



**IASS WG21**



# **2021 Harbin Institute of Technology International Ice and snow Architecture Innovation Design Competition**

**Harbin Institute of Technology (HIT), Harbin, China**



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## **1 Background of the competition**

The Winter Olympic Games are not only a grand event of ice and snow sports, but also a platform for ice and snow cultural exchange. It is an embodiment of human wisdom in the cold environment and an important part of human civilization. Ice and snow architecture is a special type of cold architecture built by human beings to resist the invasion of severe cold climate and adapt to the extremely cold natural environment. It embodies the wisdom of human beings to understand and make use of nature, and carries the long history and profound heritage of cold areas. With the rapid development of contemporary science and technology, ice and snow buildings have also been given new functions and ways of use. How to spread and popularize ice and snow culture in combination with the Winter Olympic Games, reasonably inherit and make use of traditional wisdom, innovate design and construction forms, and promote sustainable innovation of ice and snow technology and art under the background of contemporary technical conditions is not only an eternal theme, but also an urgent problem to be solved.

On the occasion of the 2022 Beijing Winter Olympic Games, the competition is committed to accelerating discipline integration, promoting cultural exchanges and deepening academic cooperation in the field of ice and snow architecture. It is jointly organized by Harbin Institute of technology, IASS Working Group<sup>21</sup> and UArctic.

## **2 Topic of the competition**

Innovative design and construction of ice architecture —— Ice house innovation design competition for the Winter Olympics

## **3 Purpose of the competition**

The competition aims at the needs of spreading and popularizing ice and snow culture in Beijing 2022 Winter Olympic Games, promoting the technological and artistic innovation of ice and snow architecture, and promoting the sustainable development of ice and snow culture and ice and snow industry. It is hoped that designers can adopt ice and snow or composite ice and snow materials (other environmental protection materials can be selected according to the design needs, and the proportion of other materials shall not exceed 10% of the total building volume), Integrate modern industrial technical means, and carry out innovative research on the materials, structure, form, construction technology and functional layout of ice and snow buildings on the basis of the existing research on ice and snow buildings and ice and snow culture, so as to promote the

development of ice and snow construction technology, serve the needs of the Winter Olympic Games, disseminate characteristic ice and snow culture and enhance the experience of ice and snow activities, At the same time, it brings more possibilities for ice and snow materials and ice and snow technology.

## 4 Design principles

- 1.Respecting the construction history of frigid region ice and snow architecture;
- 2.Expanding the technological innovation of ice and snow architecture
- 3.Adapting the special frigid region climatic environment
4. Considering functional innovation for the Winter Olympics
5. Combining both economy and feasibility

## 5 Site location

The designer can choose any venue in the Olympic host city and Olympic related cities, but it is necessary to ensure the applicability of ice and snow materials in the base.

**The size of each team's construction site of is 12m × 12m, unlimited height.**

## 6 Participants

Each team has no more than 4 members supervised by 1-2 instructors. Students and young architects can participate in the competition. It is allowed to form teams across universities / institutions (no more than 3 universities / institutions).

## 7 Design requirements

1. Architectural function: close to the theme of the Winter Olympic Games, spread the Winter Olympic culture, display the sports related to the Winter Olympic Games, serve the needs of the Winter Olympic Games and enhance the ice and snow experience of tourists. There are no restrictions on specific functions, such as commerce, exhibition, image publicity, etc.

2. Architectural modeling: the plane size of the building project shall be 12m × Within 12M, the architectural modeling is required to be novel, unique and beautiful, reflecting the characteristics of ice and snow buildings, which is related to the image of the Winter Olympic Games.

3. Architectural structure: designers should pay attention to the collaborative design of architecture and structure in the design process, be careful to the rational expression of architectural image, and consider the safety and rationality of the structure.

4. Building materials: use snow and ice or snow-based composites(Other environmental

protection materials can be selected according to the design requirements, and the proportion of other materials shall not exceed 10% of the total building volume).

5. Construction method: the innovation of traditional ice and snow building construction method is encouraged, but the base shall not be damaged, and it shall be reflected in the submitted documents.

## **8 Work requirements**

1. The design proposal must meet the following requirements: overview of conceptual ideas, drawing of plans, elevations and sections, digital model, structural analysis, construction scheme and overall design description.

2. The architectural work design must meet the requirements of innovation and integrity.

3. The structure work design must meet the requirements of rationality and reliability.

4. The design results are provided in the form of A2 layout drawings (2-3 sheets) and model electronic files.

## **9 Entry requirements**

1. Sign up in the form of individual or team, no more than 4 people in each team. The team leader should be marked when signing up, and additional 1-2 instructors should be specified.

2. Each team can submit an unlimited number of design works.

3. All works must meet the competition theme and construction requirements.

4. When submitting the works, please submit accurate personnel information, ranking, contact information and participating universities / institutions.

## **10 Registration and submission**

**The final results are as follows:**

1. Drawings: each participating team shall submit relevant technical drawings that can express the design results, so as to facilitate the review of construction possibility by the organizer (the drawings are in PDF format of A2 layout).

2. Information of participants: the team shall fill in the application form, which can be downloaded in the attachment, and the personal introduction of each participant shall be attached to the end page of the achievement drawing book.

3. Electronic document of design result model (the file format is not limited)

**Submission method:**

The final design results shall be compressed and sent to the mailbox of the activity organization of the construction Festival: Ice\_Organization@163.com, under the name of "design scheme name + team leader name + team leader school".

After the examination and verification by the accreditation body, the selected works will be selected in the official account.

**The deadline for submission of design results is December 20, 2021.**

## **11 Contact information**

### 1. Competition inquiry and information reading

WeChat official account: ArchIce

Contact person:

e-mail: ice\_Organization@163.com

Wang Xuanyu: + 86 18846751079;

Yang Shuoyong: +86 15636176390;

Luo Peng: + 86 13936243408.

### 2. Registration and submission

E-mail of competition organization: ice\_Organization@163.com

## **12 Prize and award**

The prize setting and reward methods are as follows:

1st Prize 1team (¥\_5000 and certificate)

2nd Prize 2teams (¥\_3000 and certificate)

3rd Prize 3 teams)(¥\_1000 and certificate)

**Sponsors :** Harbin Institute of Technology (HIT), UArctic, the Working Group 21 of the International Association of Thin Shells and Spatial Structures (IASS Working Group21)

**Organizers:** School of Architecture of HIT

**Note:**

1. The overview and works of previous construction camps can be viewed in the "previous review" in the annex (read the original text);

2. Depending on the development of the epidemic situation, the organizer will select 1-2 works for construction in Harbin.

## ***Competition judges :***



**Sun Cheng**, Distinguished Professor of National Talent Plan; Doctor of Engineering; Dean of School of Architecture, Harbin Institute of Technology.

Prof. Sun has long devoted himself to research on architecture and human settlements in cold regions, digital architectural design, public building design, and urban disaster prevention and building safety. He undertakes the Key Programs and Major Research Plans of the National Natural Science Foundation of China and more than 20 scientific research projects above the provincial and ministerial level including China's National Key R&D Programs. He also presided over and participated in more than 40 Key Engineering Design Projects. Moreover, he has won 2 second prizes of National Excellent Teaching Achievements, 5 first prizes and 2 second prizes of Provincial and Ministerial Scientific and Technological Progress Award, and 17 prizes of Gold or Silver Medal of China Architecture Design Award and First of Second Provincial and Ministerial Excellent Engineering Design Award.

Prof. Sun is serving on more than 10 important academic positions including the member of the Architecture Discipline Appraisal Group of the State Council Academic Degree Committee, the Director of the National Building Virtual Simulation Experimental Teaching Center, Director of the Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology and Ministry of Industry and Information Technology, the Director of the Committee Computational Design of the Architectural Society of China, and the Chairman of Heilongjiang Society for Urban Studies.



**Arno Pronk** was born on 25 April 1967 in Anna Jacobapolder, the Netherlands

Records:

- 2014 Largest span with thin shell ice structure (30 meters) in Juuka Finland
- 2015 Highest thin shell ice structure (21 meters) in Juuka Finland
- 2018 Highest thin shell ice structure (30.5 meters) in Harbin China
- 2019 First 3D printed gridshell in ice

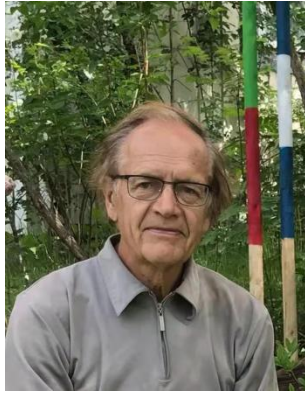
Current Positions:

- 2006 Scientific committee of: Structural Membranes, IASS and Journal Structures
- 2017 Board of advice, Joint Harbin Ice Research Institute
- 2017 Chairman IASS workgroup 21; advanced manufacturing and materials
- 2019 Jury member of International Harbin Ice festival



**Satu Miettinen**, Dean (2018-) and a Professor of Service Design (2016-) at the Faculty of Art and Design, University of Lapland in Finland. She has also worked as a Professor of Applied Art and Design during the years (2011-2016). Miettinen is co-ordinating Arctic design lab that is part of DESIS network. At the moment she is the Principal Investigator (PI) in Acting on the Margins: Arts as Social Sculpture (AMASS) project (2020-2022) which is funded from the European Commission Horizon 2020 Transformations -program. She is Pi for several high level academic research projects. She has published widely in main global academic publishing channels.





**Juhani Lillberg** (born 1943) is the President of International Association of Snow and Ice Sculpture.

Mr. Lillberg does not only have a long judging and organising experience of international snow and ice sculpture competitions, but he has also competed as a sculptor, winning prizes at various international snow, ice and wood carving competitions. His team won the first Olympic Snow Sculpture Contest in Calgary in 1988. He has been after Calgary Games involved in the cultural programs of all Winter Olympics as the judge and organiser of the Olympic snow and ice sculpture contests. He has judged over hundred international snow, ice, wood and sand sculpting contests since 1985.

Mr. Lillberg is the founder of The Arctic Centre, Finland. After founding the University of Lapland, too, he worked there thirty years as the director of administration. Since 2010 he has chaired the Alumna Association of the University of Jyväskylä, Finland. He has been a visiting lecturer at Harbin Institute of Technology 2016. Lillberg is beside of sculpting an active writer and researcher. The fields of his interest are the winter art, the developing of tourism and the social and cultural aspects of Olympic Games.



**Aleksey Marchenko** , Professor in Physics, The University Centre in Svalbard, Longyearbyen, Norway;

2003- visiting associate professor in Seoul National University, Seoul, Korea

2005- Member of the International Committee of the International Conference on Port and Ocean Engineering Under Arctic Conditions (POAC)

2010- Member of the Norwegian Scientific Academy for Polar Research

2011-2018 Leader of WP 1 in SAMCoT SFI project. Reviewer of papers in Journal of Cold Regions Science and Technology, Fluid Mechanics, Journal of Geophysical Research, Annals of

Glaciology, The Journal of Navigation Contributor with the paper in Encyclopedia of Life Support Systems (EOLSS)

2013- Visiting professor in Dalian University of Technology, China

2013- Visiting professor in the University College of London, UK