

REPORT

TENSINET SYMPOSIUM 2013 [RE]THINKING LIGHTWEIGHT

TEXTILE ROOFS 2013

PROJECTS

arenas, protective zones,
stadiums and coverages

CHINA - DENMARK - FRANCE - GERMANY
ISRAEL - ITALY - LUXEMBURG
SWITZERLAND - USA



Three cupolas

COMBINING SILICONE AND PTFE COATED GLASS MEMBRANES

for the water park and spa "Splash e Spa Tamaro",
Rivera, Switzerland

Context

On the 15th of June 2013 the "Splash e Spa Tamaro" was inaugurated at the foot of Monte Tamaro in Rivera, Switzerland (Ticino). A spectacular water park and spa with large pools, fantastic waterslides as well as themed saunas, steam baths, hamam, relaxation areas and specialized treatments. A great experience is promised in this relaxed atmosphere. The three themes with -large relaxing pools, -slides and -spa are located in three different cupolas, which vary in form and size (Fig. 1)

Project

Three domes with a primary steel structure made of radial lattice girders are covered with membrane on both sides. On the inside, towards the bath, a silicone coated glass membrane forms the space of the inner ceiling. On the outside a PTFE coated glass membrane covers the whole structure forming a continuous surface. The steel structure is not visible any more. Especially the detailing with a linear clamping on a perpendicular steel flat, which is also covered by a membrane strip, makes the steel structure disappear (Fig. 2).



The whole space within the two membrane layers is under air pressure, so that the membrane has its quite flat curvature towards the outside and follows the form of the cupolas. In the air space between the membrane envelope,

a low E foil with an aluminum coating spans between the steel girders and reduces the loss of thermal radiation. Also this foil is not visible from the outside and is translucent so that even with the three layers of membrane and foil

a slight daylight illumination exists. With artificial light from the inside the cushion volume, the atmosphere within the cupolas can also be influenced, and the appearance of the whole building gets interesting from the outside.

Figure 1.
The three different domes of
the "Splash e Spa Tamaro"

Figure 2.

Connection detail

Figure 3.

Details of intersection of the water slides
with the inter/outer membrane

Figure 4.

Water slide penetrating the membrane panel

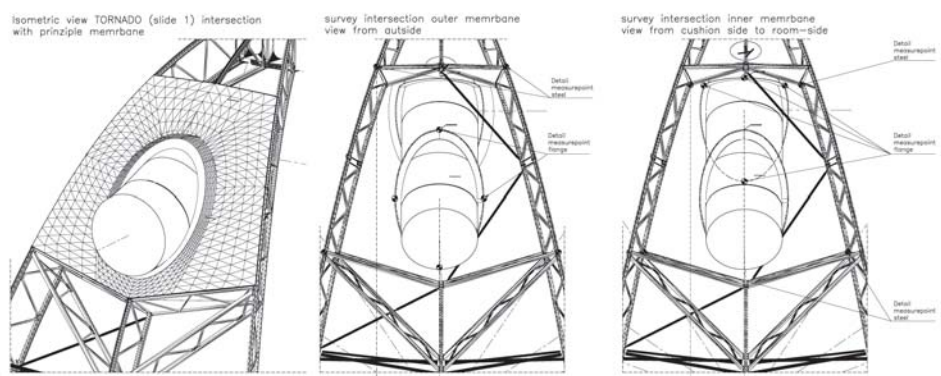
Figure 5 a - b.

Outside and inside view of the largest dome

Figure 6 a - b.

Outside view and detail of the small dome




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To continue the outer appearance of the membrane in the lower area in front of the concrete structure, the membrane structure changes from a cushion with synclastic curvature into mechanically tensioned panels with anticlastic curvature. This leads to an optical change in the base. A special challenge was the intersection of the water slides with the membrane panels (Fig. 3 - 4). In total 6 water slides and the big "Tornado" start inside the slide dome, penetrate the membrane panels and continue their curvy run outside before

they return to the inside of the dome again. The slides have to be isolated from all membrane forces, but must be included in the airtight structure. A clamped steel ring in the shape of the membrane couple the membrane stress. For tightening a so called "bellow", a membrane stripe with a small radius was clamped between steel ring and a slide to tighten the gap.

 *Michael Schäffer*
 *michael.schaeffer@form-TL.de*
 *www.form-TL.de*



Name of project:	Splash e Spa Tamaro
Location address:	Rivera, Switzerland (Ticino)
Client (Investor):	Suisse Projects (kplan AG)
Function of building :	covering of different bath areas
Year of construction :	2013
Architects :	Suisse Projects; Marco Giussani Arch. SIA OTIA
Structural engineers:	Airlight Ltd, Switzerland
Consulting engineer for the membrane:	form TL ingenieure für tragwerk und leichtbau gmbh, Germany
General contractor:	Garzoni SA, Switzerland
Contractor for the membrane:	Canobbio SpA, Italy
Supplier of the membrane:	Saint-Gobain and Interglass
Manufacture and installation:	Canobbio SpA, Italy with Seilpartner, Germany
Material:	PTFE Glass; Silicone Glass; low E foil
Covered surface (roofed area):	4040m ² (6700m ²)

TENSILE INTEGRITY

A DEPLOYABLE double hypar SHAPE COVERAGE

for the stage at Pierson Park, Tarrytown, NY






Context

The Village of Tarrytown built out the recreational space at Pierson Park, Tarrytown, NY. Tensile Integrity Inc. with support of Blackwell Engineering, Depco, Lightweight Manufacturing, and Signature Structures provided a turnkey solution to protect the stage with coverage. The structure provides shade and protection from inclement weather.

Project

The unique double hyperboloid shape is achieved using tensegrity cable and strut arrangements supported on the structural steel frame. Both the structural steel components and tensile membrane are designed to meet the loading criteria as required by building code. Design time and fabrication took approximately 8 weeks and when the structure was delivered to the project site it was built in under a week's time. RGR Landscape Architects, ELQ Industries Inc. and the Village of Tarrytown are extremely pleased with the look and feel of the new stage area, and were further pleased to realize that although deployable as initially requested, the membrane can also be left in place permanently.

 *James Gallagher*
 *jwg@tensileintegrity.com*
 *www.tensileintegrity.com*



Name of Project:	Pierson Park Stage Cover
Location address:	238 W Main Street, Tarrytown, NY 10591-3671
Client:	Village of Tarrytown, NY
Function of the building:	Outdoor performance stage
Type of application of the membrane:	performance stage cover
Year of construction:	2013
Architects:	RGR Landscape Architects
Structural engineers:	David Bowick, Blackwell Engineering
Consulting engineer for the membrane:	David Bowick, Blackwell Engineering
Main Contractor:	ELQ Industries
Contractor for the membrane (Tensile membrane contractor):	Tensile Integrity Inc.
Supplier of the membrane material:	Serge Ferrari
Manufacture:	Lightweight Manufacturing
Installation:	Tensile Integrity Inc.
Material:	Ferrari 902
Covered surface (roofed area):	75m ²