
External Movable Shading Systems Design Competition: Design Brief

1. Overview

Geographically most of India falls in these three climatic zones: hot & dry, composite, and warm & humid. There has been a proliferation of glazed buildings across the country, which are insensitive to orientation and are not well shaded. In these buildings, solar heat gain through glass constitutes a significant portion of the cooling load. External Movable Shading Systems is one of the solutions which reduces solar heat ingress inside the building and reduces the HVAC load.

Despite the potential, there are very few examples and applications of external movable shading systems in India. BEEP is organizing this design competition to promote innovative, indigenous concepts and solutions for external movable shading systems. Post the competition, BEEP will provide technical assistance to the designers to help them translate their design into final product. More information on external movable blinds can be found at <http://beepindia.org/competition>

Despite the opportunity, there are very few examples and applications of external movable shading systems in India. BEEP believes that external movable shading systems have a large potential in India and is organizing a design competition to promote innovative, indigenous designs and solutions for external movable shading systems suited to Indian climatic conditions. The project aims to help the designers translate their design into final product.

2. Categories

Based on the type of day-light control, the shading systems can be segmented into two categories: those which provide daylight control and those which do not provide day light control. The competition will have two categories, named after the most common application in buildings:

1. **Residential Sector (simple shading system):** The shading systems will block all solar radiation (heat as well as light). These are expected to be simple, low cost solutions which will find wider applications in residential buildings.
2. **Commercial Sector (shading and day-lighting system):** The shading systems will block the heat component of solar radiation but will provide effective natural day-lighting. These should be sophisticated mechanisms (can include sensors and automation) which find more application in commercial office buildings.

3. Competition Structure

The competition will be structured in two stages:

1. Design Stage
2. Mock-up Stage

At the design stage, the focus will be primarily on creative and innovative designs. During the mock-up stage, these shortlisted designs will be asked to develop working mock-up models to test their functionality and effectiveness. The winners will be decided after completion of the mock-up stage and due importance will be given to both aspects while deciding the final winners.

The objective of this competition is to help bring India-centric external movable shading system designs to the domestic market. Towards this goal, BEEP will provide further assistance to the winning teams in the form of:

- Prototype testing and product development support
- One-day business interaction event

Each of the stages and events has been described further in sub-sections below:

1. Design Stage:

The aim of the design stage is to provide complete creative freedom to the participants.

The initial/first stage of the competition is aimed at prompting the teams to focus only on the design aspect and come up with innovative, creative designs, which can achieve the desired performance and functions of the design categories mentioned in section above.

2. Mock-up Stage:

Five entries from each category will be selected by the jury (see Section 3: Design Evaluation) to develop mock-up models of their design. The mock-up model will be of a predefined size of 1m x 1m. The mock-up need not be made of the exact materials listed in the design but should be able to demonstrate the functionality explained in the design.

The teams will be required to demonstrate their mock-up model to the Jury in New Delhi. The venue will be informed to the teams later.

The final evaluation will be done based on the design and mock-up demonstration. Three winners from each category will be chosen and supported (refer section 3 and 4 for details) to develop and test their prototype.

Prototype Testing and Product Development Support

The winning entries will be provided financial and technical support to develop, test, and finalize their designs. This prototype will have to be built to exact specification mentioned in the submitted design for a pre-defined size (will be confirmed later). The materials used in the prototype have to be exactly the same as mentioned in the submitted design. All mechanical aspects and automation will be required to be as per design.

The BEEP team will provide feedback and inputs on the design and assist the winning teams to develop a prototype and test it on a real-scale size test rig. The test rig is being set up by BEEP in partnership with Center for Environmental Planning and Technology (CEPT), Ahmedabad.

One-day business interaction event

After the prototypes have been tested, tweaked, and finalized, BEEP will organize a Business Interaction event where the designers will be able to meet and interact with manufacturers. Manufacturers who produce similar products or are interested in similar domain will be invited to participate in this event. The teams can display their final prototype, demonstrate their designs, and network with these manufacturers. It is envisaged that this can act as a platform for the teams to commercialize their product.

BEEP will not be providing any financial assistance to the teams to commercialize their product.

However, within its limits, BEEP will assist all interested teams towards this motive.

4. Design Evaluation

To ensure that the process is fair and efficient, the entries will be presented to the Jury members without the name, picture, or corporate logo of the participant.

1. Stage 1: Design Stage

The design evaluation will be done in two stages: Initial pre-screening and detailed technical evaluation. The initial pre-screening will be done by the Jury based upon Overall Design, aesthetics, and Operating Mechanism. The evaluation will be done on the following criteria:

Category 1: Residential

1. Operating mechanism
2. Overall design and aesthetics
3. Controllability of shading for managing Solar Heat Gain Coefficient (SHGC) while minimizing SHGC

Category 2: Commercial

1. Operating mechanism
2. Overall design and aesthetics
3. Controllability of shading for optimising trade-off between SHGC and Visual Light Transmission (VLT)

SHGC and VLT will be evaluated using software mentioned in the section below. Other criteria will be evaluated by the jury as:

1. **Operating Mechanism:** The operating mechanism will be rated for the following features:
 - a. Operability principle of the mechanism
 - b. Potential mechanical sturdinessThe evaluation will be subjective by the jury members and their individual scores averaged for final rating operating mechanism.
2. **Overall design and aesthetics:** This will be subjectively graded by the jury members and their individual scores will be averaged for the final ratings on design and aesthetics.

Software used for Evaluation of SHGC and VLT

1. **SHGC:** Thermal performance of the system will be evaluated using Comfen Version 4.1 beta or the latest stable release (free software from Lawrence Berkley National Laboratory <http://windows.lbl.gov/software/comfen/comfen.html>) In special cases where Comfen cannot simulate the design and where ventilation between layers is a significant feature of the system, then WIS Version 3.01 SP2 (http://www.windat.org/wis/html/wis301/wis_files.html). In the exceptional cases where these two software may not be able to simulate the design with appropriate physical modelling, then analytical methods or CFD will be used. Minimum performance criterion for participating designs is that maximum value for SHGC should be 0.2, i.e. designs which will have SHGC higher than 0.2 will be disqualified.
2. **VLT (only for Category 2: Commercial):** Visual Light Transmission of the designs will be evaluated using ReluxSuite 2014 (free software from Relux Informatik AG <http://www.relux.biz/>). In the exceptional cases where these two software may not be able to simulate the design with appropriate physical modelling, then analytical methods will be used. Minimum performance expected from participating designs is that at SHGC value of 0.2, the VLT should be more than 45%.

For evaluation in the design stage, the focus will be on design and innovation. The Jury will rank each design in both categories and 5 entries from each category will be selected for the Mock-up evaluation stage.

Important: Changes in the Design after final submission in Stage 1 and declaration of Stage 1 results. The winning teams of Stage 1 will have the opportunity to make minor modification their winning design after declaration of result of Stage 1. However, only minor modifications will be allowed and the basic fundamentals of the design will have to remain unchanged. Any such modification will have to be notified to the BEEP team. Failure to disclose this might result in disqualification form Stage 2.

2. Stage 2: Mock-up Stage

The five winning entries in each category will be required to prepare a mock-up of their design for a window of size 1m x 1m. BEEP will provide a fixed amount of money to all teams (details can be found in the Prize Section) will be provided to help the teams prepare this mock-up. In addition, BEEP will organize a one-day workshop for all winning teams in New Delhi (date to be intimated at a later stage to all participants). This workshop will be aimed at providing the teams with further knowledge about external movable shading systems, with focussed sessions on product design, mechanical design, and automation.

The mock-up is not a prototype and is intended to demonstrate that the conceived design actually works when mounted on a real window. The mock-up need not be made using actual materials. However, the materials used should be able to demonstrate the capabilities of the prototype. Automation mentioned in the design can be demonstrated manually at this stage. The teams will be required to demonstrate their mock-ups to the Jury for the final evaluation of the winners. The winners of the competition will be decided based on the evaluation of the mock-ups. The evaluation

in this stage will be more detailed and the designs evaluated based on the technical as well as aesthetic factors as described below:

Technical Criteria:

1. **Actual SHGC:** Precise re-calculation of the SHGC will be done using actual mock-up calculations using tools mentioned in preceding design evaluation section.
2. **Actual VLT (only for commercial category):** Precise re-calculation of the VLT will be done using actual mock up calculations using tools mentioned in preceding design evaluation section.
3. **Actuation Mechanism and mechanical systems:** The teams will be required to demonstrate and explain their actuation mechanism and the details of the mechanical system to the Jury for evaluation.
4. **Automation (Only for the Commercial Category):** The level of automation built into the system. Aspects like intuitiveness, simplicity of design, and comprehensiveness will be evaluated.
5. **Resistance to wind:** Precise calculations will not be done. Instead, it will be evaluated subjectively by the Product Design and Mechanical Design expert members of the jury.
6. **Resistance to dust:** This cannot be calculated but will be evaluated and rated by the product design and mechanical design expert members of the jury.
7. **Bill of material:** The team will be required to present a bill of material of the standard 1m x 1m prototype for the submitted design. The cost of manufactured item will be estimated by the manufacturing expert member of the jury.

Aesthetics and Non-tangible aspects Criteria:

1. **Overall Aesthetics and design**
2. **Simplicity of operations and controls**
3. **Ease of Integration and retrofit**
4. **Ease of maintenance**
5. **Robustness and durability**
6. **Use of sustainable materials**

The jury will rate the teams and rank them to select the winner, runner-up, and 1st runner-up in each category.

That will conclude the competition stages of the event. Subsequent stages will be aimed at helping the winning teams test and develop their designs to make them market ready. They will be a collaborative effort between the winning teams and the BEEP constituted support team and the event will conclude with a Business Interaction event aimed at facilitating a meeting between the teams and prospective business partners.

5. Winning Prize and Development Support

Five designs will be chosen in each category in Stage 1. These five will be provided a fixed financial support (Rs. 40,000 for Residential and Rs. 60,000 for Commercial) for mock-up development.

During Mock-up stage, the teams will be graded and ranked. Three teams from each group will be awarded the prize. The prize money is same for both categories, and is Rs. 2.0 lakhs for the winner, 1.5 lakhs for the runner up, and 1.25 lakhs for the 1st runner up. In addition, each team will be given a fixed financial support for prototype development: Rs. 80,000 for residential, and Rs. 120,000 for commercial. If the winning team does not participate in prototype development and testing, this financial support will not be provided to them.

		Residential	Commercial
Competition Prize Money	Winner	2.0 lakh	2.0 lakh
	Runner-up	1.5 lakh	1.5 lakh
	1 st Runner-up	1.25 lakh	1.25 lakh
Support for mock-up development		0.4 lakh x 5	0.6 lakh x 5
Support for prototype development		0.8 lakh x 3	1.2 lakh x 3

6. Jury

The evaluation of Stage 1: Design Stage will be done by a three member team comprising of:

1. Prof. Ashok Lall, Indian Practitioner of Sustainable Architecture
2. Pierre Jaboyedoff, Technical Evaluation of design
3. Prof. Pradeep Nahar, Professor at NID, Ahmedabad

For Stage II: Mock-up Stage, the jury will be joined by three more members and the team composition will be:

1. Prof. Ashok Lall, Indian Practitioner of Sustainable Architecture
2. Pierre Jaboyedoff, Technical Evaluation of design
3. Prof. Pradeep Nahar, Professor at NID, Ahmedabad
4. Andreas Binkert, Swiss Practitioner, Sustainable Architecture
5. One representative from the end-user segment.
6. Mechanical Design Representation

7. Competition Timeline

Phase	Event	Timeline
Competition Launch	Competition Launch	8 th September, 2014
	Registrations Open	8 th September, 2014
Stage 1: Design Stage	Stage 1 begins	8 th September, 2014
	Registrations Close	30 th November, 2014
	Last Date for Entry Submission	15 th December, 2014
	Evaluation of Entries by Jury	20 th Dec 14 – 5 th Jan, 2015
	Evaluation of winning entry by IPR consultant	5 th – 10 th January, 2015
	Declaration of Results for Stage 1	14 th January, 2015
Stage 2: Mock Up Stage	Stage 2 Begins	15 th January, 2015
	Product and mechanical design Workshop	1 st week February 2015
	Stage 2 Ends	17 th April, 2014
	Stage 2 Evaluation	17 th April, 2014
	Mock-up Display and Award Ceremony	18 th April, 2014
Stage 3: Prototype Development	Stage 3: Prototype Development Begins	1 st May, 2014
	Prototype Testing Begins	1 st July, 2014
	Business Interaction Even	To be decided

8. Intellectual Property Right

Participant lawfully represents that the participant is the owner or authorised user of the intellectual Property Rights (IPR) of the submitted designs. No licenses, trademarks, inventions, copyrights, patents, or any other intellectual property rights, are implied or granted to third parties other than organisers on acceptance of these rules by the participant.

In all such submitted designs in which the participant is the owner, it is hereby confirmed that such participant shall continue to be the owner of the IPR including copyrights or patents during the duration of the competition unless the participant contracts otherwise.

9. IPR protection

To protect the ownership of the IP in the submitted designs, organisers will take all reasonably foreseeable and necessary precautions and measures as the owner of the IPR would employ to its own Confidential Information of like importance, but not less than a reasonable degree of care. Organisers may disclose Confidential Information of the participant's only to those of its employees or contractors who need to know such information. In addition, prior to any disclosure of such Confidential Information to any such employee or contractor, such employee or contractor shall be made aware of the confidential nature of the Confidential Information and shall execute, or shall already be bound by, a non-disclosure agreement containing terms and conditions consistent with the terms and conditions herein. Specifically, organisers have the Jury members and website hosting company sign a Non-Disclosure Agreement (NDA) w.r.t all participant confidential information provided to organisers including all Intellectual Property Rights during this Competition. Contracted website hosting company would ensure storage of participants files containing confidential information including all kinds of IPR on a secure server that is backed up regularly.

While maintaining transparency with regard to declaring the results of the competition, no material design specific information would be made public by organiser so as to compromise the IPR submitted by the participant. Additionally, any public announcement involving submitted designs would be shared with the participant by the organisers and require the participants consent before making it public.

Upon the completion of this Competition, the organizer will deliver to the participant all of the respective participant's IPR or Confidential Information in tangible form that the organizer may have in its possession or control. The organizer however may retain one copy of the IPR/ Confidential Information in its legal files.

10. Patent Infringement

The participant will have to ensure that their designs do not infringe any IPR including any existing copyright or patent. The participant, by entering this competition declares to the best of their knowledge that the submitted designs do not infringe any third party IPR's including but not limited to copyrights or patents.

Any IPR infringement of third party owners by any participant will lead to automatic disqualification of such participant from the competition.

In case of IPR infringement of any third party rights wherein the organisers would be made party to any proceedings or actions by the IPR holder, the participant agrees to indemnify organiser for all its losses and shall also be liable to bear the costs of defending the organiser.

11. Competition Rules and Regulations

By registering for the competition, the participant declares that he has read the competition rules and regulations and will abide by the following rules:

1. Participation:

Participation is open to Individuals, teams, and firms who having read the Design Competition Brief consent to comply with the rules of the competition provided herein, subject to such party also representing and warranting that they have all required power and authority to enter into and execute this Agreement and subject to the person signing on behalf of any party being authorized to bind such Party, where applicable.

The competition is open to all Indian residents over the age of 18. Interested participants who are not residents of India are required to partner with any competent Indian individual/team/firm to participate.

2. Registration:

Registration is free of charge.

Individuals/teams/firms will have to register to compete before 30th November 2014 to be able to participate. On so being registered individual/team/firm will be referred to as the participant.

An individual can only register once. In case he is part of a team or is representing a team, he can only be part of one team/firm. Likewise a firm or team can also register only once. However the number of entries submitted by each registrant can be more than one and is capped as provided in 3 below.

It will be the team leader's responsibility to register the team in case of teams and firms and the details of other team members will have to be provided by him to the organisers at the time of registration.

3. Design Submission limit for each category:

The design competition has two categories: Residential building and Commercial building. The participant can submit a maximum of two design entries for each category.

4. Last date for design submission:

The last date for design submission is 11:00 pm of 14th December 2014. Beyond that no entries will be accepted.

In case of extension of this deadline, the registered members will be informed via email and the information would also be posted on the competition homepage.

5. Changes in Design after Stage 1:

The winning teams of Stage 1 will have the opportunity to make minor modification their winning design after declaration of result of Stage 1. However, only minor modifications will be allowed and the basic fundamentals of the design will have to remain unchanged. Any such modification will have to be notified to the BEEP team. Failure to disclose this might result in disqualification form Stage 2.

6. Timelines and details pertaining to mock-up stage and prototype development stage of the competition:

The participant is expected to be conversant and is bound to abide with the related condition for the aforesaid two stages in accordance with the Design Competition Brief.

7. Intellectual Property Right

Participant lawfully represents that the participant is the owner or authorised user of the intellectual Property Rights (IPR) of the submitted designs. No licenses, trademarks, inventions, copyrights, patents, or any other intellectual property rights, are implied or granted to third parties other than organisers on acceptance of these rules by the participant. In all such submitted designs in which the participant is the owner, it is hereby confirmed that such participant shall continue to be the owner of the IPR including copyrights or patents during the duration of the competition unless the participant contracts otherwise.

8. IPR protection:

To protect the ownership of the IP in the submitted designs, organisers will take all reasonably foreseeable and necessary precautions and measures as the owner of the IPR would employ to its own Confidential Information of like importance, but not less than a reasonable degree of care. Organisers may disclose Confidential Information of the participant's only to those of its employees or contractors who need to know such information. In addition, prior to any disclosure of such Confidential Information to any such employee or contractor, such employee or contractor shall be made aware of the confidential nature of the Confidential

Information and shall execute, or shall already be bound by, a non-disclosure agreement containing terms and conditions consistent with the terms and conditions herein. Specifically, organisers have the Jury members and website hosting company sign a Non-Disclosure Agreement (NDA) w.r.t all participant confidential information provided to organisers including all Intellectual Property Rights during this Competition. Contracted website hosting company would ensure storage of participants files containing confidential information including all kinds of IPR on a secure server that is backed up regularly.

While maintaining transparency with regard to declaring the results of the competition, no material design specific information would be made public by organiser so as to compromise the IPR submitted by the participant. Additionally, any public announcement involving submitted designs would be shared with the participant by the organisers and require the participants consent before making it public.

Upon the completion of this Competition, the organizer will deliver to the participant all of the respective participant's IPR or Confidential Information in tangible form that the organiser may have in its possession or control. The organizer however may retain one copy of the IPR/ Confidential Information in its legal files.

9. IP infringement by submitted designs:

The participant will have to ensure that their designs do not infringe any IPR including any existing copyright or patent. The participant, by entering this competition declares to the best of their knowledge that the submitted designs do not infringe any third party IPR's including but not limited to copyrights or patents.

Any IPR infringement of third party owners by any participant will lead to automatic disqualification of such participant from the competition.

In case of IPR infringement of any third party rights wherein the organisers would be made party to any proceedings or actions by the IPR holder, the participant agrees to indemnify organiser for all its losses and shall also be liable to bear the costs of defending the organiser.

10. Both parties independent:

Organiser is not to be portrayed/held as as the Principal of the participant and participant as agent of the Orgnaiser due to actions of the participant for any purpose whatsoever.

11. Design Evaluation by Jury:

The designs will be evaluated by a Jury as per the guidelines mentioned in the Design Brief and the results shall be brought out on the competition website. The decision of the jury will be final and binding. Any requests for re-evaluation will not be entertained. Participants, by agreeing to the rules of the competition, declare that they will not challenge such decision of the Jury in any court of law.

12. Applicable Law and Jurisdiction:

Notwithstanding anything to the contrary, on all other aspects, this Agreement will be governed by and construed in accordance with the laws of the Republic of India without regard to conflicts of law principles. Participant agrees to submit to the sole and exclusive jurisdiction of courts at New Delhi for the purpose of any suit, action, or other proceeding

arising out of this Agreement, which is brought by or against the organiser, except for enforcement of injunctive relief, which may be enforced in any court of competent jurisdiction. Participant: (i) consents to personal jurisdiction therein; and (ii) waives the right to raise forum non conveniens or any similar objection.

13. Additional Rules :

Participant acknowledges that the organiser reserves the right to formulate additional rules to add to the existing rules particularly at the latter stages of the competition when the competition reaches the mock up stage and prototype round and agrees to be bound by such rules.