2026 Oklahoma SLSC State Additive Manufacturing

NO SUBSTITUTIONS WILL BE ALLOWED AFTER FRIDAY, March 27th, 2026. THERE WILL BE NO SUBSTITUTIONS ALLOWED ON-SITE AT THE CONFERENCE

Times/locations and general information

Contestants will need to arrive to the Cox Convention Center on Monay, April 27th, 2026, and check in the contest area at 8am.

Written testing will be held ON-LINE through the technology centers testing centers. Testing will be open, March 16th , April 3rd. No provisions are being made for make-up testing on-site.

Resume

RESUME-2026 please read

All contestants will submit a digital resume prior to contest day. Contestants will receive an email to the address used to register the contestant for contest with instructions and link to access the SkillsUSA Competitor Portal page. The email will contain contestant's username and contestant number, which are required to login to the Competitor Portal.

Deadline to submit resume is April 3rd, 2026.

Contest Meeting

meeting at 4 p.m., Sunday April 19th^{t}, in contest area. Students will turn in their engineering notebooks, final print of their project file for review by judges.

CLOTHING REQUIREMENTS

As in the past, skill contestants will not be penalized for not adhering to national clothing requirements. Contestants should not wear clothing that has school identification visible to the judges. Students should dress professional.

CELLPHONES AND OTHER SMART DEVICES

Cellphones, electronic watches and/or other electronic devices not approved by a
competition's technical committee are NOT allowed in the competition area. Please follow the guidelines in each technical standard for approved exceptions. Technical committee members may also approve exceptions onsite during the SkillsUSA Championships if deemed appropriate.

Awards Ceremony

Contest winners will be recognized at the General Session on Tuesday morning, April 29th, at 9am. in the Tulsa Convention Center Grand Hall. Contest winners will not be allowed on stage if not in official dress. For men: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes. For women: Official blazer, jacket or sweater; black dress slacks or knee-length skirt with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer, and black dress shoe

SkillsUSA 2025/2026 Additive Manufacturing State Challenge

Have questions: mdangelo@sme.org Coming soon website link team resources.

Welcome to the "Mini-Figure Catapult/Trebuchet Challenge" challenge!

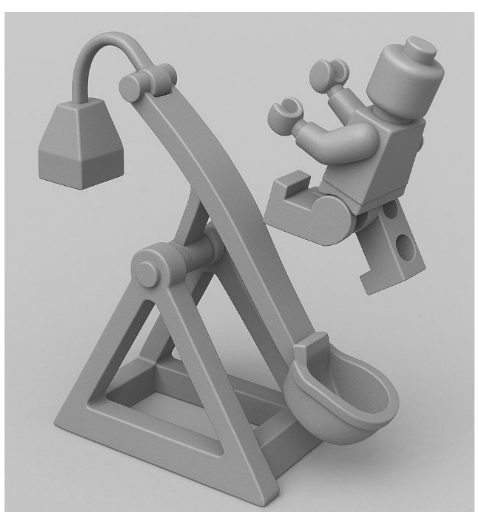
The Additive Manufacturing (AM) contest evaluates students' ability to design, prototype, validate, and communicate a functional mechanical device using **only 3D-printed components**.

Competitors must design a **catapult or trebuchet** capable of **launching a standard LEGO® minifigure** using **no added materials**, relying exclusively on the **properties of 3D-printed plastics**

Competitors create a **fully additively manufactured launcher**—catapult or trebuchet—where all energy storage and mechanical action originate from **3D-printed geometry alone**, including:

- Printed torsion beams
- Printed elastic flexures
- Printed springs or spring arms
- Printed counterweights (printed material only)
- Printed tension/flexural systems

No external rubber bands, cords, metals, or weights may be used.



Competition Requirements

Design Requirements

Each team must design a launcher that:

1. **Launches a standard LEGO® minifigure** (supplied by contest judges).
2. Stores and releases energy **using only 3D-printed material behavior**:
    - Elastic bending
    - Torsional flexure
    - Printed leaf or coil springs
    - Beam deflection
    - Printed counterweight (printed plastic only)
    - No metal, rubber, glue, magnets, or external energy inputs.
3. Operates using **a catapult or trebuchet mechanism**:
    - Catapult: energy stored in flexural or torsional arms.
    - Trebuchet: energy stored in printed counterweight or pendulum motion.
4. Has a locking trigger mechanism
5. Is safe and stable during operation.
6. Requires no fasteners—**all connections must be printed or snap-fit**.
7. May be a **single print** or **multi-component assembly** (can use multiple 3D printed material):
    - **Bonus points** for functionally integrated, single-print solutions.

Size & Print Constraints

- Fully assembled launcher must fit inside: **150 × 150 × 150 mm**
- All components must be **100% 3D-printed**
- **Any** 3D printer technology may be used:
    - FDM, SLA, DLP, PolyJet, SLS, SAF, MJF, etc.
- **Any printable material** is allowed:
    - PLA, ABS, TPU, Nylon, resin, PA11/12, etc.
- If multiple materials are used, all still must be 100% AM-produced.

Performance Requirements

During testing, each launcher must:

1. Securely hold and release the minifigure.
2. Launch the figure forward, not upward only.
3. Complete **three launches**, which are measured for:
    - Distance
    - Repeatability (all three launches must land within a 6-inch diameter of first launch.
    - Safety and stability (No part interference, damage during operation, or unsafe trajectories)

Design Considerations

4.1 Energy Storage Methods (Allowed)
Teams may use:
- Printed flexible beams (like bow limbs)
- Printed torsion rods
- Printed leaf springs
- Printed coil springs
- Printed counterweights (solid or hollow filled only with printed material)
- Printed whip-action arms

4.2 Energy Storage Methods (NOT Allowed)
- Rubber bands
- Metal or lead weights
- Ball bearings
- Strings or ropes
- Electronics
- External kinetic input beyond human-triggered release

4.3 Stability & Safety
- Broad base recommended
- Ensure center of mass remains within footprint
- Avoid high-tension prints that may crack explosively
- Ensure minifigure is not struck by structural components during firing

4.4 AM Material Behavior Tips
- FDM: stronger along filament path; avoid layer-splitting by orienting beams horizontally
- Resin: brittle; great for fine details but avoid ultra-high deflection
- SAF/SLS: excellent for small flexures; nylon is durable
- Multi-material: optimize stiffness vs elasticity

4.5 Recommended Geometries
- Arched, tapered arms for elastic bending
- Hollow counterweights (printed-only mass)
- Integrated bearings or bushing pockets
- Snap-fit axles and pivot joints
- Lattice structures for energy absorption

State Competition Procedure

Before or on contest day:
1. Students submit Engineering Notebook (Engineering notebook guidelines below)

2. Students submit print files in both CAD (.step, .iges, .sldprt, etc.) and mesh (STL, 3MF, OBJ, etc.) format to [State Designated File Share Site]
3. Students submit physical parts
4. Students submit final assembly if applicable
5. Students submit their Presentation

State Competition Judging Criteria

1. The Engineering Notebook should contain robust content, including at a minimum the following:
    - 1.1. Be clearly labeled with contestant name(s), date and page # on each page
    - 1.2. Begin with a problem statement
    - 1.3. Include discovery and documentation of approach to solve problem
    - 1.4. Include sketched design concepts with critical features labeled
    - 1.5. Critical dimensions clearly labeled in design sketch
    - 1.6. Considerations for designing for additive manufacturing distinctly addressed (i.e. part strength, part orientation) especially including any expected risks during printing
    - 1.7. Screenshots of the print time and material usage for all printed parts
    - 1.8. Design decisions and alternatives are documented and evaluated thoughtfully

2. The design must adhere to the Competition Requirements stated in the prior page.

3. Quality of final assembly
    - 3.1. Does it perform the function in the manner it was designed to do?
    - 3.2. Does it meet all requirements in contest guidelines?
    - 3.3. Do inserted components or multiple printed parts mates together properly?
    - 3.4. Did the students design the part with additive manufacturing in mind?
    - 3.5. Is there sufficient tolerance between parts for movement?

4. The design must illustrate best practices for "design for additive manufacturing (DFAM)". Below are some *potential* DFAM metrics to optimize for.
    - 4.1. Build Time
    - 4.2. Post-Processing/Support Removal Time
    - 4.3. Functionality Optimization (gear ratio, pliability, strength, etc.)
    - 4.4. Monetary Savings

4.5. Material Consumption
4.6. Energy Usage
4.7. Component Consolidation (lack of store-bought hardware)
4.8. Lightweighting for Ergonomics

5. Presentation Criteria

5.1. The team clearly describes their understanding of the problem to be solved.
5.2. Design Process: good design logic is used for key design choices. Intentional and well-communicated
5.3. The presentation is professional and well-rehearsed
5.4. The presentation emphasizes quantitative improvements (measured and estimated) of the time, quality, or cost of the improvement as well as any DFAM tactics employed.
5.5. Practical evaluation: team demonstrates visually (videos, photos, drawings, animation, etc.) the task they improved, both before and after.

Grading Rubric

GR.1 Launch Performance — 35 pts

- Distance (best of 3 launches): 25 pts
    - Compare to peer competitors
- Consistency: 5 pts (all 3 figures land within a 6-inch diameter)
- Safe trajectory & controlled release (no interference or damage to parts while operating): 5 pts

GR.2 DFAM Execution & Print Quality — 20 pts

- Efficient use of AM geometry
- Thoughtful layer orientation
- Integrated mechanisms (springs, hinges, etc.)
- Complexity that adds functional value
- Built in locking trigger
- Clean print
- Quick assembly
- Good tolerance

GR.3 Engineering Notebook — 15 pts

- Completeness
- Technical clarity
- Analysis & iteration

- CAD quality

GR.4 Presentation — 15 pts
GR.5 Knowledge Exam — 15 pts
Pass with 70% or better or Fail