67. Add springs to mechanical swivel
68. Add springs to electro-mechanical swivel
69. Add spring to magnetic swivel
70. Rotating upper section of T
71. Mimic mountain goat hooves
72. Add sandbag weights to pallet
73. Put bubble wrap on the bottom
74. Add carpet to plant floor
75. Train switch swivel with built-in dampening
76. Magnetorheological fluid
77. Electrorheological fluid
78. Silly putty cushion with conforming bowl
79. Add silly putty and sandbags
80. V-shaped fins 90 degrees from v chuck
81. Foam pit around conveyor
82. Add a cutting station and keep the part long for conveyor transport
83. Make V's always in tension
84. Magnets on tops of T's, large overhead magnet
85. Drones carry ceramics
86. AC motor to fold/raise the T's
87. Cut hole in top of imaging system and add robot to grab T's
88. Magnetize entire conveyor so pallets float (bullet train)
89. Make conveyor actually stop so there is no vibrations



90. T's made from ice that dissolve at imaging system
91. Bubble wrap ceramics
92. rope around ceramic with sniper robot
93. Set ceramics on top of sand
94. Enclose pallets with clear material
95. Make pallet out of foam
96. Romba(TM) that drives T carts back to start
97. Smaller T's that can be scanned through
98. Add a C slot and extra V's
99. Add sand around conveyor
100. Put wall on conveyor