



2020 I3DC Competition Rules and Guidance

Division III - Professionals

1. The Competition

2020 International 3D Printing and Design Competition

2. The Competition Theme

The theme:

Lightweight design of ribbed panel structure for air and space vehicles

Requirements:

Based on the application background of ribbed panel structure for air and space vehicles, lightweight design the structure according to the part structure and load conditions, as well as taking consideration of the constraints of the additive manufacturing process, to improve the bearing efficiency of the structure as much as possible.

3. Territory and Eligibility

The competition is open to researchers, industrial enterprise structural designers, university teachers and students, creators, geek and other 3D printing industry practitioners etc. worldwide.

The Competition can be entered by an individual or a team. The maximum team size is 3 members.

Finalists should be able to available to travel to and from the China on any date between 23rd to 25 th September 2020 (in case the competition is entered by a team, minimum 1 team member required)

4. The Competition Dates

The Deadline for Registration: 30th June 2020

The Deadline for Entries Submission: 8th July 2020

The announcement of the first qualification round winner and theme for Final Competition: 4th August 2020

The final competition: 23rd to 25th September 2020, Xi'an, China

The final Competition will be on-site competition, on-site verification and presentation is needed.

5. How to Enter

The Competition will be promoted through the NIIAM website:

www.niiam.com/news/i3dc

For registration, please send the *2020 I3DC Registration Form and Letter of Commitment for Intellectual Property Protection* to I3DC@NIIAM.CN. Participants are responsible for ensuring the form is completed fully and correctly.

6. The Theme for First Qualification Round

1) The design object is shown in Fig. 1, the upper part has 4 through holes connected with $\Phi 6$ fixture through-pins, and the lower part has 3 through holes connected with $\Phi 6$ work fixture through-pins. The relative relationship between the through hole and the symmetry axis of the rib panel is shown in Fig. 2:

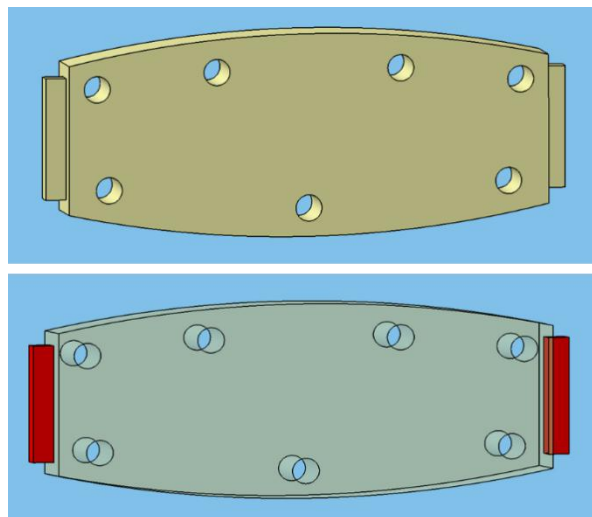


Fig. 1 Design object

2) The competition requires that the design scope shall not exceed the area given by the topic (yellow part in Fig. 1); The relative positions and diameters of 7 through holes shall not be changed; Both ends of the rib panel (red part in Fig. 1) must be reserved; The rest parts can be designed freely.

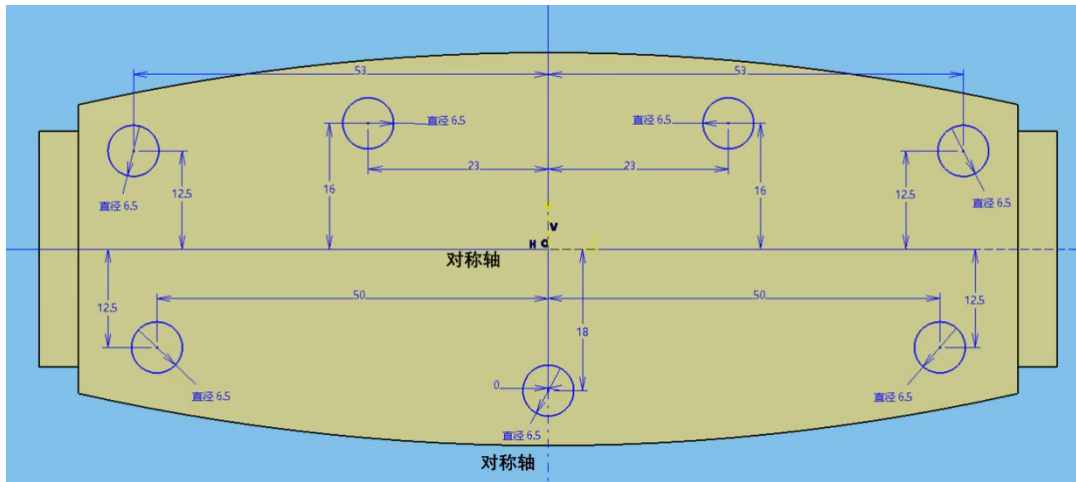


Fig. 2 Relative relation of the symmetry axis of the rib panel

3) The performance test method is that the tensile testing machine is loaded along the y-axis direction, and the vertical symmetry axis of the rib panel forms an angular relationship of 15° with the y-axis, as shown in Fig. 3:

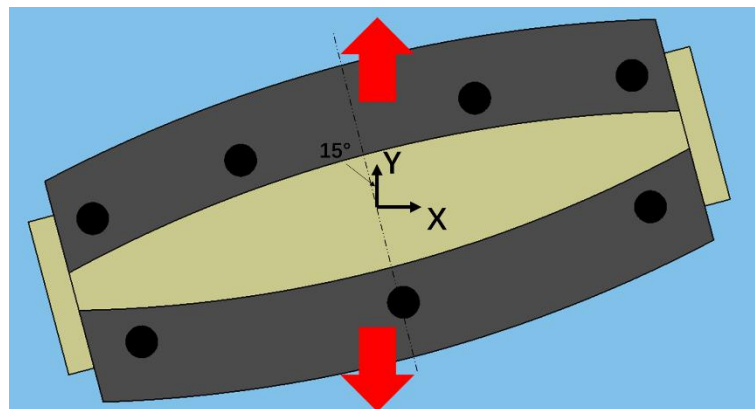


Fig. 3 Loading mode

The test mainly investigates the bearing efficiency of the structure, and the scoring method is as follows:

$$R = F/m$$

Where, R is the test result (N/g), F is the maximum load (N) borne by the structure, and m is the structure mass (g).

4) The competition entries are made by SLA process, the material is photosensitive resin, the material properties are shown in Table 1, and the process characteristics are shown in Table 2:

Table 1 Material properties

Tensile strength	27-31 MPa
Bending strength	69-74 MPa

Elongation rate	8 %
Flexural elongation	3 %
Elasticity modulus	2.1 GPa
Poisson's ratio	0.38-0.41
Density	1.16 g/cm ³

Table 2 Process characteristics

Minimum layer thickness	0.05 mm
Build accuracy	$\pm 0.1 \text{ mm}$ ($L \leq 100\text{mm}$) $\pm 0.1 \%$ ($L > 100\text{mm}$)
Minimum wall thickness	$\geq 0.5 \text{ mm}$
Minimum rod diameter	$\geq 1 \text{ mm}$

5) Model acquisition: download the "Industrial Group Model" file at www.niiam.com/news/i3dc

7. Entries Submission

To help us identify your work, please use "Professional Division + Entry name + Team name (or Individual name)" as your email subject line, please ensure your entry includes:

- 1) Registration Form
- 2) Letter of Commitment for Intellectual Property Protection: this document should be signed by all the contestants (if a team competes, it must be signed by every member in the team).
- 3) Part Design Report, in word format, it includes but not limited to the structure re-optimization design ideas, optimization methods, design process, process constraints, strength check, etc.
- 4) Part design digital model, STP or STL format file.

8. Selection of Entries

Twenty (20) winning teams will be selected in the first qualification round.

The entries will be judged by a panel of judges appointed by the Competition Organizer, who will select winning teams by running a loading test and reviewing the design report, based on the following criteria:

- 1) Loading test results(80%): Loading tests were carried out on the physical part printed based on models provided by the participants. The higher the R value (N/g), the higher the score.
- 2) Design Report(20%):The rationality of the design method; whether the design process takes into account the additive manufacturing process constraints;whether the analysis of the design results is accurate and credible; whether the strength check results are approximately consistent with the test results, etc.

9. Fees

Entry to the Competition is free of charge. Expenses related to participating in the competition should be borne by participants.

10. Prizes

The prizes for Final Competition are as follows:

- **Gold Prize:** 1 team, Certificate & 10,000 RMB Equivalent Cash Award
- **Silver Prize:** 2 teams, Certificate & 6,000 RMB Equivalent Cash Award
- **Bronze Prize:** 4 teams, Certificate & 4,000 RMB Equivalent Cash Award
- **Excellent Design Report Award:** One team, Certificate

All awards will not be repeated.

11. Intellectual property agreement

In order to effectively protect the intellectual property of entries for the participating teams or individuals, the participating teams or individuals shall promise to own the intellectual property of the entries (including but not limited to creativity, documents, source files, pictures, videos, etc.). The entry team shall submit the "Letter of Commitment for Intellectual Property Protection " together with the "Registration Form". If the organizing committee receives these two documents, the registration will be deemed successful. Any absence of any type of documents will be deemed unsuccessful. The competition organizing committee reserves the right to display, publicize and promote the entries. The organizing committee promises to consult with the participating teams or individuals about other commercial uses of the entries.

12. General

The participating team or individual shall voluntarily participate in this competition, have read the competition rules of this activity in detail, and agree to and guarantee to abide by the competition rules.

All documents and physical objects submitted by the participating team or individual are not supposed to be returned, and have been backed up by themselves.

The Organizing Committee of the competition shall be responsible for the confidentiality of the entries and personal information provided by the participating teams or individuals. At the same time, the participating teams or individuals shall be responsible for the confidentiality of the information of the competition. Before the end of the competition, they will not use the entries of the competition for any purpose in other competitions or other media.

The entry documents and articles shall not include libel, abuse, slander, obscenity, violence, threat, malice or harassment, incitement to discrimination, hatred, etc.; It shall not contain any other behavioral factors that encourage suicide, endanger health or physical, mental or moral health; There must be no information that undermines respect for privacy; There must be no content that induces crime, terrorist acts or advocates war or endangers humanity.

The organizing committee does not restrict the team's gender, political views, birth or facial features, race, nationality or religion, sexual orientation, etc. The Organizing Committee of I3DC reserves the final interpretation right of this Competition Guidance and Rule.