

## PURDUE/ AUTODESK/ ASME Design to Make Competition March 2021

### Goal:

To design a skateboard that can be easily transformed into a scooter. The skateboard/ scooter (hereby called “product”) will be built by Purdue Polytechnic Learning Factory. Its design will determine the layout and configuration of the Factory.

### Prizes:

The Product must be:

- Designed entirely using Fusion 360 (except purchased parts McMaster-Carr)
- Easy to assemble
- Light-weight and portable
- Innovative Design
- Assembly consists of less than 50 parts (excluding nuts and bolts)
- Human-powered (solely mechanical)
- Product should be capable of withstanding a static load of minimum 400 lbs (+/- 15-degree tilt from center axis)
- Have at least one part inspired by Fusion 360’s Generative Design

### Special considerations:

- Winning product will have the possibility of being built in the Learning Factory. The intention is to mass produce.
- In the future, the product will be Bluetooth/ internet enabled (IOT enabled smart device). Think: GPS, health apps, etc.

Parts to be manufactured in house will use the existing equipment below:

- Aluminum gravity green sand cast – Sinto FDNX machine. The largest casting capabilities of Purdue’s facility is 18” x 14” x 12”
- Vertical Mill – HAAS VF2-YT
- Vertical Mill – Hurco VM1
- Lathe – HAAS ST-10
- Vertical Bandsaw- 18"x20”
- Table Router – 4'x8’ sheet capacity
- Table Saw
- Drill Presses, Grinders, belt sanders

## **Deliverables & Timeline:**

Teams of 5 students maximum can submit their product design. Individual submission is acceptable. Student (s) must be ASME member (s).

### **Deliverables:**

- Full report including, 3D design/s, a full Bill of Material showing: materials, size, and suggested fabrication methods.
- A Fusion Public Share link (drawings and model must match).
- Students can submit any additional documents they deem necessary such as presentations or a paragraph with design intent.
- Send all items above in ONE email to [fab.clayton@autodesk.com](mailto:fab.clayton@autodesk.com) using the subject line: **Purdue ASME Competition [Team name]**. DO NOT use any personal identifier on the files, title blocks or product. Use only team name. If you are entering as an individual, create a team name alias.

### **Timeline:**

- June 30th – Final Day for submission to ASME
- July 9th -Winners announced

## **Judges:**

### **Polytechnic:**

- Dr. Ragu Athinarayanan, Professor
- Grant Richards, Assistant Professor
- Dr. José M. Garcia Bravo, Assistant Professor
- Dr. Huachao Mao, Assistant Professor

**Purdue ME school:**

- Dr. Greg Jensen

**Autodesk**

- Jeff Smith, Manufacturing Adoption, USA

**Roller Derby Skate Corp., Illinois**

- David Hurt – Director of Design
- Chad Seibel - VP of Product Development

**Skatedeluxe, Germany**

- Christoph Hartleib - CEO

**Autodesk Mentors for students (ASME will hold sessions Q&A and training)**

- Philipp Manger, Sr. Implementation Consultant, Germany
- Dan Banach, Technical Manager, USA
- Jeremy Casella, Autodesk Ambassador
- Drew Gregory, Autodesk Ambassador

**Prizes:**

- 1<sup>st</sup> Place - \$2,500.00 scholarship to be divided with team members
- 2<sup>nd</sup> Place – \$1,000.00 scholarship to be divided with team members
- 3<sup>rd</sup> Place - \$500.00 scholarship to be divided with team members

**Rubric:**

Topic (Weight)	Unacceptable (0)	Marginal (1)	Acceptable (2)	Exceptional (3)	Points
<b>Design Problem and Boundaries</b>	Little or no grasp of problem. Incapable of producing a successful solution.	Some understanding of problem. Major deficiencies that will impact the quality of solution.	Overall sound understanding of the problem and constraints. Does not significantly impair solution.	Clear and complete understanding of design goal and constraints.	
<b>User-Centered Design</b>	Product does not show understand context of use.	Product satisfies some user goals but doesn't address all user types and or functionalities	Product satisfy basic user and fabrication needs but no improvement from existing similar design is shown	Product solution considers the whole user experience, multiple-user types and the whole product life-cycle	
<b>Application of Engineering Principles/ Manufacturability</b>	No or erroneous application of engineering principles yielding unreasonable solution.	Serious deficiencies in proper selection and use of engineering principles.	Effective application of engineering principles resulting in reasonable solution.	Critical selection and application of engineering principles ensuring reasonable results.	
<b>Innovative Product Design</b>	Design is not creative and/ or innovative, and it does not use the capabilities of Fusion 360	Design is creative, but it does not use any Generative Design Component	Design is creative, uses Generative Design but is not manufacturable	Design is creative, innovative uses the full capabilities of Fusion 360 and fabrication methods were considered	
<b>OVERALL PERFORMANCE</b>	<b>Unacceptable</b>	<b>Marginal</b>	<b>Acceptable</b>	<b>Exceptional</b>	<b>TOTAL</b>
<b>POINTS REQUIRED</b>	<b>0-4</b>	<b>5-8</b>	<b>9-12</b>	<b>13-16</b>	