

**BUILD, FLY & RACE
YOUR BOAT!**

POWERED BY

V10 SC... THE SUN
V10 H2C... WATER

**SOLAR
SPORTONE**

4 QUALITY
EDUCATION



7 AFFORDABLE AND
CLEAN ENERGY



14 LIFE
BELOW WATER





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EMPOWER YOURSELF AND TAKE THE CHALLENGE

Building and racing boats fueled by renewable energy give a huge opportunity to interest youth in sustainability, technology and energy. It enables to show theory in practice and will make team members work for their goal. Teams racing fossil free powered boats are a multidisciplinary crew that loves to design, build and race to make a difference in this world.

Believe it or not, YOU can easily participate by building the V10. What do you need? A passionate team with smart thinkers, nifty builders, wise managers and a sharp pilot to win the races. This solar powered boat can be built for approx. € 12.500, - ex. VAT. Her twin sister powered by H2C costs approx. twice as much. Recent employment surveys show that more than one-third of the world market is experiencing a shortage of technical skills. Companies and educational institutes love technical students with ambition. So get on board!

You can race this year at one of the locations around the world. Find a team base, get the school involved and start building. Racing fossil free boats was a dream of Dutch first astronaut Wubbo Ockels and since 2006 we have been doing so. We empowered a lot of youth to find their career path and want to give you a head start as well.

We are all astronauts on spaceship earth. We would love to see you on the water soon!

On behalf of Stichting Solar Sport One,



Marcelien Bos- de Koning
Chief Solar Officer
Olympian



The best way
to learn is by
seeing, feeling,
talking and
doing



THE STORY OF SSO

Fossil free boat racing is for technicians, courageous ones, team players and organizational talents, who are close to Mother Earth. Our competition is only powered by the elements sun and water. The race stimulates technical innovations in shipbuilding and the energy and transportation sector. It's a proven concept for making new possibilities for our modern world and enlighten our energy footprint. Teams find new ways to make the boat faster every year by inventing new techniques.

The solar boat race is a happening mirrored from the World Solar Challenge car racing in Australia and initiated by Dutch astronaut Wubbo Ockels. He challenged technicians to make a floating version and race in a less sunny country like the Netherlands. There are many technological developments, making the fastest boats speed more than 50 km per hour! Since 2020 we put another element to the test: WATER. We challenge you to race the boat in hydrogen. The races are interesting to compete in and visit for young and old. The participants range from 11 to 80 years. The event focuses on renewable energy, technology, engineering, life-long learning and inspiring each other.

Why: We dream of a green balanced world

Team members are enthusiastic about their engineering and inventions. They love to share their stories. During Solar Stages passionate team members like to present their design, innovations and show off their special talents.

VISION

Solar Sport One is primarily a design competition to discover the world's most efficient solar or H₂C powered boat. The biennial event seeks to inspire some of the brightest young people on the planet to address the imperatives of renewable transport and energy. The event features different classes to foresee different age groups and levels.

Making the world a better place is a very broad vision. How to break this vision up in particles so we learn every day? Electrical systems around humid areas are like water and fire. Therefore boats are a challenge to build. The energy demands are staggering while the conditions on earth are out of balance due to human interference. Dare to take on our challenge and change human impact on Mother Earth.

How: By awakening the innovator and team player within

GOALS

Solar Sport One wants to organize boat racing fueled by renewable energy. And other events to stimulate innovation, to connect and inspire education and businesses and others involved to make a renewable and better society. Our goals include:

- Host an international design competition for fossil free boats
- Build a technical platform of young-minded who think beyond current horizons
- Initiate meetings for audience, local society and business to rethink their energy infrastructure

SDG'S AND SOLAR SPORT

The Sustainable Development Goals (SDGs) are the world's best plan to build a better world for people and our planet by 2030. Adopted by all United Nations Member States in 2015, the SDGs are a call for action by all countries - poor, rich and middle-income - to promote prosperity while protecting the environment. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth. And address a range of social needs including education, health, equality and job opportunities, while tackling climate change and working to preserve our oceans and forests.

What: Create a platform for young minded to build fossil free boats and leave no trace

SOLAR SPORT ONE AIMS TO HELP TO REACH 3 OF THE IN TOTAL 17 GOALS. THESE THREE GOALS ARE ABOUT EQUAL EDUCATION, MODERN ENERGY, RENEWABLE INDUSTRIALIZATION AND FOSTER INNOVATION, COMBATING CLIMATE CHANGE AND OF COURSE RENEWABLE USE OF OUR WATERS.



FULL SCOPE RACE CLASSES Knock us off our feet!

COMPETITORS

We believe that technical innovations will bring the world a better environment. However, participants can come from any background. Useful insights are not limited to technology and engineering studies. Add the best marketeers to your team for ultimate sponsorship engagement or find that smartass biologist who can inspire you with knowledge about the aerodynamics of flying fish.

The heart of the matter:
A smart and fast team needs multidisciplinary members. Join forces, share information, insights and skills and use it wisely.

THE POSSIBILITIES WITHIN FOSSIL FREE BOAT RACING ARE:

9-12 years: Mini Solar

13-14 years: RC Solar Class

14-17 years: V5 / Young Solar Challenge

18-24 years: V10 Solar and Hydrogen

18- 80 years: V20 and Open Class Solar and Hydrogen

MINI SOLAR

Teams consist of 2-4 children aged between 9-12 years. The local waste processing company provides the materials. SSO provides the solar powered engine and batteries. Online video's teach teachers and pupils how to set it up. No need for swimming diploma; the 'battle is on' in a mobile swimming pool. The festivities are commented by a speaker to raise the awareness of everybody and share the excitement of the teams with the crowd. Teams can win prizes in the categories: fastest, most innovative or most beautiful boat. This class is easy to enroll anytime and anywhere. Cost are € 40, - per kit.

RC SOLAR CLASS

The radiographic class is a class in which first and second graders (13-14 years) get acquainted with building their own solar boat. Teams design and build their own solar boat based on a number of guidelines. The remote-controlled boats must sail two different competition elements: which boat has been designed the most effectively and which boat is fastest. Starter kit is € 450, -.

More information can be found on the website

YOUNG SOLAR CHALLENGE

The Young Solar Challenge is a fantastic project for young people between 14 and 17 years old. The teams consist of a maximum of 8 students and 2 teachers. Some schools allow various classes to participate in the project in the preliminary phase, but eventually 1 group is formed for the 3 two-day competitions. A kit, worth € 1.700, - is sent to school to start the work. All together it will be around € 5.000, - to get the boat up and racing.

Check out the website of the Young Solar Challenge to start your adventure

V10 (SC AND H2C)

The V10 is designed for 18 to 24 year olds to start racing with the 'big boys'. The class is one design, has fixed rules, but some parts of the hull are open to redesign and 3D print. In this class it is possible to race powered by two elements in this world which are most important: sun and water. Affordable materials, off the shelf technology, yet state of the art racing with possibility to foil starts at approximately € 12.500, - for solar powered. Her twin sister powered by water costs approx. twice as much.

V20

This one design class makes it easy to step into the solar racing world. No precise need for maritime expertise. Yet racing like a pro. The boats are seaworthy and stable in swell. The total onboard energy storage capacity for V20-class boats is limited to 1.75 kWh (=6.3 MJ). This capacity includes the storage capacity of batteries for storing electrical energy. The participants work close together for the progress and innovations of the class.

OPEN CLASS

The boundaries of the solar class are scarce; maximum length 8 meters and maximum width 2.4 meters and maximum total onboard energy storage capacity 1.5 kWh (=5.4 MJ). Furthermore, run free and go wild. Worldwide universities compete in this class to become the best. Some teams set up an entire boat in one-year. Others reshape the design every year. This class is for the greatest adventurers. Since 2021 hydrogen boats are invited to compete alongside their solar powered versions.



Powered by
the elements
sun or water

RULES AND REGULATIONS

Visit the site to talk to fellow competitors in the forum and find the racing rules and technical regulations. See what kind of race elements you need to sail in order to strive for the championship.

Although it's a competition, fellow competitors are willing to share expertise. So, find each other and talk things through. The challenge is high so use your time and effort wisely.

SOLAR SPORT ONE

REGISTRATION INFO

Would you and your team like to compete in the Solar Sport One races? Great!

2021 Race Season:

Race 1: 26 - 29th of May - Groningen, The Netherlands

Race 2: 23 - 26th June - Purmerend / De Beemster, The Netherlands

REGISTRATION FEE

A registration fee is asked in order to participate in our races. The registration fee is for a team of maximum 6 team members, where overnight and catering is included. It is possible to order catering for more persons.

- What is included the price per race?

To be announced.

• Entering the SSO races can be done 5 days before the first race.
• You can't start without payment.
• Proof of payment is a copy of the bank statement at the info desk at race location or an agreement from the administration.
hello@solarsportone.org

THE HISTORY OF THE V10

In October 2019 we started creating a new class together with a group of (previous) competitors and solar boat racing spin-off start-ups. The V10 is designed for 18 to 24 year olds to sail boats on renewable energy. Affordable materials, off the shelf technology, yet state of the art racing is what makes this new kid on the block challenging.

The V10 is the future that you can be a part of

Education and especially technical education asked to build a bridge between the different classes so level and cost would fit better. As markets move fast nowadays and especially in the energy sector, a twin sister came into play.

So, starting in 2021 we present H2C next to SC! Choose wisely according to your level of schooling and support team around you. This class captures and turns your wildest fantasies into reality.



SSO V10 SOLAR CLASS - SC

Sun is the first power to grow life

The global solar energy market was valued at \$52.5 billion in 2018 and is believed to reach \$223.3 billion by 2026! Knowing this who still thinks solar energy is less challenging? There's a world of information to be found, data to be processed and upscaling to do. An industrial solar system is by far using it's potential. You can actively help reduce our footprint while racing at your best. How will it look when you drive a V10 powered by the sun? Read on the following pages some fun facts of the boat.

SPECIFICATIONS V10-SC (SOLAR CLASS)

Age: 18-24 years

Pilot: 1 male + 1 female

Length: 5,00 meter

Beam: 1,67 meter

Draft: 0,13 meter

Weight: Circa 150 kilo

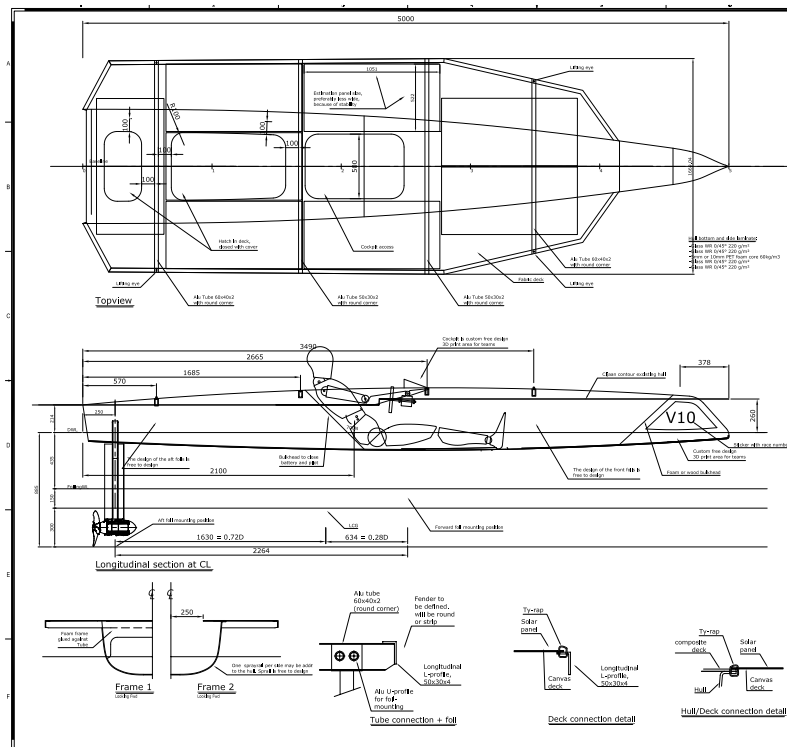
Engine Power: +/- 4 kW

Maximum speed: 25 km / hour

Solar Panel area: < 5 m²

Battery: LiFoPO, 60 Ah

Operation Modus: Displacement and foiling



The design of the front foils is free to design

Foam or wood bulkhead

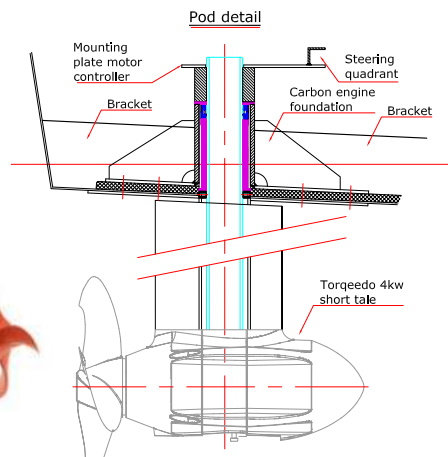
FREE DESIGN ZONES FOR V10 SC (SIMILAR AS V10 H2C)

- Hydrofoils
- Spray rails on hull
- Cockpit
- Bow of the hull
- Electronic component connections

INTENDED SYSTEM COMPONENTS

Drive system

- Selected label: Torqeedo 4kW pod.
- Standard component.
- Built-in controller with throttle



Solar panel:
solbianSX serie



Battery

- Selected label: Spike 12S21P (Spike 21)*
- 50.4V rated voltage, 60Ah capacity, 3 kWh
- Weight 16.7 kg
- * integrated BMS (battery management system)



Built-in controller
with throttle

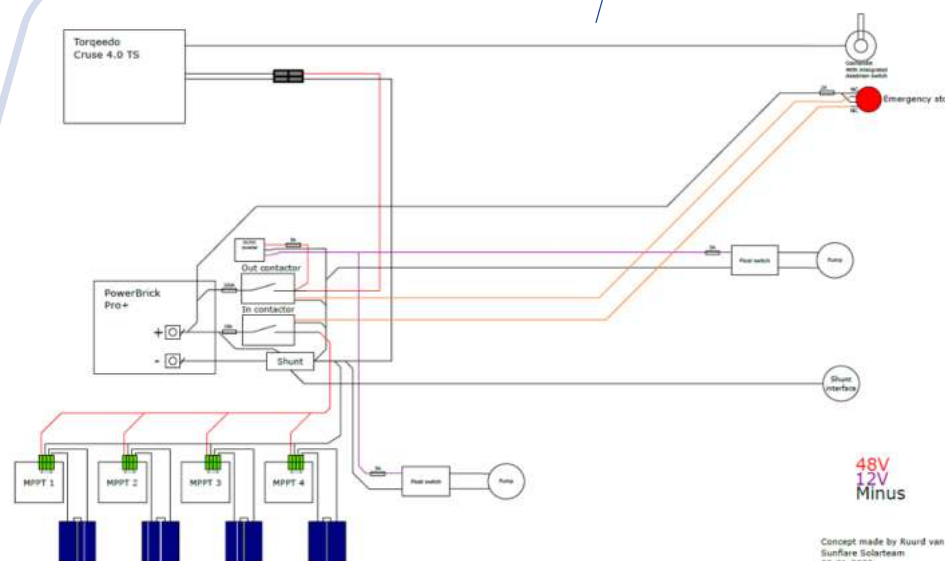


MPPT: Victron Smart Solar
100/20-48V



Cable engine
to battery

Electric scheme:



48V
12V
Minus

Concept made by Ruud van Buiten
Sunflare Solarteam
09-01-2020



WHY

Why choose solar power?

You'll learn from the experience of the passed SSO years and contribute to the further development of solar panels. It's advised to find a strategic mastermind within your team as weather conditions affect the boats performance. You'll race in a highly competitive and experience field of competitors. Your innovative ideas can be part of the future of renewable energy solutions and boost the SDG's.

As a starter kit you need a medium budget and medium knowledge level. We'll support you on the way and put you in contact with progressive companies and brainy students.

VTO SC

SSO V10 HYDROGEN CLASS - H2C

Unfortunately, in the Netherlands we can't rely on sunshine throughout the year. Therefore, hydrogen is the future of energy. Industry and knowledge centers are working around the clock to make this pure and green energy form available to the hungry energy industry. A world of the unknown is yet to be discovered. What will it look like when you drive a V10 powered by hydrogen? Read on the following pages some fun facts about the boat.

A world of the unknown is yet to be discovered

SPECIFICATIONS V10 - H2C (HYDROGEN CLASS)

Age: 18-24 years

Pilot: 1 male + 1 female

Length: 5,00 meter

Beam: 1,67 meter

Draft: 0,13 meter

Weight: Circa 180 kilo

Engine Power: +/- 4 kW

Maximum speed: 25 km / hour

Hydrogen: 424 gram

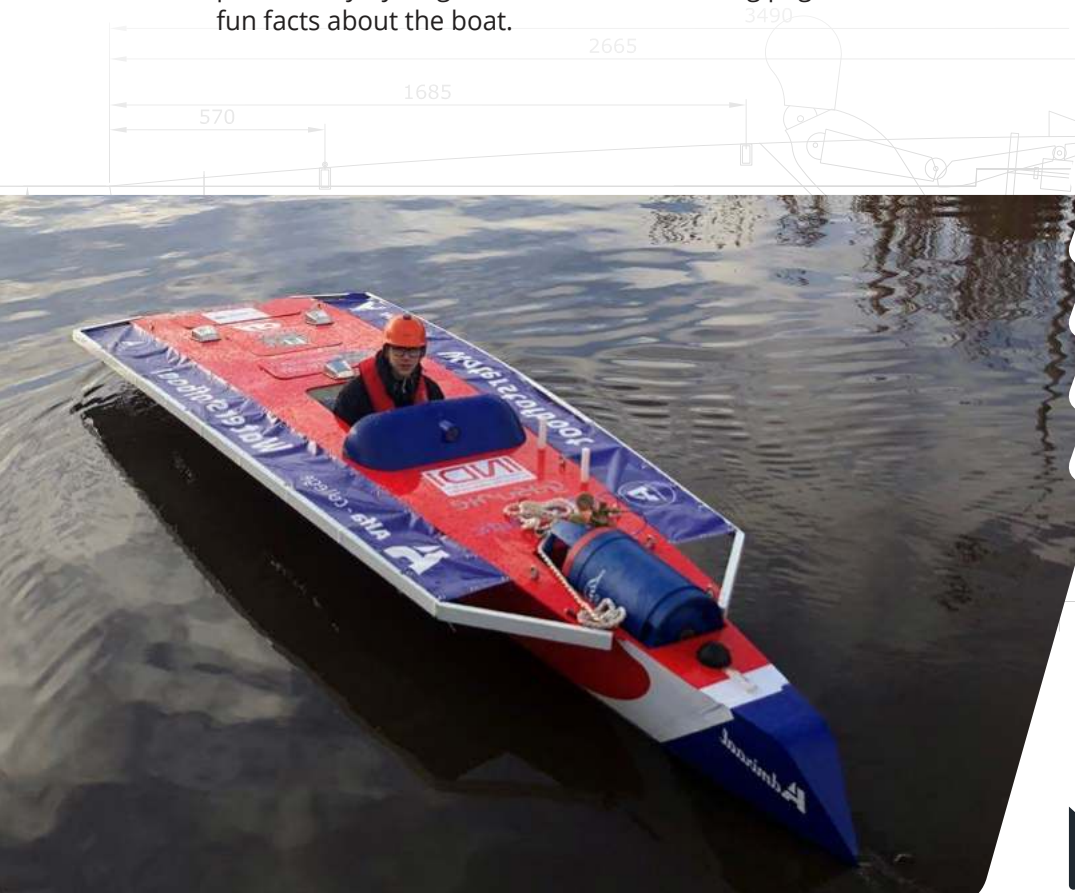
Battery: LiFoPO, 60 Ah

Fuel Cell: 1KW Operation Modus: Displacement and foiling

Forward foil mounting position

FREE DESIGN ZONES (SIMILAR AS V10 - SC)

- Hydrofoils
- Spray rails on hull
- Cockpit
- Bow of the hull
- Electronic component connections



INTENDED SYSTEM COMPONENTS

DRIVE

- Selected label: Torqeedo 4kW pod.
- Standard component.
- Built-in controller with throttle



HYDROGEN STORAGE

- Selected label: The Linde GENIE® hydrogen tank. This tank accommodates 300 bar pressure and is filled with 424-gram hydrogen. This corresponds to circa 7kWh electric power.
- A team rent tanks at Linde for circa € 200, -- a year. A refill of the tank costs € 50, --.
- Alternative storages are available but be aware that the level of delivery certainty is low(er).



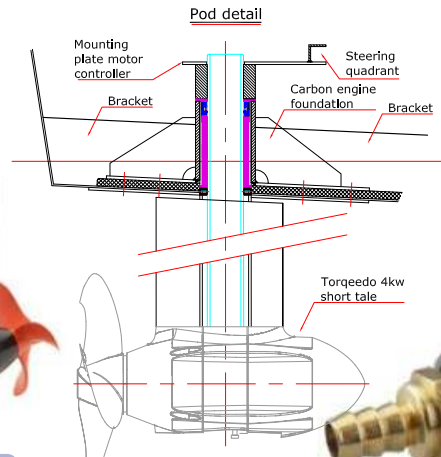
BATTERY

- Selected label: Spike 12S21P (Spike 21)
- 50,4V rated voltage, 60Ah capacity, 3 kWh
- Weight 16.7 kg



FUEL CELLS

- Fuel cells convert hydrogen into electricity.
- Selected label: Intelligent Energy type FCM 801
- This system, including a DCDC converter, can directly be connected to the battery. It converts hydrogen into electricity. The system is air cooled.
- Suitable for the selected battery label.



SOLENOID VALVE

- In the event of spillage of hydrogen or a shutdown of the system the solenoid valve blocks the hydrogen supply



PIPEWORK

- Selected label: Swagelok Flexible. This pipework is suitable for the intended use and pressures (bars).
- The pipework is fitted with standard couplings which reduces the chance of incorrect assembly and consequently spillage of hydrogen.
- A great opportunity for students to gain extracurricular futureproof skills.



PRESSURE REDUCING VALVE

- Selected label: Linde Redline C300. Single-stage 300 bar > 0,2-2 bar.
- Mounted directly to the tank.
- When an alternative storage tank is selected by the team a matching pressure reducing valve is a must.



VACUUM RELIEF VALVE

- In the event of failure of the pressure reducing valve the system pressures may never exceed. In these unfortunate events the vacuum relief valve operates as an emergency exit, so the other components won't be negatively affected.

LEAK DETECTION

- Selected label: Hatech JL269
- Install at least one leak detector to prevent seeing your hard work disappear beneath the water surface and exploring the underwater world.



HYDROGEN DETECTION

- Install at least one hydrogen detection sensor in the area where hydrogen is present. This sensor must be mounted at the highest point in this area.
- Connect the sensor to a controller which activates the solenoid valve in case of spillage. In this way you create a safe stand-alone system for the detection of faults and consequently the shutdown of the system.



WHY

Why choose hydrogen power?

As stated, there is a world to discover. Hydrogen power is the new kid on the block which makes it exciting to work with. What knowledge is already there and what progress can be expected? Show us this thrilling game in live performance. We're looking forward to a mouth-watering finale come rain or shine!

As a starter kit you need a higher budget and higher knowledge level. We'll support you on the way and put you in contact with like-minded people who strive to make hydrogen the power of the future.



VT HRC

PRICE BREAKDOWN OF THE V10

	DESCRIPTION	SSO V10 - SOLAR	SSO V10 - HYDROGEN	REMARK
1	Licence Costs Support SSO Team	€1.000 €500	€1.000 €500	Registration and organisation fee
2	Hull, Deck and Flange Structure	€4.350	€4.350	To be purchased via Polynautic
3	Pod Torqeedo 1kW en accu LiFoPO Battery	€1.975 €1.077	€1.975 €1.077	To be purchased via Stille Boot
4	Solar panels 5M2 Fuel cell 1kW	€2.000	€8.100	Supplier list can be supplied
5	Electrical systems and pipework Pipework, valves and detection Storage tank Hydrogen	€455	€250 €2.300 €250	Supplier list can be supplied
6	Small finishing materials	€1.000	€1.000	Water sports shop
7	Safety equipment	€200	€200	Water sports shop
TOTAL EXCLUDING VAT APPROX.		€12.500	€21.000	

ADDITIONAL COSTS...

- Design Bow and 3D printing
- Design and build Sprayrails
- Design and build Hydro Foils
- Transport trailer
- Cover for transport
- Customising of the boat

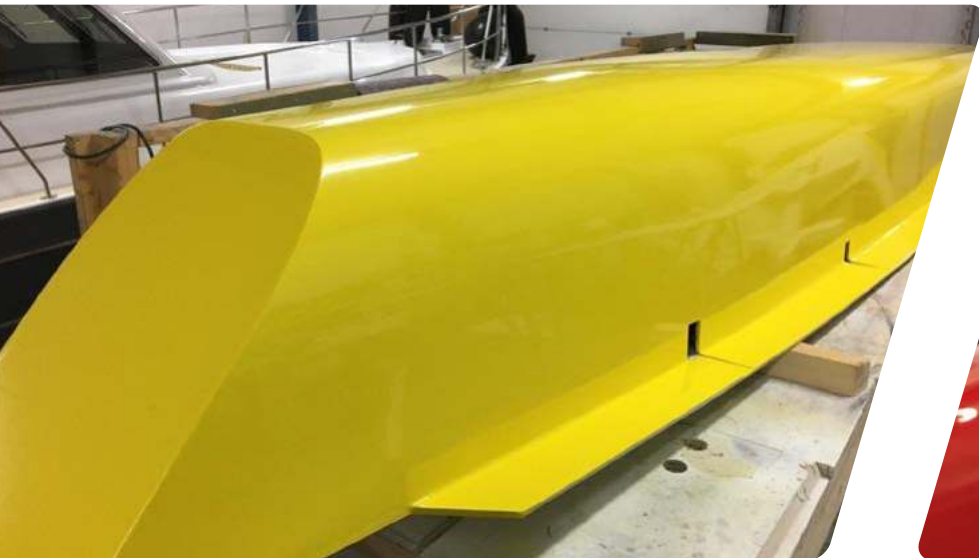
TO WORK...



CONSTRUCTION PACKAGE

SSO V10 - SC

- Casco hull (bow not included) including aluminium profiles and motor foundation
- Deck cover
- Pod, standard Torqeedo 4kw
- Pod foundation, mounted in the casco
- 5m2 Solar panels 'Stille Boot'+ MPPT's
- Battery (48V)
- Steering quadrant to be assembled to the pod



SSO V10 - H2C



- Casco hull (bow not included) inclusive aluminium profiles and motor foundation
- Deck cover
- Pod, standard Torqeedo 4kw
- Pod foundation, mounted in the casco
- Hydrogen system
- Battery (48V)
- Quadrant to be assembled to the pod

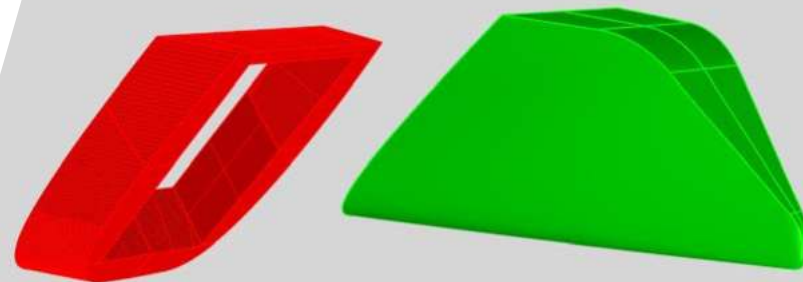
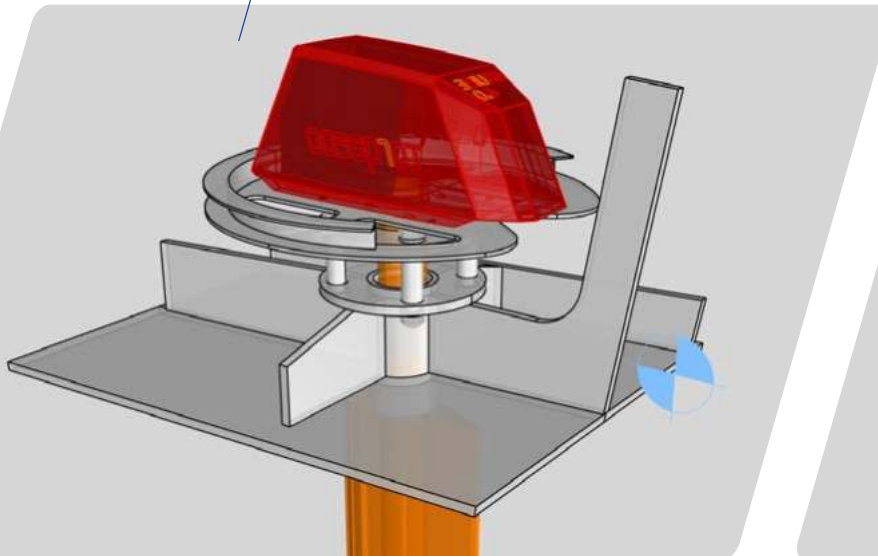
BUILDING INSTRUCTIONS

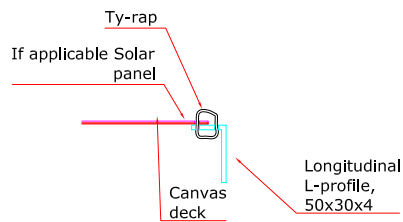
Teams receive the following teaching aids through the digital highway:

- 3d model of the bow.
This part must be designed and 3D-printed by the team itself.
- Construction drawings
- Technical schematics
- Technical specifications of the components

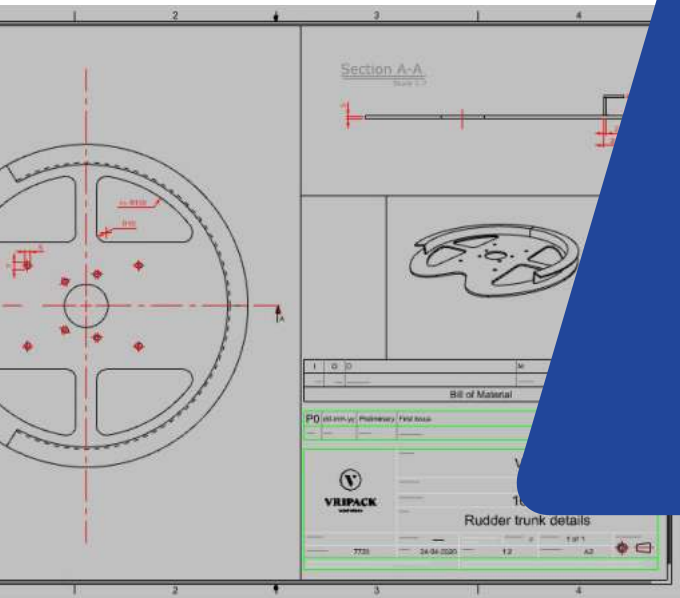
On the basis of the components above and the drawings teams kick it off by:

- Going through the complete dossier of technical regulations!!!



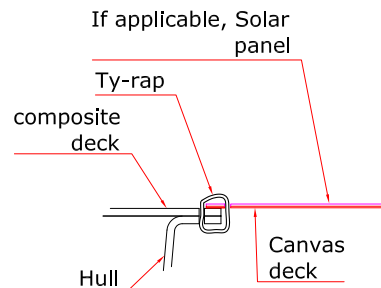


Deck connection detail

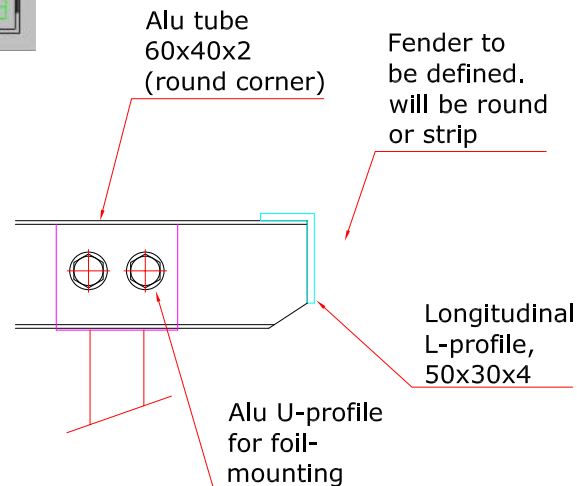


THE ROADMAP

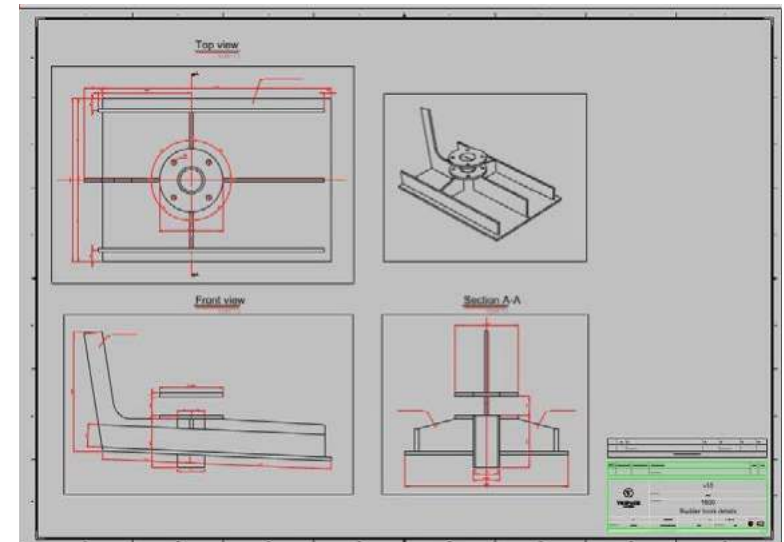
- Study construction drawings and drawing of the centre of gravity of the boat
- Install the pod in the foundation
- Assemble the quadrant on the pod
- Design and build your steering system on your own terms. Be creative and innovative!
- Design your electro system based on the provided electro plans
- Assemble the components
- Design telemetry to be able to read data of the boat through a wireless device
- Assemble the transport cover on the aluminium deck carriers
- Mount the boat fender to prevent damage on your boat
- Assemble the power system of your choice: solar or hydrogen
- Design your own 3D drawings of your hydrodynamic bow
- Produce this component by a method of your choice. For example 3D printing.
- Design and assemble your own spray rails in a way it affects the performance of the boat in the best possible way
- Design, produce and assemble hydro foils
- Design a trailer for your boat for road transport
- Arrange or design and produce a protective cover for your boat during transport
- Customize your boat. Fit it with a fancy color or a bold custom wrap. Don't forget to mention your sponsors in your design and make sure their logos are visible during a race
- Arrange and install safety equipment: a fire extinguisher, life jacket, paddle et cetera.



Hull/Deck connection detail




Tube connection + foil



No competition, no progress. Let's go V10!

Visit our website for the latest info:

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- **What is included the price per race?**

To be announced.

AA solarsportone.org

SOLAR SPORT ONE

REGISTRATION INFO

Would you and your team like to compete in the Solar Sport One races? Great!

2021 Race Season:

Race 1: 26 - 29th of May - Groningen, The Netherlands

Race 2: 23 - 26th June - Purmerend / De Beemster, The Netherlands



SIGN ME UP!



Awesome! You decided to join and have found a team. Let's get to it! Visit our Facebook and Instagram to see how other teams have worked it out. Some have set up their workspace in the basement of their school and others built a hangout, study, innovate workstation at a local company. Whatever works for you but let's get going! And remember: the journey is just as important as the end goal! We are looking forward to meeting you on the water.

Check out our social media and website for the latest updates. The racing season starts in May.

I want to be a
game changer
and offer
Mother Earth
a helping hand



COLOPHON

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