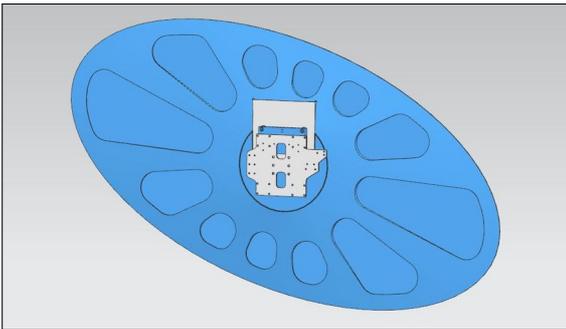




Luca Urban

Graduate Candidate	Luca Urban
Examiner	Prof. Dr. Gion Andrea Barandun
Co-Examiner	Prof. Dr. Michael Niedermeier, Hochschule Ravensburg-Weingarten, Weingarten, BW
Subject Area	Plastics Technology

## Development & Production of an ultralight disc for an art installation



CAD model of the prototype disc including the assembly solution.  
Own presentment

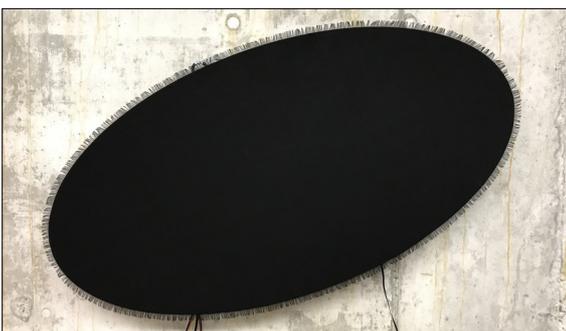
**Definition of Task:** For an art project, an ultra-lightweight, elliptic disc has to be developed and manufactured along with an assembly solution. The disc will be mounted on a mechanism which moves it in a random fashion. The motion imitates a handheld, zoomed camera video. The dimensions of the disc are given with the long axis of 2.885 m and the short axis of 1.5 m for the elliptic geometry. The mounted disc should be very stiff and as light as possible, with a matt black surface and a "furry material" around the edge.

**Approach / Technology:** The specifications have been noted and a brainstorming has been organized (6-3-5 method) to gather as many ideas as possible with the given requirements. Then, the ideas have been transferred to a morphological box, where 3 concepts have been selected. Those concepts have been analyzed further and finally, 2 have been compared in order to select one solution for the implementation. The final concept is designed with the help of topology optimization and modal analysis to make sure the product meets all specifications. The optimized concept is then manufactured and rated in terms of the quality, performance and optical impression.



Manufactured disc as sandwich structure with integrated aluminum core for assembly.  
Own presentment

**Result:** Due to cost reasons and to be able to go through an optimization cycle, a scaled-down prototype (1:2) is manufactured. This enables the production using standard tooling at HSR. The prototype is combined with the real-scale assembly solution. This way, the disc could be mounted on the moving mechanism to test its behavior. The prototype disc remained very stable during the fast changing motion of the mechanism, and the assembly solution stayed locked in place. The assembly parts allow to mount the disc in a simple way - this might turn more difficult with the full size disc. The total weight of the disc including the assembly parts is 2.1 kg, which means the original sized model would reach about 7 kg with this concept. The stretched textile and the "furry material" have been bonded to the back of the disc with adhesive tape. Thus, the textiles could be removed without damaging the disc. There are still some optimizations for the production of the final model, to further decrease the weight to approx. 5 kg. The prototype disc provides enough data to manufacture the full sized disc without having to worry about major manufacturing problems.



Final product mounted on the moving mechanism with the textile and "furry material" attached.  
Own presentment