ASM Geodesic Dome Design Competition
2026 Format & Rules

TABLE OF CONTENTS

A. DEFINITION AND HISTORY

Welcome to the ASM International Geodesic Dome Design Competition, otherwise known as DomesDay! Established in 2014, this competition was created to introduce Material Advantage (MA) students to a defining piece of ASM culture, the Dome (pictured right), through a hands-on challenge in materials selection, design, and fabrication.

Figure 1: ASM Headquarters, located in Materials Park, OH. To learn more, please visit the ASM website.

As a competitor, you and your team will take on the challenge of constructing a dome that balances structural performance, material innovation, and creative design. While your dome's ability to withstand loads is a key factor, the competition is more than just strength. DomesDay is about exploring the vast possibilities of material science and engineering. Your choices in materials, manufacturing methods, and design aesthetics will all play a role in how your dome is judged.

DomesDay is an opportunity to step beyond the classroom and bring your ideas to life. It's a chance to experiment, problem-solve, and collaborate with teammates all while gaining hands-on experience with real-world material challenges. Whether it be through refining fabrication techniques, exploring unconventional materials, or designing something truly unique, this competition encourages you to embrace the creative side of materials science.

We encourage you to take risks, push the limits of innovation, and most importantly, enjoy the process!

B. IMPORTANT DATES AND DEADLINES

1. ASM has a limited number of Participation Grants available to help students offset expenses associated with traveling to IMAT for DomesDay. Grant requests must be submitted by **Sept. 2, 2026**. Learn more.
2. To participate in the contest, an online registration form must be submitted no later than **Sept. 14, 2026**.
3. By **Sept. 23, 2026**, a Schedule of Events will be sent to each Team Captain.
4. The competition will take place on **Sept. 29, 2026**, onsite at IMAT 2026.

C. GENERAL CONTEST RULES

1. The competition is open to all full-time students pursuing graduate or undergraduate degrees who are ASM/Material Advantage members. *Not yet a member? Join by clicking here*.
2. Each team must have between 2-5 members who are from the same university. Each participant can only be on one team, and only one dome may be submitted per team. Teams must have a faculty advisor.
3. There shall be no more than two teams per university accepted into the competition.
4. A minimum of one team member must be registered for IMAT and present in person for the entire competition and judging.
5. Teams will design and build a geodesic dome out of the material(s) of their choosing and are responsible for selecting all materials for dome construction (see *D. Code of Conduct*).
6. Project teams are responsible for transporting their dome. Domes must be completely assembled and able to be carried by hand. Domes must not be attached to any type of display base.
7. Teams must print and complete the *Rules Compliance Checklist* and then submit it at check-in on the day of the competition (see *Appendix A*).
8. A dome that does not fall within all the specifications in *E. Geometric/Build Requirements* will be ineligible to win any major awards. Ineligible teams will still be allowed to participate in the contest and will be eligible to win category awards, but their scores will not be factored into score calculations for major awards (see *H: Awards*).
9. All decisions regarding rules and scoring are final once the contest concludes onsite at IMAT. Individual team metrics will remain confidential and will not be shared with third parties.

D. CODE OF CONDUCT (Labor Guidelines)

1. Students must lead all aspects of materials selection and design. Team advisor may not perform any labor.

2. Use of multiple materials is encouraged. Pre-made material (such as metal tubing) may be used; however, teams must fabricate the entire dome with exceptions listed in this section.

3. Assembly that requires a specialized skill (welding, etc.) that a team does not possess may be outsourced to another student at the university. This choice must be defended in the presentation; the external student must be credited and may not perform more than 30% of the labor hours on the project. It is highly preferable that the team performs all labor.

E. GEOMETRIC/BUILD REQUIREMENTS

1. The dome must fit within the negative space formed by a flat surface, the inner dome gauge (a hemispherical shape with an outside diameter of 140 mm), and the outer dome gauge (a hemispherical shape with an inside diameter of 200 mm). See *Appendix A* and *Appendix B*.

2. Dome mass must not exceed 2.0 kg.

3. No element of the dome may exceed 10 mm in thickness. See *Appendix A* and *Appendix C*.

4. The dome must have at least five distinct contact points (i.e. a leg) with the ground, meaning it must rest on a minimum of five separate surfaces. Each leg must have its own individual contact point. No two legs may share the same ground contact point, as this would be counted as one leg. See *Figure 2* below and click here to see more examples.

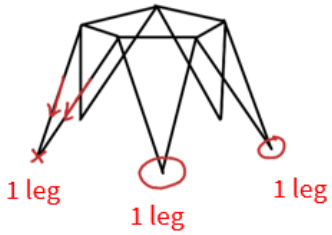


Figure 2: Rule E.4 Illustration. Note: This figure is intended solely to illustrate dome legs as defined by Rule E.4. It does not represent a fully compliant dome design, which must still satisfy all geometric requirements listed.

5. The dome must contain at least one hexagonal structure which is not filled with struts or any other structural materials.

6. Domes must be an open lattice-like structure, i.e., not an unbroken hemispherical surface. Click here to see examples. The use of large and flat plate-like components, e.g., holding together the bottom and/or top of the dome, is not allowed.

7. Due to the complexity of the testing machine, glitter is prohibited from being used.

F. DESIGN JUDGING POSTER REQUIREMENTS

1. The poster must be 48 x 36 inches (+/- 1 inch margin of error) and oriented 'landscape'; all text must be legible from a 5-foot distance.

2. All contributing authors, team advisor, and references (if used) must be listed. The school, university, or institution name must be prominently displayed.

3. Include the four main sections to your poster: Introduction, Justification, Manufacture, and Conclusion. See *Appendix D.*

G. FORMAT OF COMPETITION AND SCORING

The competition will occur at IMAT during the morning/early afternoon on **Tuesday, Sept. 29, 2026** on the show floor in the exhibit hall. Teams will first report to the DomesDay booth for check-in, poster set-up, and rules compliance inspection. Then, within their dedicated time slot, each team will undergo design judging. Mechanical testing will immediately occur afterward and be conducted at the ZwickRoell booth. A schedule will be provided to each participating team prior to the contest. Before mechanical testing, a brief, non-scored presentation to the audience will take place. During this informal presentation, teams should present information such as their name and school, the materials used in the dome, how the dome was manufactured, and performance expectations.

Teams will be scored out of 200 points in two categories, with potential bonus points and deductions also available. A detailed scoresheet is available here.

Category 1: Design Judging (100 points available)

Design judging will be conducted by ASM volunteers who have relevant industry and/or academic experience, hereon referred to as "Judges." The Judges will assign a score for Category 1 based on a combined presentation and question session as well as assess teams on their poster, materials innovativeness, and dome aesthetics. All final decisions on scoring in this category will be made at the Judges' discretion.

Design judging for each team will be conducted over a 10-minute period, with the first three minutes reserved for the team to make a presentation and the remainder of the time used for questioning by the Judges. Teams are responsible for ensuring their presentations remain within the time limit (see linked scoresheet). The presentation should highlight features of the design - materials selection, manufacturing process(es), challenges encountered, description of costs and labor budgeting, and other pertinent details. No individuals outside of the design team may take part in the presentation. Teams will be required to have a full-sized poster, compliant with the rules of *F. Design Judging Poster Requirements*, to display during design judging. Refer to *Appendix D* for guidelines on poster design and content.

If IMAT/DomesDay is being held in a country/state/province where the official language is not English, teams will have the option to write/present their posters in English or in the official language. At least one judge will speak both the official language and English. Since DomesDay is being held in Quebec City, teams can write/present their posters in English or in French. Teams must indicate their language preference during registration.

Category 2: Structural Integrity (100 points available)

Domes will be assessed for their structural performance in compression testing. Testing will be conducted with a ZwickRoell Kappa 100 DS electromechanical load frame, which will be set to 100 kN. The dome will be placed on the

flat surface of a static lower platen with a 270 mm [10.63 in] diameter. The load frame crosshead will compress the dome using the flat surface of an upper platen with a 136 mm (5.35 in) diameter. Testing will be performed under displacement control at a rate of 50 mm/min. Structural performance metrics will be evaluated over the load and displacement values recorded over the testing period. The testing period is considered to span from the test start condition to the test end condition. There are three possible end conditions. Whichever end condition occurs first will constitute the end of the testing period. Each of these terms are defined below.

- *Start condition*: The moment the upper platen, moving downwards, contacts the dome.
- *End condition*: Any one of three possible conditions, whichever occurs first, termed (1) nominal end condition, (2) load limit exceeded, or (3) dome catastrophic failure.

    1. *Nominal end condition*: A displacement interlock activates the moment the upper platen is 50 mm from the lower platen.
    2. *Load limit exceeded:* The moment the measured load exceeds the contest maximum test load of 100 kN.
    3. *Dome catastrophic failure*: Complete mechanical failure of the dome leading to a sudden drop in load between recorded data points, signifying that the dome will no longer support any significant load. ASM DomesDay staff discretion will be used if there is any ambiguity.

Points will be awarded based on two structural metrics:

- 2.1 The peak load sustained by the dome, normalized by dome mass. (50 points available).
- 2.2 The compression energy absorbed, normalized by dome mass. (50 points available).

These metrics are designed to encourage a wide variety of material selections and dome designs. Consider how both strong, brittle domes as well as weak, ductile domes may perform well in at least one category. Further, consider that scores will be normalized by the dome mass. As such, teams are discouraged from designing a bulky, massive dome which leads to exceeding the load limit, as mass normalization will limit their score. To normalize score by dome mass, the mass of any dome in question, m_{team}, will be considered relative to the maximum and minimum masses of all eligible domes, m_{max} and m_{min}, respectively.

The peak load sustained by the dome is measured as the maximum load value recorded, as measured by the load frame instrumentation, over the testing period. Points for *Category 2.1* will be awarded based on the maximum force sustained by the dome during the testing period, P_{team}, normalized by the dome mass, m_{team}. The formula below will be used, where $(P/m)_{team}$ is the mass normalized peak load for an individual team, and $(P/m)_{max}$ and $(P/m)_{min}$ are the maximum and minimum mass normalized peak loads, respectively, of all eligible teams in the competition.

$$Points_{Cat.2.1} = 50\left(\frac{(P/m)_{team} - (P/m)_{min}}{(P/m)_{max} - (P/m)_{min}}\right)$$

The energy absorbed by the dome is measured as the integral of the load-displacement curve, as measured by the load frame instrumentation, over the testing period. Points for *Category 2.2* will be awarded based on the compressive energy absorbed by the dome E_{team}, normalized by the dome mass, m_{team}. The formula below will be used, where $(E/m)_{team}$ is the mass normalized peak load for an individual team, and $(E/m)_{max}$ and $(E/m)_{min}$ are the maximum and minimum mass normalized peak loads, respectively, of all eligible teams in the competition.

$$Points_{Cat.2.2} = 50\left(\frac{(E/m)_{team} - (E/m)_{min}}{(E/m)_{max} - (E/m)_{min}}\right)$$

Themed Design - Potential Bonus (20 points available)

This year's design theme is **City/State/Province Pride** - the dome incorporates unique elements or embellishments that celebrate the team's home city, state, or province, fostering a sense of pride by incorporating elements such as official color(s), flag(s), name, or any other distinctive feature(s) into its design.

The judges will award bonus points based on the effort and creativity each team puts into embodying the theme. For a chance at receiving full bonus points, the theme's application should be discussed in the presentation and in relevant sections of the poster.

NOTE: If participating in the theme, ensure that your dome continues to meet all geometric requirements as outlined in *E. Geometric/Build Requirements*.

Deductions (-35 points available)

To help maintain the integrity of the rules, certain deductions may be applied (in full or partial) based on the type of infraction. Please see the scoresheet (link at top of this section) for comprehensive details.

H. AWARDS

Three major prizes will be awarded based on the scoring described in *G. Format of Competition and Scoring*:

1. Top scoring team overall will be designated **First Place** and receive $1,000.
2. The next highest scoring team overall will be designated **Runner-Up** and receive $750.
3. The team that attains the highest score in the design competition (Category 1, including deductions and bonus points) will receive the **Judges' Choice Award** and $500.

Three category prizes will be additionally awarded based on varying criteria:

1. A **Materials Innovativeness Award** ($250 prize) will be given to the team that scored the highest in the "Materials Innovativeness" subcategory of Category 1 by the Design Judges.

2. A **Best Themed Design Award** ($250 prize) will be given to the team that best embodied the theme by scoring the highest amount of bonus points.
3. A **Best-In-Destruction Award** ($250 prize) will be awarded to the dome that displays the most spectacular mechanical failure, determined at the discretion of the DomesDay staff.

No team that wins a major award may also win a category award. In the case that the one such team was scored the highest by the Judges in the relevant subcategory, the next highest scoring team which did not win a major award will win the category award.

Funds will be awarded and divided among the individuals of the winning teams. Each winning team will also receive a plaque. Ineligible domes (see *E. Geometric/Build Requirements*) are not eligible to receive a major award.

APPENDIX A. RULES COMPLIANCE CHECKLIST

The below inspection matrix will be used to confirm rules compliance and directly relates to cited rules. Additional notes have been added to specify the inspection method. **Teams must complete this checklist prior to the competition and submit this document, signed by the team advisor and team captain, upon team check-in on the date of the competition (Rule C.7). Failure to do so will result in a point deduction.** It is strongly suggested that teams use inspection techniques which mirror the practices listed below to the best of their ability. The document should show that a team inspection **(TI)** has resulted in full rules compliance. DomesDay staff will conduct an inspection onsite after team check-in and before the beginning of design judging (**SI**).

This document affirms that the team has inspected their dome according to the criteria below ahead of the competition date and can confirm complete rules compliance to the best of their knowledge and ability.

University: _____ **Team name:** _____

Team advisor: _____ **Team captain**: _____

Rule *Inspection Notes*		
E. GEOMETRIC/BUILD REQUIREMENTS	**TI**	**SI**
E.1 The dome must fit within the negative space formed by a flat surface, the inner dome gauge (a hemispherical shape with an outside diameter of 140 mm), and the outer dome gauge (a hemispherical shape with an inside diameter of 200 mm). *Dome will be placed over the inner dome gauge on a flat surface. The outer dome gauge will be passed over the dome in multiple directions. If the gauge cannot be freely passed over the dome, it is not rules compliant. Note: Student teams are encouraged to construct their own gauges using the information provided in Appendix B to ensure rules compliance.*		
E.2 Dome mass must not exceed 2.0 kg. *Domes will be weighed on a digital scale.*		
E.3 No element of the dome may exceed 10 mm in thickness. *A set of lock-joint transfer calipers set to 10 mm must be able to pass over all elements of the dome. Note: Student teams are encouraged to construct their own calipers using the information in Appendix C to ensure rules compliance.*		
E.4 The dome must have at least five distinct contact points (i.e. a leg) with the ground, meaning it must rest on a minimum of five separate surfaces. Each leg must have its own individual contact point. No two legs may share the same ground contact point, as this would be counted as one leg. Click here to see examples.		
E.5 The dome must contain at least one hexagonal structure which is not filled with struts or any other structural materials.		

E.6 Domes must be an open lattice-like structure, i.e., not an unbroken hemispherical surface. Click here to see examples. The use of large and flat plate-like components, e.g., holding together the bottom and/or top of the dome, is not allowed.		
F. DESIGN JUDGING POSTER REQUIREMENTS	**TI**	**SI**
F.1 The poster must be 48 x 36 inches (+/- 1 inch margin of error) and oriented 'landscape'. All text must be legible from a 5-foot distance. *Poster will be measured with a tape measure and visually inspected from a 5-foot distance.*		
F.2 All contributing authors, team advisor, and references (if used) must be listed. The school, university, or institution name must be prominently displayed.		
F.3 Include the four main sections to your poster: Introduction, Justification, Manufacture, and Conclusion. More details can be found in *Appendix D*.		

Please list each material used and briefly describe the corresponding dome element.

MATERIAL USED	DOME ELEMENT(S) DESCRIPTION	TI	SI

If you followed the theme **City/State/Province Pride**, please briefly describe how it is incorporated into your design.

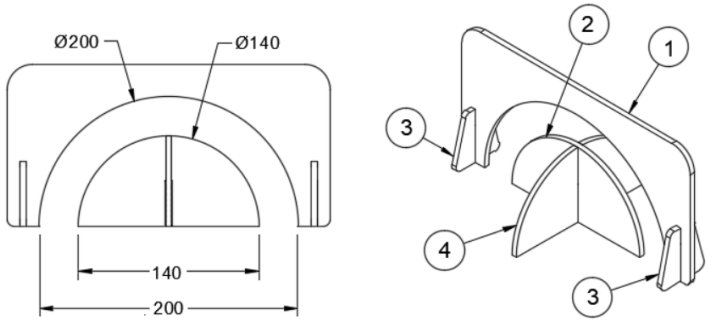
DOME ELEMENTS	CONNECTION TO THEME	TI	SI

APPENDIX B. DOME GAUGES

The inner dome gauge and outer dome gauges are designed to be reproduced by the student teams for their own use in inspecting their dome. The gauges are designed to be cut from standard sized sheets goods, 3/16 inch thick or 5 mm thick. To facilitate this, .dxf files of the gauge components are available for download which may be used to fabricate the gauges with equipment such as a laser cutter. If the student team does not have access to analogous materials or methods, .pdf drawings* of the gauge components, at a 1:1 scale, are available for download. These may be used as templates to cut the gauges from cardboard or a similarly accessible material. It's recommended that students inspect a known dimension of their gauges, e.g., the width of the gauge, to confirm that their manufacturing equipment or printer has faithfully reproduced the intended geometry of the gauges.

Note: Student teams are encouraged to avoid designing their domes close to the limits of the allowable geometry. For example, a dome designed to be 200 mm in diameter may actually be 201 mm in diameter accounting for manufacturing imprecision. This dome would fail inspection.

Note: While the gap between the dome gauges is greater than 10 mm, the dome must still satisfy rule E.3 and not exceed 10 mm in thickness in any one location. See *Appendix C* for details.



PARTS LIST		
ITEM	QTY	PART NUMBER
1	1	OUTER GAUGE
2	1	INNER GAUGE TOP HALF
3	2	OUTER GAUGE SUPPORT
4	1	INNER GAUGE BOTTOM HALF

Figure 3. (Left) A front view of the dome inner and outer gauges fully assembled and together, with critical dimensions noted. (Center) Isometric view of the inner and outer dome gauges fully assembled and together. (Right) Parts list describing each gauge component, corresponding to the center isometric view. Units are in [mm].

*If printing the .pdf drawings, select the "actual size" option in the printer dialogue box to ensure measurements on the printout are correct.

APPENDIX C. DOME THICKNESS INSPECTION

A set of lock-joint transfer calipers, pictured below, will be calibrated such that the distance between the measurement points is 10 mm. These calipers will be passed over the dome, with one measurement point inside the dome and one outside it. The calipers must be able to pass over any and all elements of the dome in at least one direction and orientation. Teams are encouraged to either (1) attain a similar measurement tool to inspect their dome or (2) build one using cut-outs from a rigid material. To facilitate this, a set of to-scale .pdf drawings* and .dxf files are available for download which can be used by student teams to manufacture their own set of calipers as necessary.

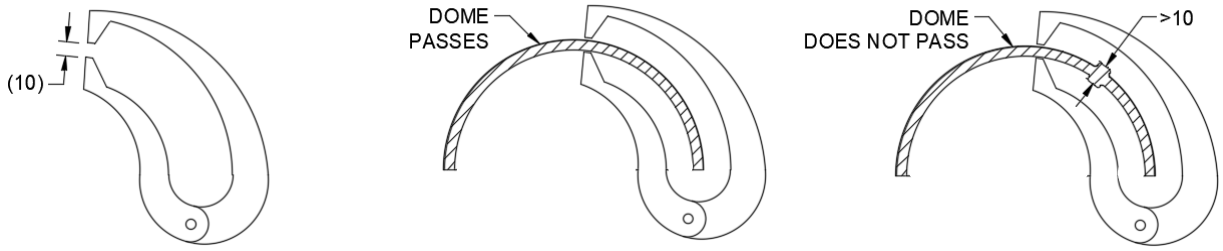


Figure 4: Drawing of lock-joint transfer calipers, set to 10 mm distance between probing points. One example of a dome cross-section which does pass, and one of a dome which does not pass are shown.

*If printing the .pdf drawings, select the “actual size” option in the printer dialogue box to ensure measurements on the printout are correct.

APPENDIX D. POSTER PRESENTATION REQUIREMENTS

Think of a captivating title for your poster. Be sure to include your team's name, team member names, and your university affiliation in the header. Posters must be compliant with the requirements of *F. Design Judging Poster Requirements*. There should be four main sections to your poster:

1. **Introduction**: Describe what the design constraints are and how your idea will satisfy them.

2. **Justification**: Justify your dome design through various tools (finite element analysis, CAD software, calculations, etc.), presenting as much data as needed. Include material selection, material cost, and any material properties that were determined for the dome (hardness, tensile strength, etc.). Use visual depictions with figure captions to show graphically that your design is superior. Pair these images with written explanations to validate your design.

3. **Manufacture**: Depict the manufacturing process as visually as possible (pictures of your team welding metal tubes, using 3D printers, selecting materials, your team designing the dome in CAD, etc.). Give an explanation on how your dome was manufactured, including the feasibility of your design. Examples of manufacturing processes include 3D printing, mold preparation, casting, post processing, and heat treatment.

4. **Conclusion**: Write a conclusion to summarize the design constraints, your design, your justification for your design, and the feasibility of the manufacturing process. This should be a short summary and should not include any points not previously mentioned (no new material goes in the conclusion).

Remember that you will be using this poster as a visual aid in your presentation to the judges. The poster should not simply be read from but rather used as a guide in your presentation. Refer to the figures to clarify your presentation.

Although you will use the poster as a visual aid, the poster MUST be able to "stand alone" - meaning a passerby can read your poster and understand your goals and results without hearing your presentation. Please see the sample poster layout below for ideas when designing your poster. Your text should be readable when standing five feet away.

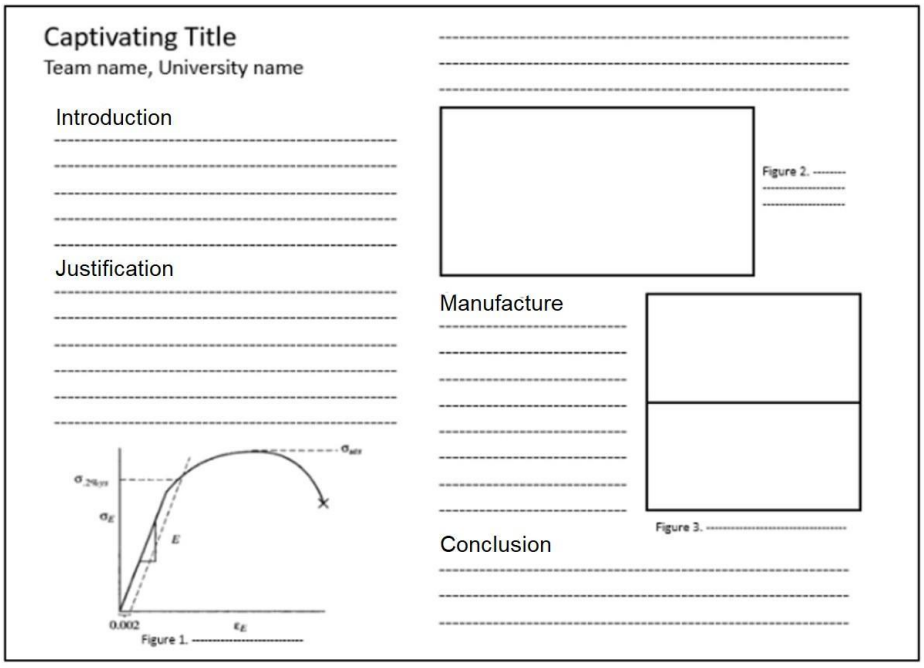


Figure 5: Example of a poster with the required sections.