Giant screens are **at least**

- 70 feet (21.3 meters) wide, **or**
- 3,100 square feet (288 square meters) in total area for flat screens, **or**
- 60 feet (18.3 meters) in diameter for domes, **and**
- Place all seating within one screen width of the screen plane.

How the Specifications Were Determined

In June 2008, the GSCA Board of Directors adopted a set of initiatives designed to enable the development of marketing tools for its members who operate a “giant screen” that would help them to differentiate themselves from the growing number of smaller-sized screens utilizing 3D and other new specialty cinema technology. The Board simultaneously appointed a Technical Task Force, chaired by Board member Andrew Oran (FotoKem), to recommend a definition of “giant screen” for the Association and a Marketing Task Force, chaired by Board member Mike Lutz (MacGillivray Freeman Films), to recommend ways those theaters could differentiate themselves in the marketplace.

Oran presented the Technical Task Force-recommended definitions of what dimensions and geometry constitute a “giant screen” to the Board at the GSCA 2009 Conference in Indianapolis on September 20 and to the general GSCA membership at the All Members meeting on September 21. On September 23, the GSCA Board discussed Oran’s presentation and voted to accept the recommendations with the provision that no action be taken on them until such time as the Marketing Task Force presented its recommendations and those recommendations were enacted by the Board. The specific recommendations are detailed below under "Technical Task Force Report."

TECHNICAL TASK FORCE REPORT

by Andrew Oran

The Technical Task Force’s objective was to come up with a definition of the term “giant screen” that was clear, and specifications that were as inclusive as possible (that is, representative of the highest percentage of our current membership) while still being meaningful and technically sound.

We asked GSCA theater members for details of their screen and theater dimensions, and received replies from 76 flat-screen theaters and 39 dome theaters, a total of 115. We also consulted the GSCA’s worldwide database of more than 350 giant-screen theaters.

In the end, our specs came down to four basic criteria. Giant screens are **at least**

- 70 feet (21.3 meters) wide, **or**
- 3,100 square feet (288 square meters) in total area for flat screens, **or**
- 60 feet (18.3 meters) in diameter for domes, **and**
- Place all seating within one screen width of the screen plane.

Our starting point on the issue of screen size was the question, How big are our screens at present?

Among the 76 flat screen theaters that replied to our survey, the average screen width was 75 feet (22.9 meters). The average width of the flat screens in our worldwide database was 71 feet (21.6 meters). We decided to lower that specification to 70 feet to include over a dozen IMAX GT, SR, and MPX system theaters that would otherwise have not qualified.

The average area of the 76 flat-screen respondents was 4,300 square feet (400 square meters). The average for the full database was 3,800 square feet (353 square meters). We decided to lower that specification to 3,100 square feet (288 square meters) to include several GSCA member theaters that would otherwise have not qualified.

Despite these accommodations, there are still 16 GSCA theater members with flat screens (out of a total of 107 flat screen theater members) that do not meet these specifications. However, there are 17 lapsed theater members that do meet them, and even more that meet them but have never been members of the GSCA.

Dome theaters

The average dome screen diameter of the 35 dome theaters that replied to our survey was 72 feet (22 meters). The average diameter of the 125 dome screens in our wider database was 70 feet (21.3 meters). When considering the impact of a 70-foot requirement, we noted that quite a few GSCA member theaters with screen diameters of 60–70 feet would be excluded.

Since almost all dome theaters, regardless of size, provide an immersive visual experience, the question of "what is giant" with respect to the dome screen seemed subjective. We decided to be as inclusive as possible while still providing meaningful differentiation between giant and non-giant dome screen alternatives.

For example, in the expanding fulldome digital planetarium field, only 65 out of more than 400 screens meet this criterion – less than 17%.

Of the 125 dome screen theaters in the worldwide database, 92 meet the 60-foot requirement. Among the 26 current GSCA dome theater members, only four do not.

Theater depth

The requirement that the last row of audience seating be within one screen width of the screen plane is based on IMAX Corporation's original theater designs, which called for a minimum viewing angle of no less than 53 degrees. While human peripheral vision extends well beyond 53 degrees, this angle has long been considered the narrowest practical viewing angle for a giant-screen cinema.

Almost every theater in our database that meets the screen size requirement also meets this immersivity requirement. In other words, our survey results suggest that if the screen was built "giant," it was built to meet the standards of immersivity as originally established by IMAX.

Linking screen size and immersivity addresses a related question that came up throughout our discussions, namely, What distinguishes a "giant screen" from its nearest competitors? With multiplex screens approaching, or even exceeding, 70 feet in width, and the latest digital projection systems (from a variety of vendors) promising to fill that screen width with bright and high-resolution images, we felt that overall screen size (width and height) *combined with* theater architecture should act as our key differentiator. So, while a standard 72-foot-wide, digital multiplex screen with a 1.78 aspect ratio will meet our width requirement, the auditorium's geometry will probably not meet our immersivity requirement. This is borne out by our survey results.

Several current member theaters fall just shy of meeting the requirements outlined. The Task Force and Board are considering a "grandfather clause" that would permit theaters that meet at least one of the two basic requirements, and fall within a certain percentage of the others, to receive special consideration with respect to any GSCA-endorsed "Giant Screen" designation.

Other issues

We identified three other areas as essential components of the giant-screen theatergoing experience: resolution, light, and theater and audio design. Although important, we chose not to make them criteria in the definition of the term "giant screen." The following are therefore guidelines, not requirements.

Resolution: Giant-screen projection ideally provides an angular image resolution of one arc-minute (eye limited resolution, or 20/20 vision) to all viewers.

Therefore, the general guideline is that we should strive to deliver 20/20 vision to every seat in the house. At present, this ideal resolution is most consistently delivered by the projection of 15/70 film prints from 15/65 original camera negative.

For digital systems this ideal resolution guideline translates to approximately 8,000 horizontal pixels, assuming the front row is no closer than 0.3 screen widths, which is the case with most of our giant-screen theaters. However, establishing a GSCA-endorsed or recommended digital resolution guideline is still in its early stages, and more work needs to be done before we'll be prepared to issue a recommendation in that area.

Light. Giant-screen projection relies on sufficient image brightness to achieve optimal color saturation and maximum visual acuity to the viewer. Considering practical technical limits, optimal projection performance is at present achieved at raw light levels, measured center-screen, of 20–22 fL (2D flat silver screens, unfiltered to the eye), 6–8 fL (3D flat silver screens, filtered) and 3–4 fL (2D dome).

Our recommendation is to continue to support these guidelines, which are currently followed by virtually all of our giant screen theater members.

Theater and audio design

Recommended characteristics of giant screen theater and audio design include:

- Stadium-style seating and, for flat screen theaters, mid-height rows that align to approximately one-third of screen height.
- A high degree of noise isolation.
- A “neutral” acoustic environment, with short reverberation time and minimal sound reflections.
- Discrete rear channel speakers.
- A derived sub-bass speaker system.
- An uncompressed audio source.
- Appropriate amplifier power and speakers to deliver extended dynamic range, and proper equalization to provide an accurate frequency response.

As with light, we decided to continue to support these long established practices and guidelines.

I’d like to thank the people who helped me sort through these issues, including the GSCA Technical Task Force:

- Morgan Gabereau, Tenare Pictures
- Rick Gordon, RPG Productions
- Jeffrey Kirsch, Reuben H. Fleet Science Center
- Ed Lantz, Vortex Immersion Media
- Paul Panabaker, 3D Solutions
- Phil Streather, Principal Large Format
- Dick Vaughan, National Media Museum
- Alvis Wales

I’d especially like to thank the GSCA’s Tammy Seldon and Kelly Germain for their unflagging help in conducting our theater survey, collating the data, and answering the questions I posed to them at all hours of the day and night.