büro für leichtbau

TRITTHARDT + RICHTER

COMPANY PROFILE

Who we are

büro für leichtbau (bfl) is an engineering practise specialized in design, analysis and construction of architectural lightweight structures.

bfl was established in 1995 by engineer jörg tritthardt and architect dr. hartmut ayrle as a spin-off from the wrapped reichstag project by christo and jeanne-claude.

based in south germany at the shore of lake constance the team now can look back on over 27 years of experience and more than 515 executed projects.

after resignation of dr. ayrle in 2003 the company today is a partnership of engineers jörg tritthardt and dirk richter.

What we do

- bfl offers design and engineering knowledge for tensile structures to clients all over the world including:
- new designs for tensile, mobile and retractable structures
- development of existing designs in collaboration with architects and general contractors
- project consultancy and planning
- cost estimation for special structures
- numerical formfinding of membrane-, cable- and shellstructures.
- structural analysis complying to Eurocode or local codes
- cutting patterns for double curved textile membrane surfaces
- quality control of manufacturing processes
- method statements and site inspection

Christo and Jeanne-Claude, WRAPPED REICHSTAG, BERLIN, 1971–95

Juristische Beratung
Scott Hodes, Chicago
Prof. Dr. Peter Raue, Berlin

Projekthistoriker
Michael S. Cullen, Berlin

Architektonische Beratung
Prof. Jürgen Sawade, Berlin

Exklusiv authorisierte Projektphotographen
Wolfgang und Sylvia Volz
Photoanfragen:
Fax: 040-420 78 76

Bauleitung
Architekturbüro Mann, Berlin

Ingenieure und Architekten
IPL Ingenieurplanung Leichtbau GmbH, Radolfzell

Technische Textilie
Schilgen GmbH & Co., Emsdetten

Metallisierung
Rowo Coating GmbH, Herbolzheim

Monitororganisation
Siegward Hausmann

Nähereien
Spreewald Planen GmbH, Vetschau
Zeltaplan GmbH, Taucha
Canobbio Sp. A., Castelnuovo

Kunsthändler in Deutschland/art dealer
Carl Fisch, Berlin

Projektassistent
Simon Chaput

Archivar-Kurator
Josy Kraft

Technisches Consulting
Vince Davenport
John Thomson
Mitko Zagoroff

Montage
RVM - Reichstagsverhüllungs-montage GmbH, Berlin

Seile
Geo Gleistein & Sohn GmbH, Bremen

Montagekissen
HeBa Kunststoffe GmbH, Emsdetten

Stahlkonstruktionen
Stahlbau Zwickau GmbH, Zwickau

Dachplattformen
Gerüstbau Tisch GmbH, Berlin

Stahlgewichte
EKO Stahl GmbH, Eisenhüttenstadt

Verhüllter Reichstag GmbH
Ebertstr. 27, 10117 Berlin
Fax: 030-201 95-174
bis 31. Juli 1995

Geschäftsführer/CEO:
Roland Specker
Wolfgang Volz

Christo and Jeanne-Claude
Fax: 1-212-9662891, New York
Office manager: **Calixte Stamp**

To whom it may concern

Letter of Recommendation

Herewith we do confirm, that Hartmut Ayrle, Architect, and Jörg Tritthardt, Civil Engineer, have as responsible project architect and engineer designed and worked out the technical realisation of the Wrapped Reichstag in Berlin, backed up by their former office IPL GmbH.

Hartmut Ayrle was leader of the engineering team and coordinated the design and workshop detailing process. He conducted the technical investigations necessary to obtain the building permit from the Berlin authorities. He was able to understand our aesthetical visions and convey them into construction technology.

Jörg Tritthardt took on the responsibility for the engineering of the fabric panels. His high level of precision and structural understanding for fabric made possible an installation of 100.000 m2 of fabric.

Both, Hartmut and Jörg, worked in direct relation with us, from May 1994 until the installation and removal in June/July 1995. They both dedicated all their workforce and emotional engagement to the project.

We can encourage everyone who is looking for design and engineering of demanding projects to use the services of Hartmut Ayrle and Jörg Tritthardt as architects and engineers. We are fully satisfied by their work for the Wrapped Reichstag in Berlin and hope to work with them some day in the future.

Berlin, 5.7.1995

Christo and Jeanne-Claude

Christo et Jeanne-Claude

L'Arc de Triomphe, WRAPPED

To whom it may concern

Letter of Recommendation

Herewith I confirm, that Jörg Tritthardt, Civil Engineer, has as responsible project engineer designed and worked out the technical realisation of “L’Arc de Triomphe, Wrapped” with his “büro für leichtbau, design+engineering”.
Jörg Tritthardt took the responsibility for the engineering of the fabric panels, the tensioning system of the fabric panels, the steel block fixation, the red ropes, the installation procedure of the fabric and ropes. His high level of precision and structural understanding for fabric made possible an installation of 25.000 m² of fabric and 3.000 m particular pretensioned red ropes.
Jörg worked in direct relation with me, from July 2019 until the installation and removal October 2021. He dedicated all his workforce and emotional engagement to the project.
Based on Christo and Jeanne-Claude and my satisfaction by his work for the “Wrapped Reichstag” in Berlin, Christo and I worked with him again for “L’Arc de Triomphe, Wrapped”. I encourage everyone who is looking for design and engineering of demanding projects to use the service of Jörg Tritthardt with his “büro für leichtbau, design+engineering” as engineers. I hope to work with him some day in the future.

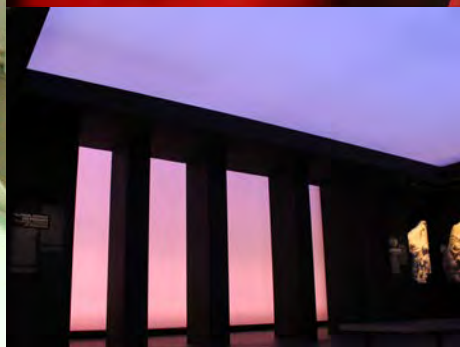
Paris, 01. 12.2021

Vladimir Yavachev

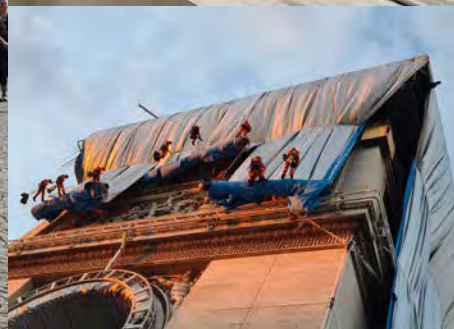
ADT WRAPPED COMPAGNIE 10, RUE ALFRED STEVENS 75009 PARIS
SIRET N°852 145 176 00016 | TVA N° FR 55852145176

Projects

- membrane roofs and textile facades
- design objects and sculptures
- sails and umbrellas
- tents and buildings
- special structures
- textile ceilings



Paris - *Christo and Jeanne-Claude, L'Arc de Triomphe, Wrapped*



2019-2021: 25000 m² fabric, 3000 m red ropes
bfl provided for fabric, ropes and steelblocks
structural analysis, detailed design, conceptual design for steelblocks to fix the fabric,
workshopdrawings, cutting pattern,
management of materialflow for production of fabric and ropes,
Installation concept and management on site, planning of mock-ups

Panometer - *Yadegar Asisi*

Wittenberg

Rouen


Hannover

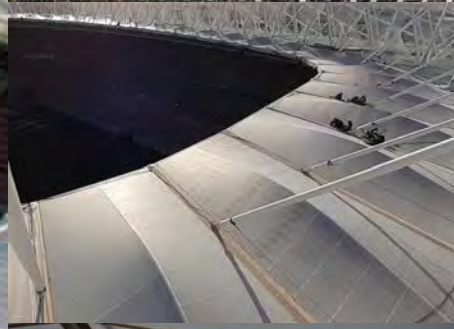
Hannover + Wittenberg:
bfl provided structural design, analysis for concrete, steel, façade, roof

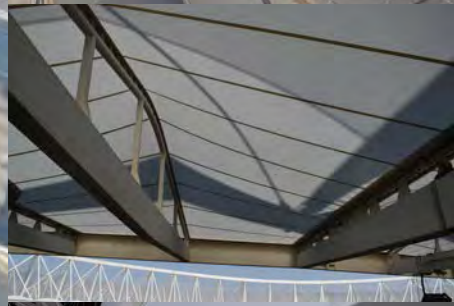
since 2009 for All Panorama structures (Berlin Pergamon, Berlin Wall, Dresen, Leipzig, Hannover, Wittenberg, Pforzheim, Konstanz, Rouen):

bfl provided engineering of railsystem for fabric, door construction, tensioning system, cutting pattern, installation concept and installation management on site,

Qatar - *Stadium Al Rayyan*

2020: 5808 m² membrane roof, 4414 m² windnet, 3563 m² textile façade under the roof.
bfl provided detailed design, workshopdrawings, cutting pattern



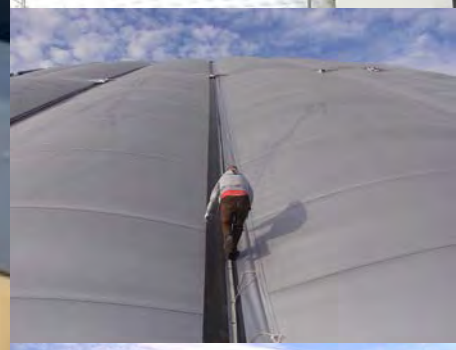


Sochi - *Fisht Olympic Stadium - air supported central roof*

2013: 40000 m² 90 air supported cushions with PVC-coated Polyester-fabric on intermediate steel structure
bfl provided structural analysis and detailed design for intermediate steel-sturcture and membrane, cutting pattern





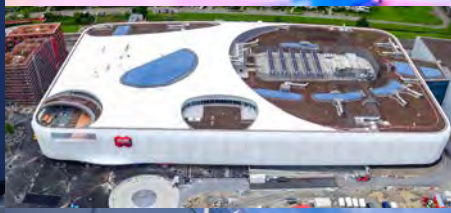



Aguascalientes - *Velodrom*

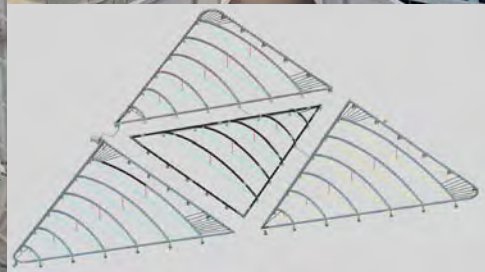
2008: 8331 m² air dome for a Velodrom with 333m track
bfl provided structural design, analysis and workshop drawings for membrane, steel structure, reinforced concrete foundation and cutting pattern

Luzern - *Mall of Switzerland*

2017: 11240 m² ETFE - single layer foil façade,
82 façade fields wíth illumination inside,
bfl provided structural design, structural analysis,
ETFE-Foil engineering, cutting pattern



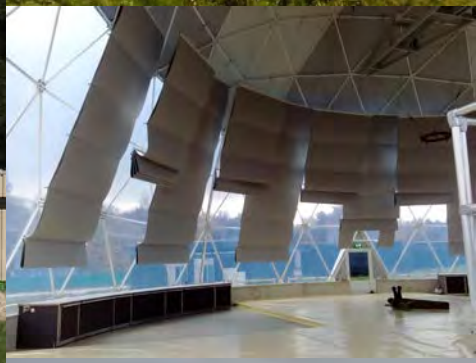
Hannover - *Lister Triangle*



2019: 1200 m² ETFE - foil cushion roof,
3 triangles with 7 cushions and 1 triangle with 6 cushions
bfl provided structural design, structural analysis,
ETFE-Foil engineering, workshopdrawings, cutting pattern

Pfullendorf - *Gridshell with pendulum tower*

2018: gridshell an concrete platform with
487 m² PVC-coated Polyesterfabric
487 m² transparent ETFE-foil
bfl provided architectural and structural design, analysis and detailing of concrete platform, steeltower, gridshell, membrane engineering + cutting pattern
design of sunshadestructure, project management

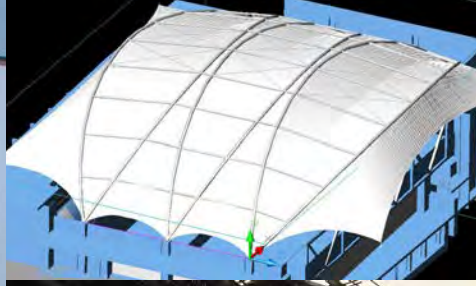


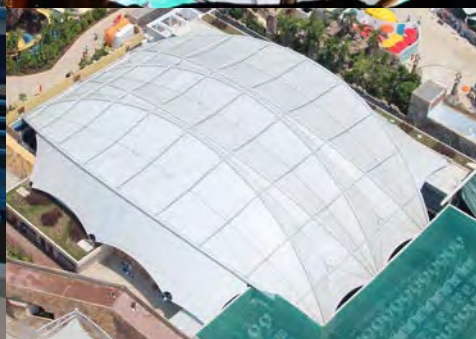
Vodnany - *company entrance*

2015: Together with architect Claire Braun we developed an entrance roof in 2 material parts.
1927 m² PVC-coated polyester fabric and
135 m² PTFE-coated glasfiber fabric
bfl was responsible for structural design, analysis, membrane engineering and cutting pattern.

Singapore Sentosa Island - *Open Ocean Tank*

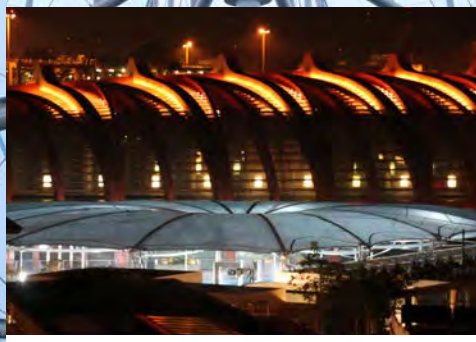
2011: 2500 m² cable stayed membrane roof over the open ocean tank - a seawater aquarium with worlds largest acrylic underwater panorama window.
bfl provided structural design, analysis and detailing

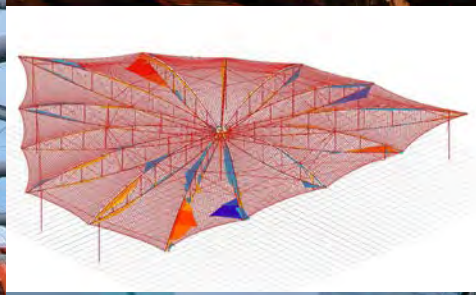




Singapore Sentosa Island - *Sharktank*

2011: Glasfiber-Silicone membrane roof stabilized by 14 radial fishbelly girders above the sentosa resortworld sharktank.
bfl was responsible for architectural design, structural analysis and detailing





Bangalore - *Mantrimall*

2008: 30m x 120m Combined glass/membrane roof above the mantri-atrium shopping mall in bangalore india. bfl provided structural analysis and detailing

Mainau - Island at Lake Constance - *Entrance canopy*

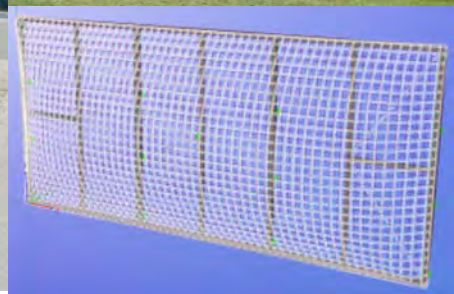
2003: Glasfiber PTFE mesh canopy at the visitor entrance of Mainau island. bfl provided structural design, analysis, membrane engineering and shopdrawings.

Berlin - *SOS Kinderdorf*

2015: 1825 m² textile façade with 302 movable frames, covered with PTFE-Glasfibermesh.
bfl was responsible for structural analysis and detailing of the frames

BER Airport Berlin - *textile covered frame system*

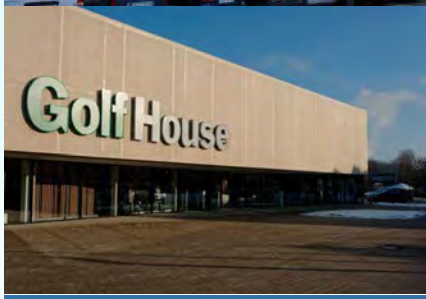
2009: textile façade frame system for nearly 20000 m²
several different frame formats.
bfl provided structural detailing and analysis

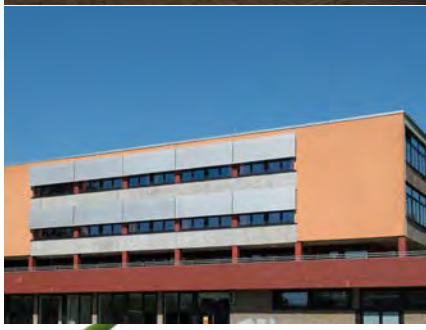


Sachsenhausen memorial place - *textile covered structure*

2004: textile façade for nearly 3200 m² PTFE-coated Glasfiber
structure is under negative airpressure inside
bfl provided structural detailing of tensioning system for supportstructure,
analysis of fabric and fabric details for airtight connections,
workshop drawings of all tensioning systems and fabric detailing, cutting pattern

Textile façades

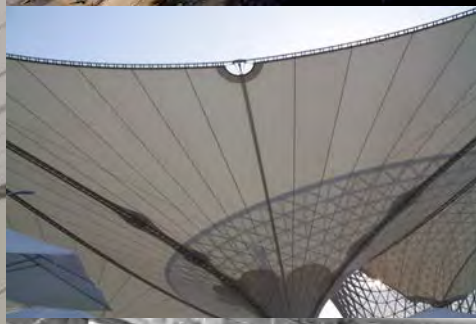




bfl provided structural engineering for textile façades
for glassfibre-PTFE fabric and for PVC-coated Polyesterfabric, developing frame systems

Shanghai - *Expo Axis*

2008 / 09: dirk richter@Knippers Helbig was responsible for conceptual design, formfinding and structural analysis of the 65000 m² glassfibre-PTFE roof for the 2010 Shanghai Expo.



Jessore - *#3 15m Umbrellas*

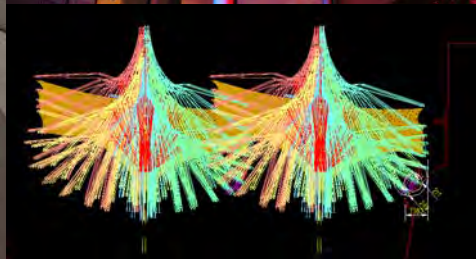
2019: bfl designed a group of three collapsible 15m umbrellas
bfl was responsible for structural design, development of kinematics and drive system, analysis, detailed 3d-CAD model, membrane engineering and cutting pattern

#9 16x16m Umbrellas for *Carthago Mobilehomes*

2013: bfl designed a modular and optional extensible membrane roof covering with ~ 2300m²
The concept was realised by 9 pcs. of similar 16 x 16 m non-collapsible umbrellas.

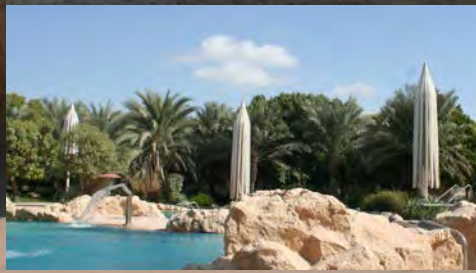
Dublin Meeting House Square - *Collapsible Umbrellas*

2011: Together with irish architect Sean Harrington / Dublin we developed a group of four collapsible umbrellas each 11.5 x 14m. bfl was responsible for structural design, development of kinematics and drive system, analysis, membrane engineering and wokshop drawings.



Abu Dhabi - *Ø 8.1 /12m Umbrellas and Trisail*

2006: bfl developed a 5 pcs. group of collapsible umbrellas and a sunsail arrangement for the sultan's family in Abu Dhabi.



Exhibition Ship - *foldable structure with 16 arcs*

2005: 475m² Teflon fabric roof on foldable steel arcs
bfl formfinding, structural concept, design + analysis, workshop design,
cutting pattern for 3 sunroofs on a 138m mega yacht.

Mega Yacht - *3 aircushion sunroofs*

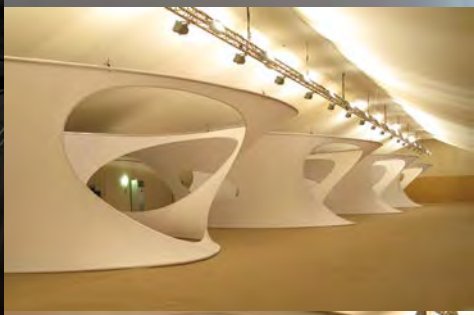
2004: bfl formfinding, structural analysis, workshop design,
cutting pattern for 3 sunroofs on a 138m mega yacht.

Mega Yacht - *sunroofs*

bfl formfinding, structural analysis, workshop design, cutting pattern

Qatar - *ATP Turnament*

2009: based on a given design and the upper and lower geometry,
bfl provided formfinding and cutting pattern



36m Waterslide - *pneumatic structure*

2017: 36m long, platform 10m high, total 13,7m high
temporary structure, anchoring with watertank balast
bfl provided structural analyis for pneumatic structure,
anchoring system and fabric details for anchoring system

Contact:

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