

Vitorlakészítés állomásai

Előadó: Kelemen Tamás

Vitorlatervező Hunsails

Mi a Vitorla?

- A hajó különböző anyagok felhasználásával készített térbe szabott vagy épített része, amely a rigg segítségével lekövetíti a hajóra a rajta kialakuló szél által keltett levegőáramlásból kialakuló erőt.
- Szél a légkör (levegő) áramlása. A hőmérséklet és a terep változatossága nyomán létrejött nyomáskülönbség kiegyenlítődése. Sok dolog befolyásolja: domborzat, földforgás, páratartalom stb. Fő jellemzője a sebessége és az iránya.
- A vitorla által rigg és a hajó uszonyai segítségével előre hajtó erőt nyerünk.
- Rigg: a hajó rudazata és azok tartozékai.
- Uszony: a hajó vízalatti tartozékai, melyek a hull-on (hajótest) rögzülnek, a hajó előrehaladásában illetve irányításában van szerepe. Ezek a svert (centerboard, daggerboard) tőkésúly, kormány, stb.

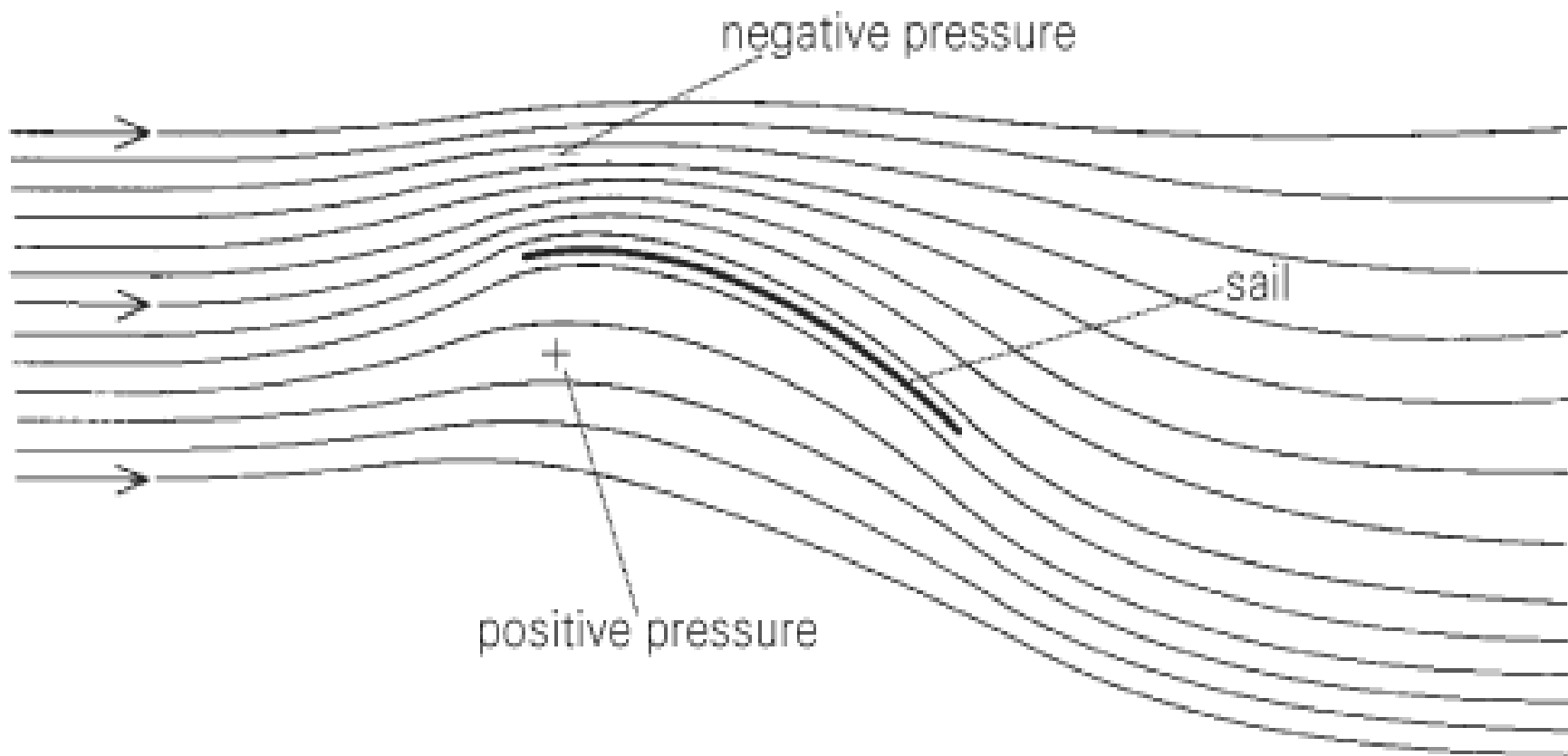
Szerepe, összefüggései a hajózásunkban

- A vitorla hajtja a hajót
- Kezelése, állítása (trimmelése) nagyon összetett feladat. Elméleti és fizikális felkészültséget igényel.
- A környezet (szélirány, szélerő, hullámozás) folyamatosan változik, a taktikai versenyhelyzet is folyamatosan változik, ezeket a változásokat késedelem nélkül azonnal le kell követnünk, ami nagyfokú koncentrációt és kondicionális igénybevételt jelent .
- A vitorlakezelést **tudatosan** elméletileg felkészülten kell végrehajtanunk, hogy a legideálisabb, leghatékonyabb eredményt érjük el.
- Tehát tudnunk kell mit miért csinálunk, meg kell tanulnunk a látható, kiszámolható és érezhető jeleket egységes átgondolt vitorlaállítással megválaszolni.
- A vitorlaállítást be kell illeszteni a versenyzésünkbe, hajó vezetésünkbe, hogy összességében a **lehető legjobb sebességet, legideálisabb haladási irányt érjük el.**
- A vitorla a hajó egy része a többi eszközzel összhangban kell használnunk.

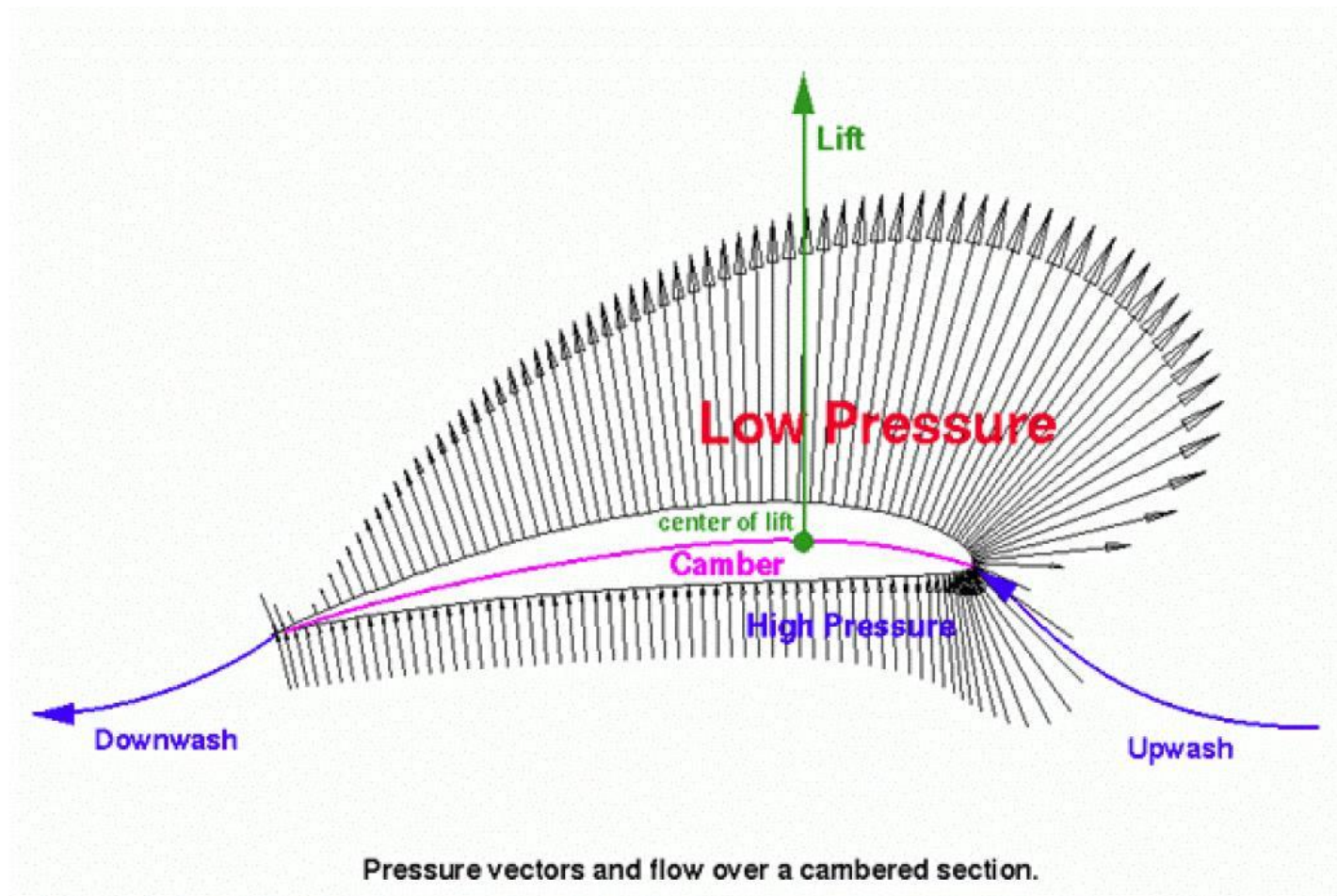
Vitorla működése rajta ébredő erők

- Kialakuló áramlás
- Nyomáskülönbség
- Vitorlán ébredő erők iránya, vektorok
- Látszólagos szél:
iránya (apparent wind angle, AWA)
sebessége (apparent wind speed, AWS)
- Twist (csavarodás)
- Heel (dőlés)

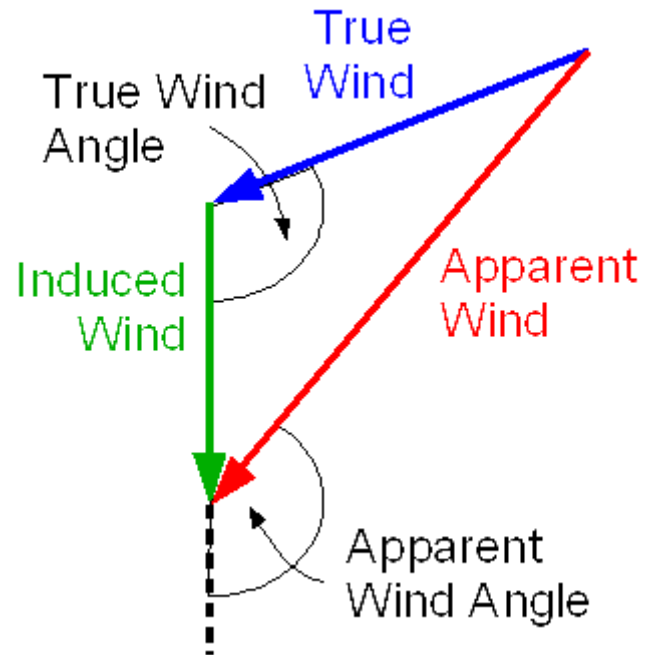
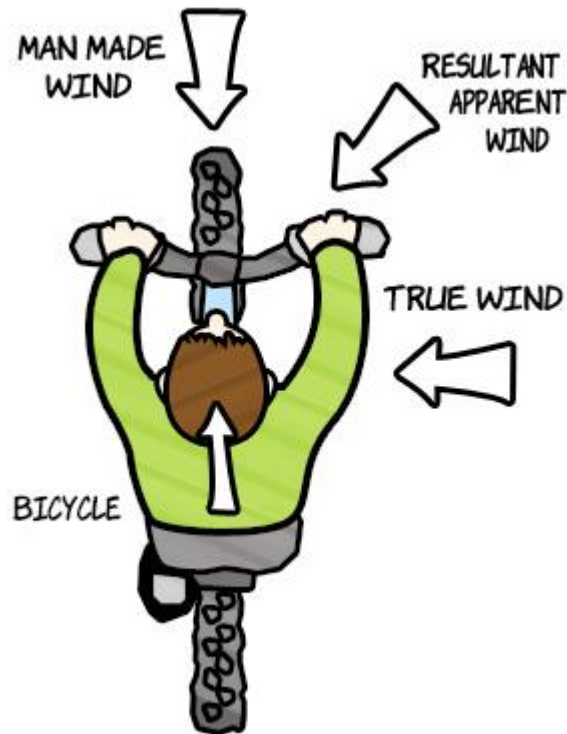
Nyomáskülönbség



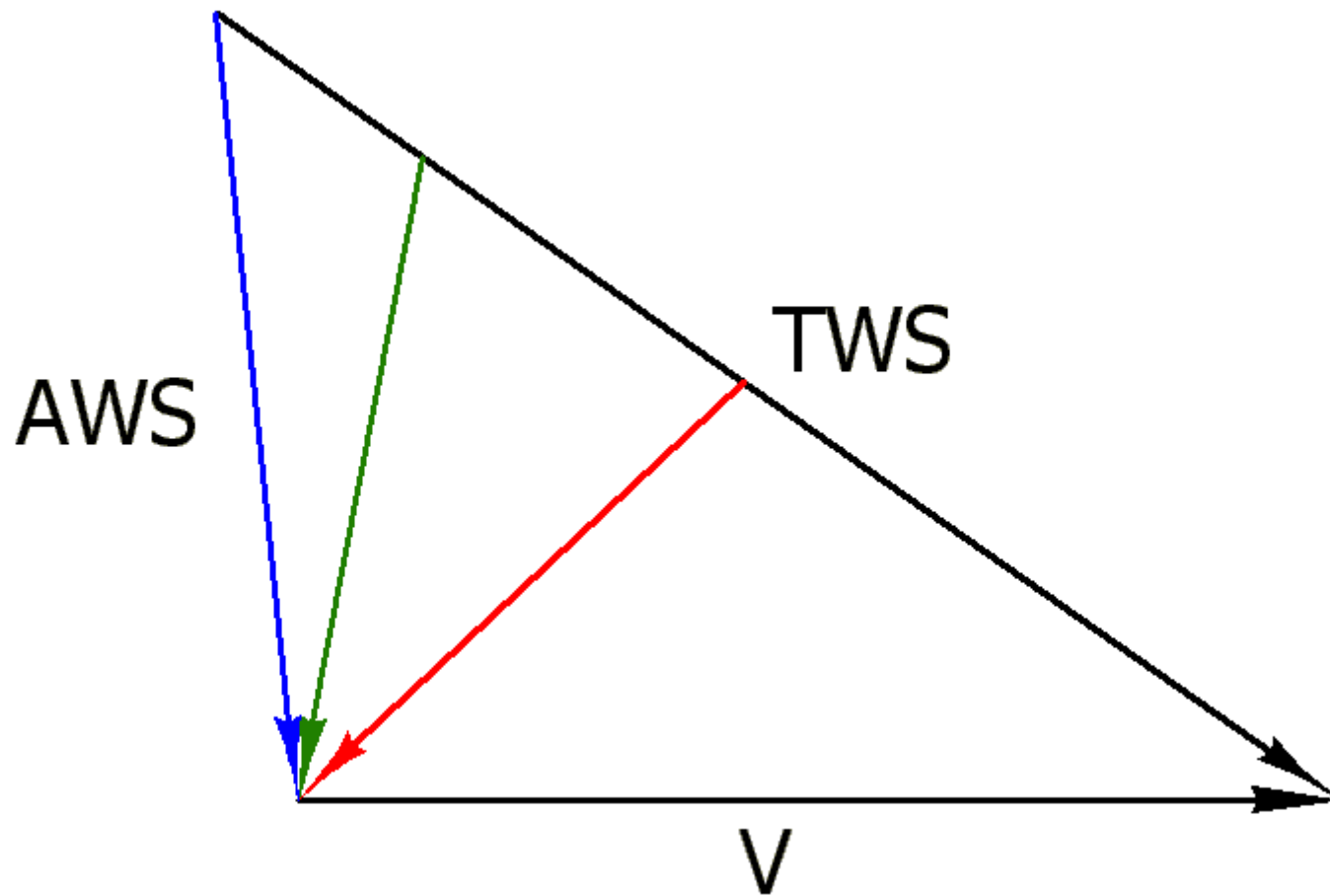
Vitorlán ébredő erők iránya

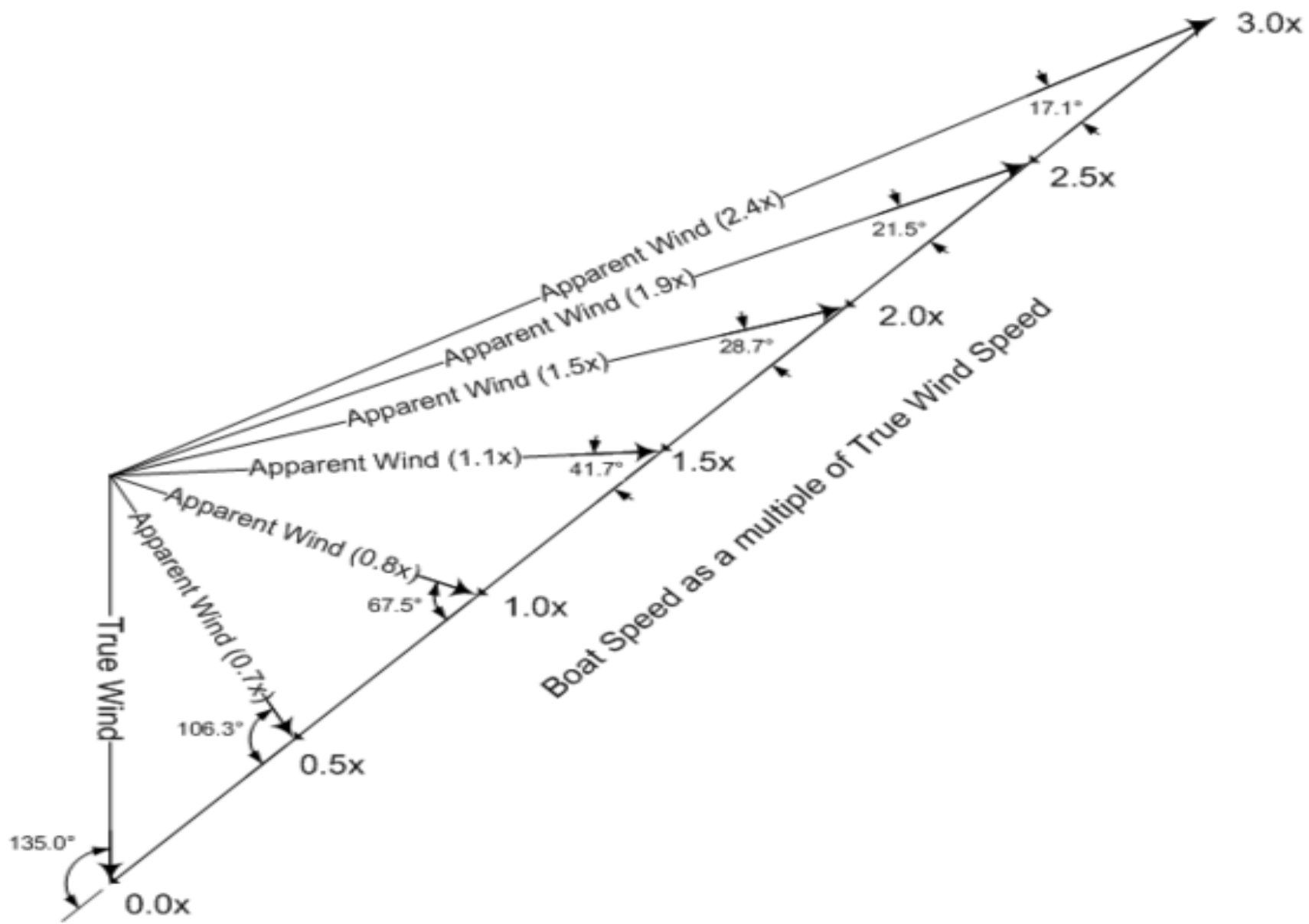


Látszólgos szél irány AWA (Apparent Wind Angle)

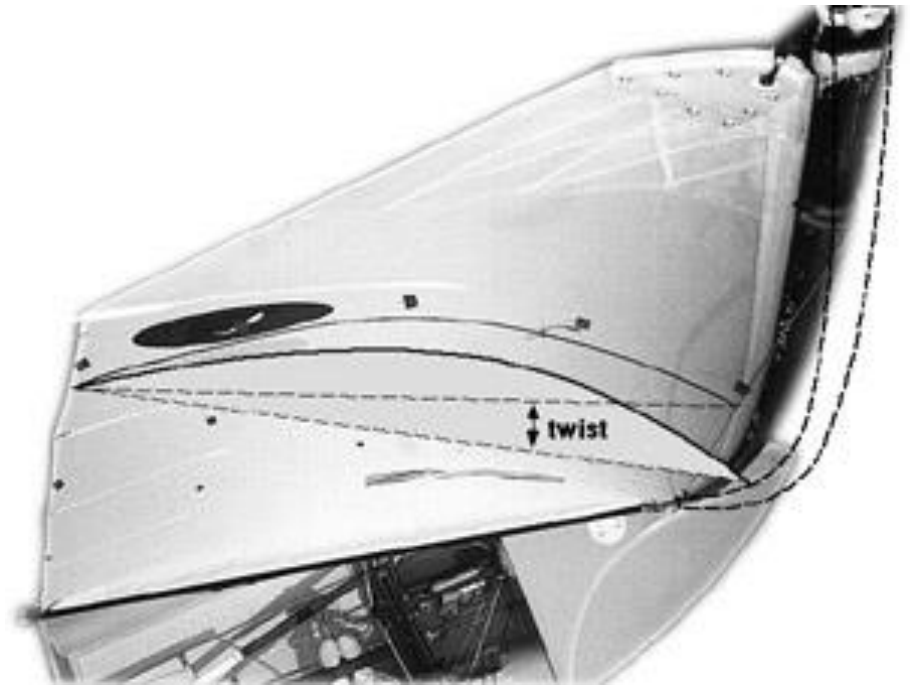


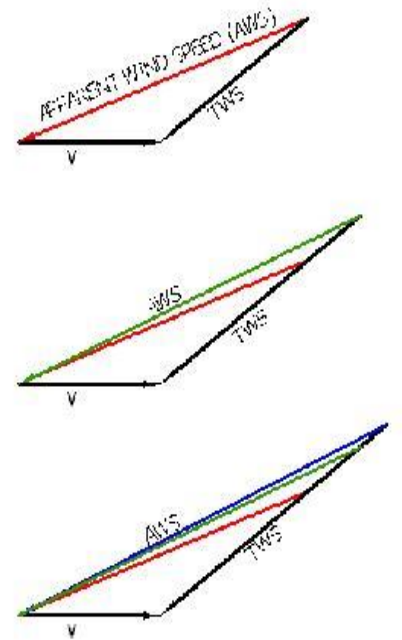
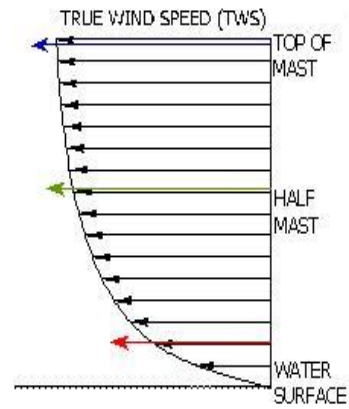
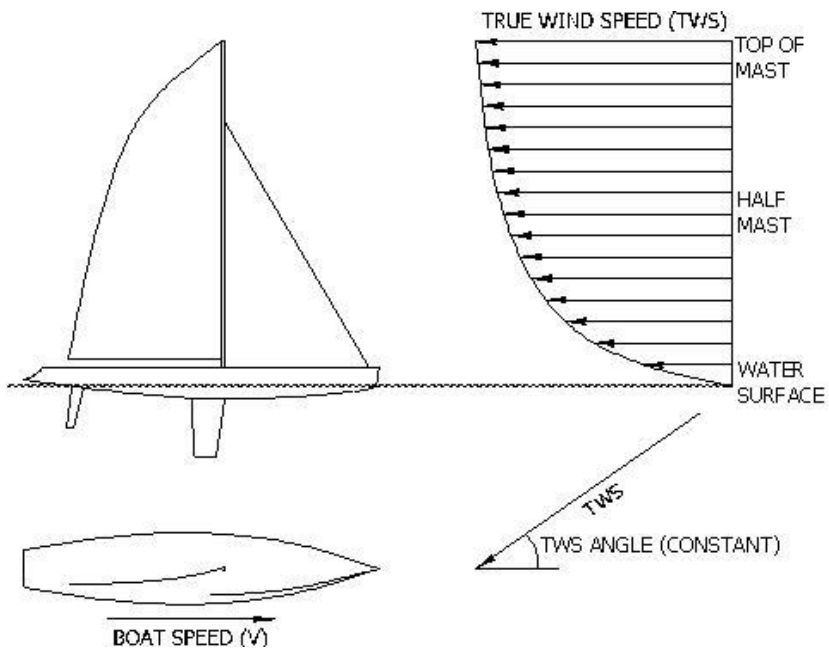
Látzólagos szél sebesség AWS (Apparent Wind Speed)

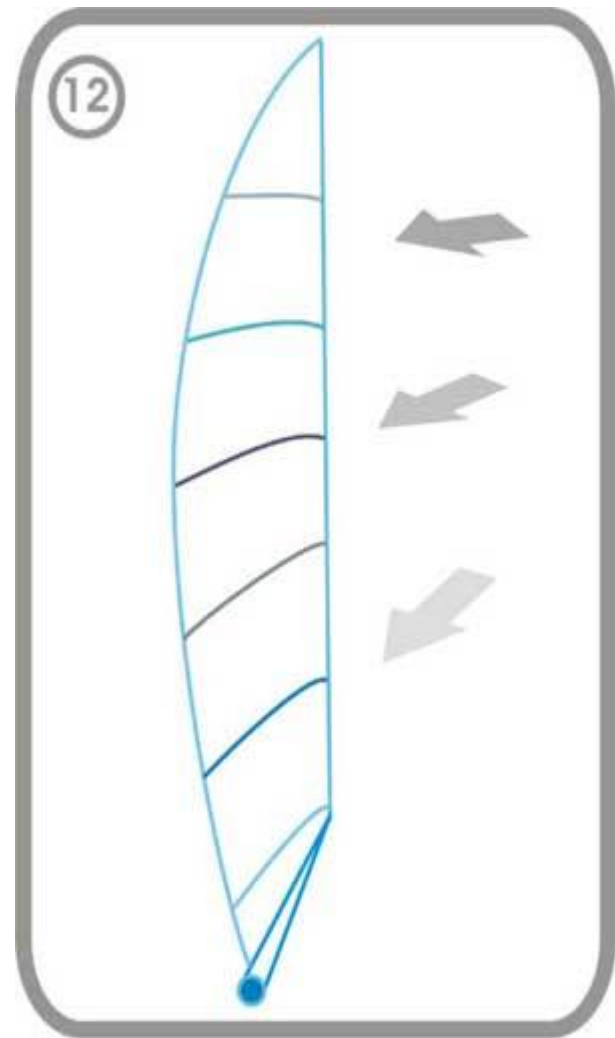
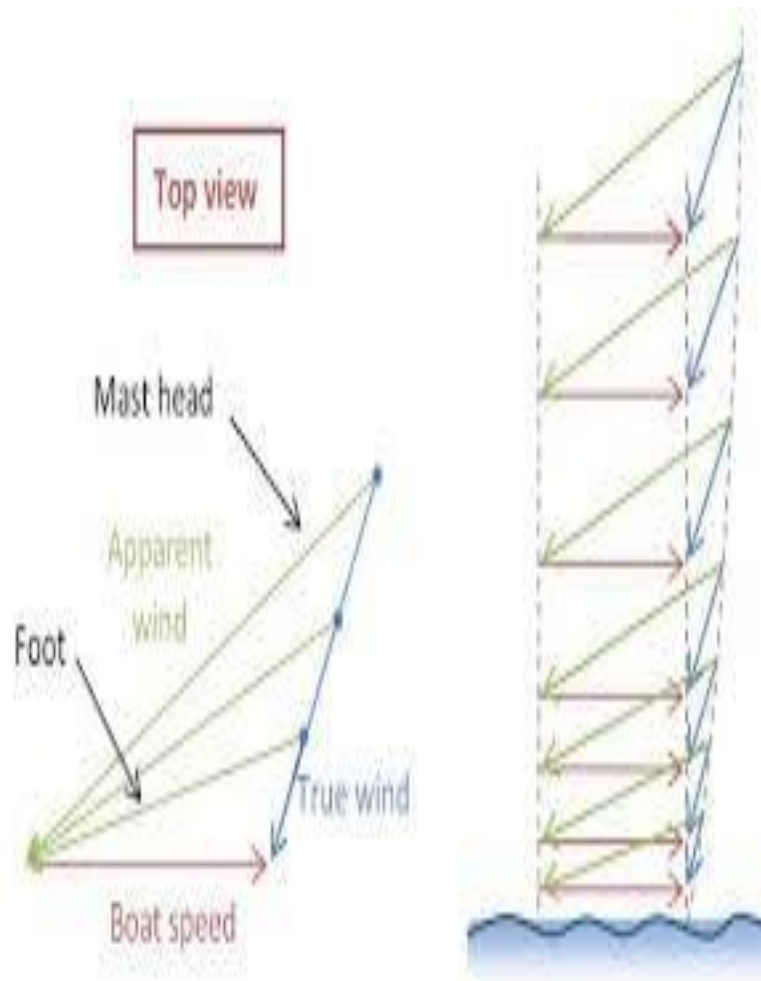




Twist





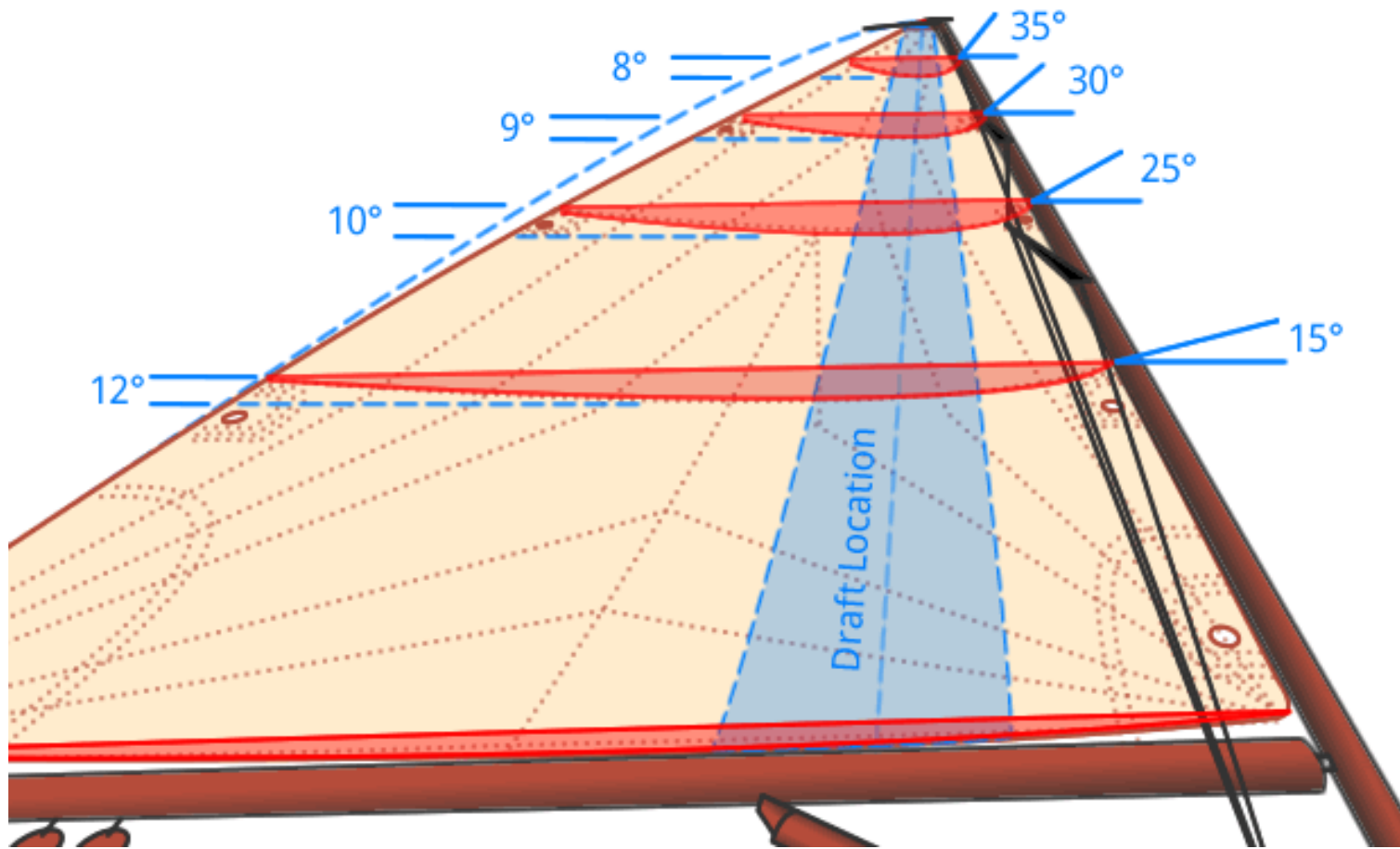


Heel



Vitorla karakterisztikáját meghatározó tényezők

- Hasmélység, CAMBER
- Has helyzete, DRAFT
- Vitorla nyitottsága, csavarodása a TWIST
- Belépő szög
- Kilépő szög



Vitorla készítés fázisai

- Vitorla szükséglet realizálása a hajón
- Kívánt vitorla kiválasztása, koncepció kialakítása
- Vitorla rendelés: kategória, tartalom
- Felmérés
- Tervezés
- Szabás
- Öszeállítás: varrás, ragasztás
- Szükséges statikai részek felrakása
- Szükséges szerelvények, funkcionális alkatrészek felrakása
- Rendelt kiegészítők legyártása, felrakása
- Kézi finishelés
- Műszaki ellenőrzés
- Csomgolás
- Átadás

Vitorla szükséglet

- Miért akarunk új vitorlát?
- Mit várunk tőle?
- Melyik vitorlára, vitorlákra lenne pontosan szükségünk?
- Kitől rendeljük
- Kapcsolat a céggel, tervezővel, hajóosztály specialistával

Vitorla kiválasztása, koncepció

- Vitorlafajták, megnevezések
- Hajónk tulajdonságai
- Mire akarjuk használni
- Versenyzőnk képessége

Napjaink vitorláinak fajtái

Normál (hagyományos) „puha” vitorla

- Nagyvitorla: Gaffos, Roll, Latnis, Átmenő latnis, Teli latnis, Sqere top (fat head),
- Orrvitorla: Fock, Genoa, Drifter (top genoa, Reacher) Code 0 (70% smw alatt)
- Bőszeles vitorlák: Spinnaker, Gennaker (assymetrical spinnaker), Code 0 (70% smw fölött)
- Cableless vitorlák

Szárny (wing) vitorla

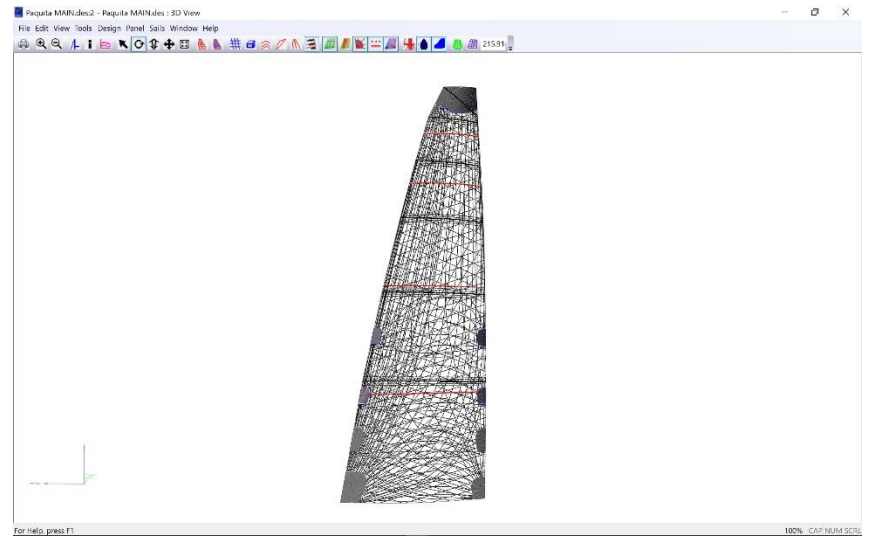
- Kemény (hard) wing
- Lágú, puha (soft) wing
- Ezeket kombinálják az orr és bőszeles vitorlákkal

Nagyvitorla

Normal



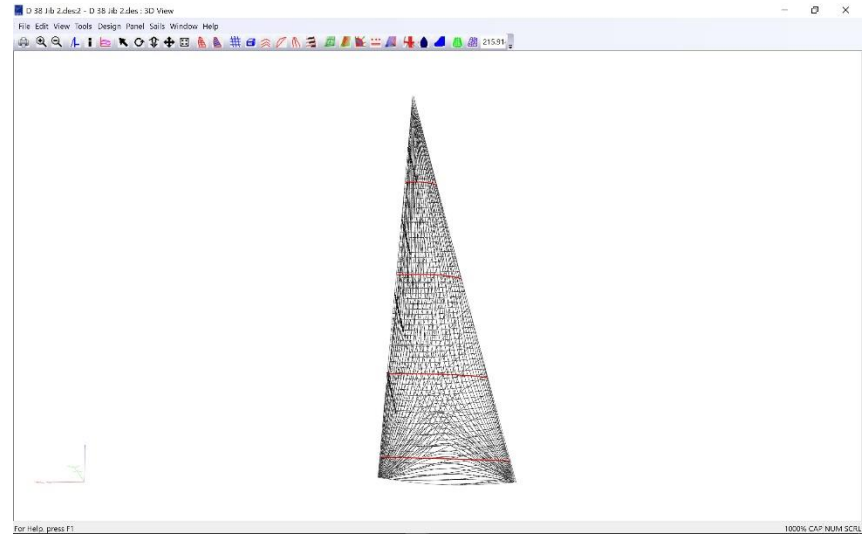
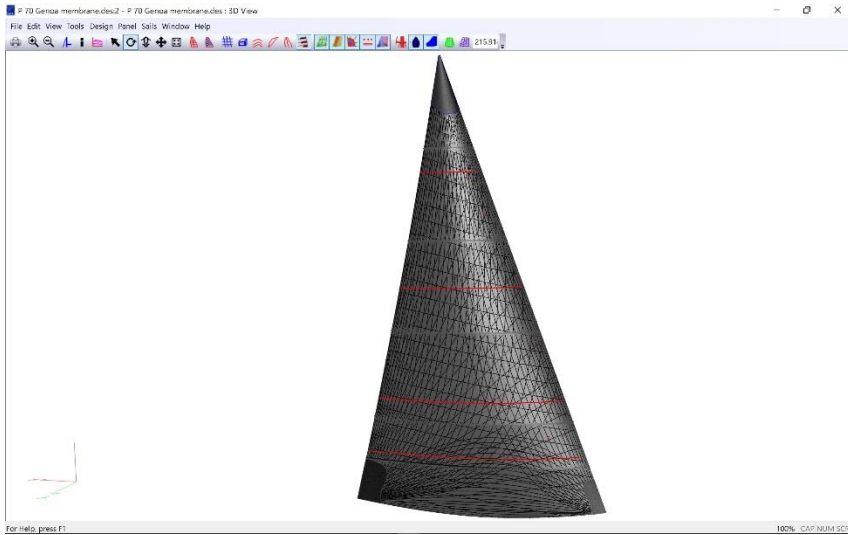
Squere Top



Orrvitorla

Genoa LP>100%

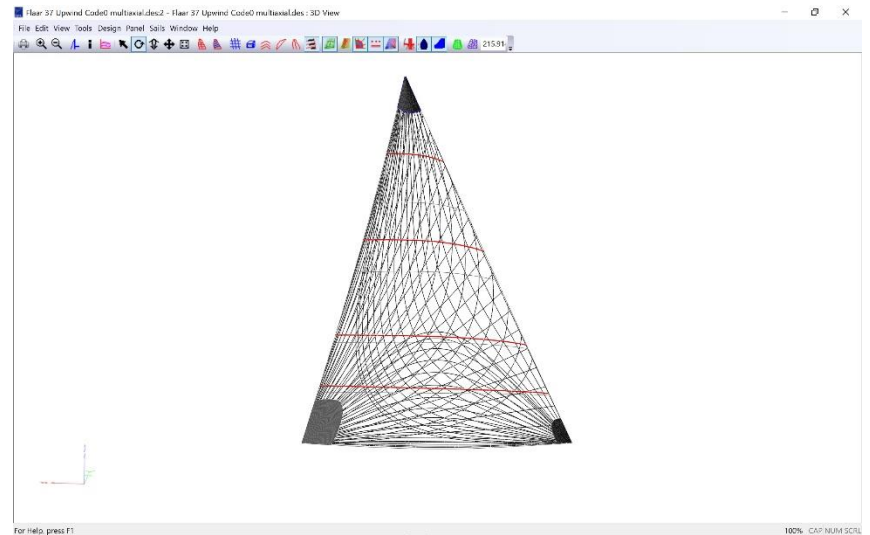
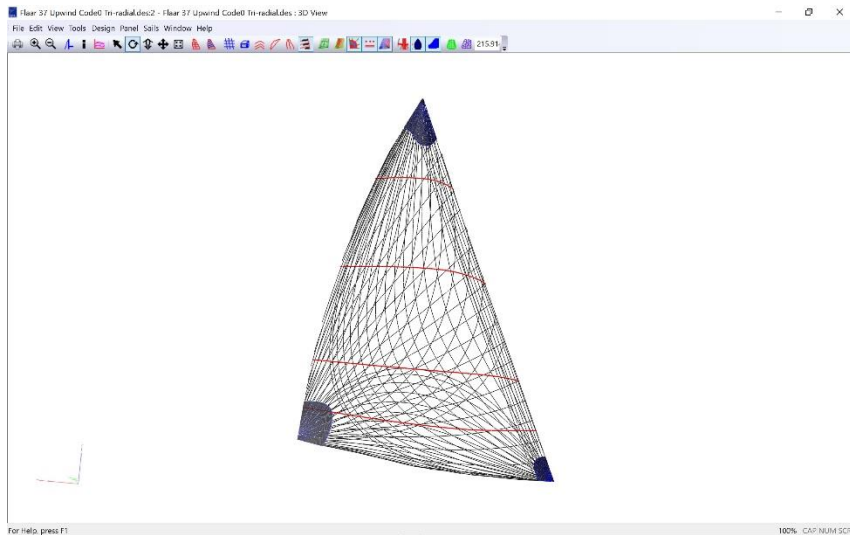
Fock LP<100%



Code 0

Code 0

Top Genoa Code 0/drifter



Bőszeles vitorlák

Spinnaker (symetric)



CODE ZERO
LIGHT AIR
REACHING

S1
LIGHT AIR
REACHING

S2
LIGHT AIR
RUNNING

S3
MEDIUM AIR
REACHING

S4
MEDIUM/HEAVY
RUNNING

S5
HEAVY AIR
SPINNAKER

Description:
Light Air asymmetrical reaching sail that meets the minimum definition of a spinnaker. While it is a very small spinnaker, it is nearly three times the size of a light No. 1 on a boat with non-overlapping genoas.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
45 - 70 degrees

Materials:
Light laminate or 1.5 ounce nylon

Description:
Light Air Reaching Symmetrical Spinnaker. In the past would have been called a VMG spinnaker. Used in winds too light to sail deeper than 110 degrees AWA.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
70 - 110 degrees

Materials:
.5 ounce nylon

Description:
Light Air Running Symmetrical Spinnaker. Full shape with big shoulders designed to rotate to windward at deep angles.

Apparent Wind Speed:
6 - 18 kts

Apparent Wind Angle:
110 - 170 degrees

Materials:
.6 to .75 ounce nylon

Description:
Medium Air Reaching Symmetrical Spinnaker. Wider and deeper shape than the S1, yet narrower and flatter than S2 and S4.

Apparent Wind Speed:
10 - 20 kts

Apparent Wind Angle:
70 - 130 degrees

Materials:
.9 to 1.5 ounce nylon

Description:
Medium/Heavy Running Symmetrical Spinnaker. Smaller shoulders than S2, yet still designed to rotate to windward of the headstay at deeper angles.

Apparent Wind Speed:
14 - 30 kts

Apparent Wind Angle:
110 - 170 degrees

Materials:
.9 to 1.5 ounce nylon

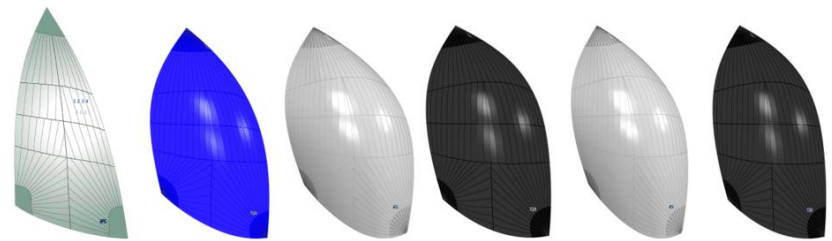
Description:
Heavy Air Reaching Asymmetrical Spinnaker. Short on the hoist, or flown from the hounds instead of the masthead on a fractional rig.

Apparent Wind Speed:
20 - 35 kts

Apparent Wind Angle:
90 - 170 degrees

Materials:
1.5 to 2.2 ounce nylon

Gennaker (asymetric)



CODE ZERO
LIGHT AIR
REACHING

A1
LIGHT AIR
REACHING

A2
LIGHT AIR
RUNNING

A3
MEDIUM AIR
REACHING

A4
MEDIUM/HEAVY
RUNNING

A5
HEAVY AIR
SPINNAKER

Description:
Light Air asymmetrical reaching sail that meets the minimum definition of a spinnaker. While it is a very small spinnaker, it is nearly three times the size of a light No. 1 on a boat with non-overlapping genoas.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
45 - 70 degrees

Materials:
Light laminate or 1.5 ounce nylon

Description:
Light Air Reaching Asymmetrical. In the past would have been called a VMG spinnaker. Used in winds too light to sail deeper than 110 degrees AWA.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
70 - 110 degrees

Materials:
Half ounce nylon

Description:
Light Air Running Asymmetrical. Full shape with big shoulders designed to rotate to windward of the headstay at deep angles.

Apparent Wind Speed:
8 - 18 kts

Apparent Wind Angle:
105 - 155 degrees

Materials:
.6 to .75 ounce nylon

Description:
Medium Air Reaching Asymmetrical. Wider and deeper shape than the A1, yet narrower and flatter than A2 and A4.

Apparent Wind Speed:
10 - 20 kts

Apparent Wind Angle:
75 - 130 degrees

Materials:
.9 to 1.5 ounce nylon

Description:
Medium/Heavy Asymmetrical Runner. Smaller shoulders than A2, yet still designed to rotate to windward of the headstay at deeper angles.

Apparent Wind Speed:
14 - 30 kts

Apparent Wind Angle:
105 - 155 degrees

Materials:
.9 to 1.5 ounce nylon

Description:
Heavy Air Reaching Asymmetrical Spinnaker. Short on the hoist, or flown from the hounds instead of the masthead on a fractional rig.

Apparent Wind Speed:
20 - 35 kts

Apparent Wind Angle:
110 - 155 degrees

Materials:
1.5 to 2.2 ounce nylon

Spinnaker (symetric)



CODE ZERO
LIGHT AIR
REACHING

Description:
Light Air asymmetrical reaching sail that meets the minimum definition of a spinnaker. While it is a very small spinnaker, it is nearly three times the size of a light No. 1 on a boat with non-overlapping genoas.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
45 - 70 degrees

Materials:
Light laminate or 1.5 ounce nylon



S1
LIGHT AIR
REACHING

Description:
Light Air Reaching Symmetrical Spinnaker. In the past would have been called a VMG spinnaker. Used in winds too light to sail deeper than 110 degrees AWA.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
70 - 110 degrees

Materials:
.5 ounce nylon



S2
LIGHT AIR
RUNNING

Description:
Light Air Running Symmetrical Spinnaker. Full shape with big shoulders designed to rotate to windward of the headstay at deep angles.

Apparent Wind Speed:
6 - 18 kts

Apparent Wind Angle:
110 - 170 degrees

Materials:
.6 to .75 ounce nylon



S3
MEDIUM AIR
REACHING

Description:
Medium Air Reaching Symmetrical Spinnaker. Wider and deeper shape than the S1, yet narrower and flatter than S2 and S4.

Apparent Wind Speed:
10 - 20 kts

Apparent Wind Angle:
70 - 130 degrees

Materials:
.9 to 1.5 ounce nylon



S4
MEDIUM/HEAVY
RUNNING

Description:
Medium/Heavy Running Symmetrical Spinnaker. Smaller shoulders than S2, yet still designed to rotate to windward of the headstay at deeper angles.

Apparent Wind Speed:
14 - 30 kts

Apparent Wind Angle:
110 - 170 degrees

Materials:
.9 to 1.5 ounce nylon



S5
HEAVY AIR
SPINNAKER

Description:
Heavy Air Reaching Asymmetrical Spinnaker. Short on the hoist, or flown from the hounds instead of the masthead on a fractional rig.

Apparent Wind Speed:
20 - 35 kts

Apparent Wind Angle:
90 - 170 degrees

Materials:
1.5 to 2.2 ounce nylon

Gennaker (asymmetric)



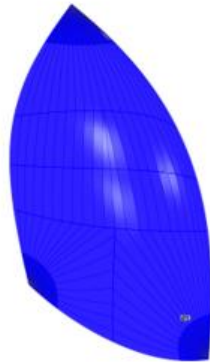
CODE ZERO
LIGHT AIR
REACHING

Description:
Light Air asymmetrical reaching sail that meets the minimum definition of a spinnaker. While it is a very small spinnaker, it is nearly three times the size of a light No. 1 on a boat with non-overlapping genoas.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
45 - 70 degrees

Materials:
Light laminate or 1.5 ounce nylon



A1
LIGHT AIR
REACHING

Description:
Light Air Reaching Asymmetrical. In the past would have been called a VMG spinnaker. Used in winds too light to sail deeper than 110 degrees AWA.

Apparent Wind Speed:
0 - 10 kts

Apparent Wind Angle:
70 - 110 degrees

Materials:
Half ounce nylon



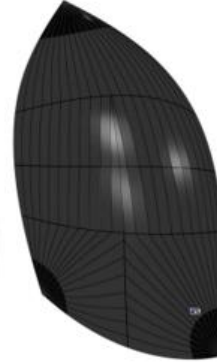
A2
LIGHT AIR
RUNNING

Description:
Light Air Running Asymmetrical. Full shape with big shoulders designed to rotate to windward of the headstay at deep angles.

Apparent Wind Speed:
8 - 18 kts

Apparent Wind Angle:
105 - 155 degrees

Materials:
.6 to .75 ounce nylon



A3
MEDIUM AIR
REACHING

Description:
Medium Air Reaching Asymmetrical. Wider and deeper shape than the A1, yet narrower and flatter than A2 and A4.

Apparent Wind Speed:
10 - 20 kts

Apparent Wind Angle:
75 - 130 degrees

Materials:
.9 to 1.5 ounce nylon



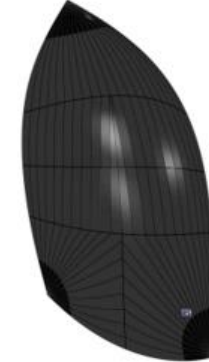
A4
MEDIUM/HEAVY
RUNNING

Description:
Medium/Heavy Asymmetrical Runner. Smaller shoulders than A2, yet still designed to rotate to windward of the headstay at deeper angles.

Apparent Wind Speed:
14 - 30 kts

Apparent Wind Angle:
105 - 155 degrees

Materials:
.9 to 1.5 ounce nylon



A5
HEAVY AIR
SPINNAKER

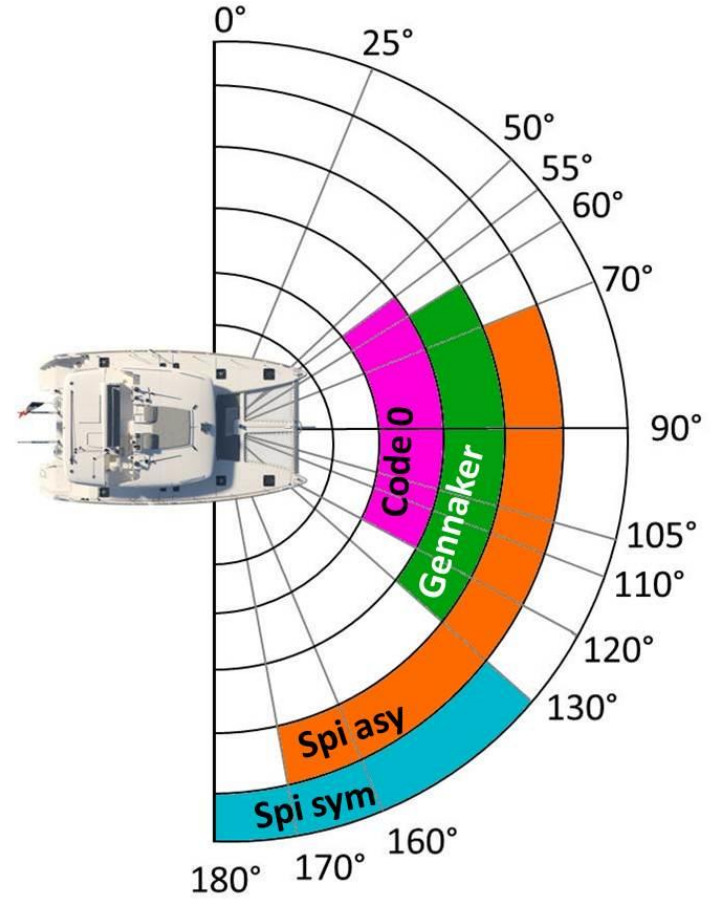
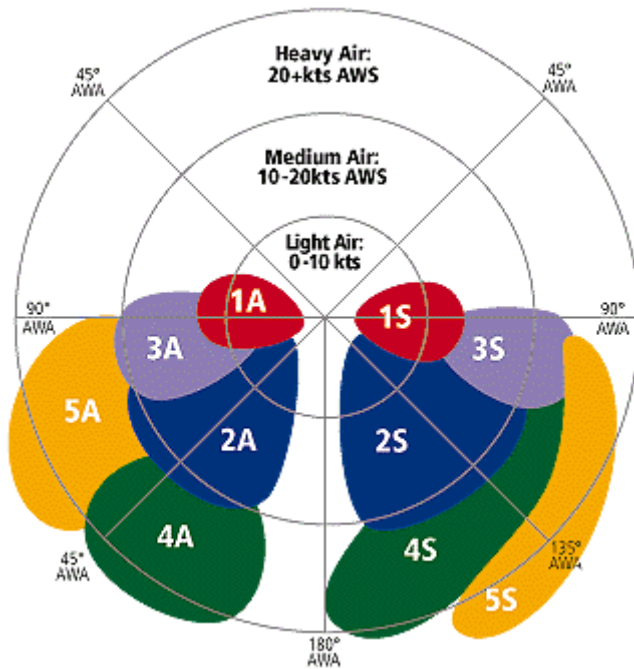
Description:
Heavy Air Reaching Asymmetrical Spinnaker. Short on the hoist, or flown from the hounds instead of the masthead on a fractional rig.

Apparent Wind Speed:
20 - 35 kts

Apparent Wind Angle:
110 - 155 degrees

Materials:
1.5 to 2.2 ounce nylon

Polár Diagram



Sail cross over chart

	35	40	45	50	55	60	65	70	75	80	85	90	95	100
35	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4
30	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4
29	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4
28	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4
27	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4
26	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4	J4
25	J3	J3	J3	J4	J4	J4	J4	J4	J4	J4	J4	J3	J3	J3
24	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3
23	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3
22	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3
21	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3
20	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	FRO
19	J3	J3	J3	J3	J3	J2	J2	J2	J2	J2	J2	J2	J2	FRO
18	J3	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	FRO	FRO
17	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	FRO	FRO
16	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	A0	A0
15	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	J2	A0	A0	A0
14	J2	J2	J2	J2	J2	J2	J2	J2	J2	A0	A0	A0	A0	A0
13	J2	J2	J2	J2	J2	J2	J2	J2	J2	A0	A0	A0	A0	A0
12	J2	J2	J2	J2	J2	J2	J2	J2	A0	A0	A0	A0	A0	A0
11	J2	J2	J2	J2	J2	J2	J2	J2	A0	A0	A0	A0	A0	A0
10	J2	J2	J2	J2	J2	J2	J2	A0	A0	A0	A0	A0	A0	A0
9	J2	J2	J2	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0
8	J2	J2	J2	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0
7	J2	J2	J2	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0
6	J2	J2	J2	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0	A2
5	J2	J2	J2	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0	A2
4	WS	WS	WS	A0	A0	A0	A0	A0	A0	A0	A0	A0	A0	A2
2	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS

Vitorla rendelés

- Kitől?
- Mire használjuk, kategória, tartalom.
- Mit szeretnénk elérni vele.
- Anyagválasztás

Kitől?

- Konzultáció lehetősége!
- Szakértelem
- Árfekvés
- Milyen anyagokkal, technológiával foglalkozik
- Milyen gépeket használ
- Design, designer, verseny vitorlánál eredmények
- Elérhetőség, esetleges reklamációk érvényesítése
- Átadás, bevitorlázás, after sales

Kategóriák

- Day sailer
- Túra cruising: inshore vagy offshore
- Túra-verseny: inshore vagy offshore
- Verseny: One design, előnyszámos, offshore, high-performance

Tartalom

- Élek
- Első, alsó él, rendszer
- Reef-ek
- Trimm zsinór
- Ringlik
- Kikészítés
- Zsák, szám stb.
- Átadás, bevitórlázás

Anyagok

- Forradalmi fejlődés az aramid és karbon szálak megjelenésével mind a vitorlaanyag, rigg (vitorlatartó rudazat), és a hajótest tekintetében.
- A hajók súlyának csökkenése és a szerelvények formatartásának és keménységének növekedésével egyre hatékonyabb aero és hydrodinamikai elképzeléseket tudtak megvalósítani. Eljutottak a háromszög vitorlától a square-top vitorláig.
- Nagy szerepe volt a fejlődésben az egyre gyorsabb hajóknak surf, katamarán, melyek sebességnövekedésük folytán egyre tökéletesebb vitorlák kifejlesztését követelték.

Napjaink vitorlaanyagai technológiái

- Dacron: túra, verseny, OD,
- Dacron, Polyester szendvics
- Fólia vitorlák: Polyester, Aramid
- Aramid-carbonszálás panel vitorlák
- Multiaxiális vitorlák Maxx, Flexx
- Monofilm
- Membrán technológia
- Unique, 3DL, 3Di vitorlák

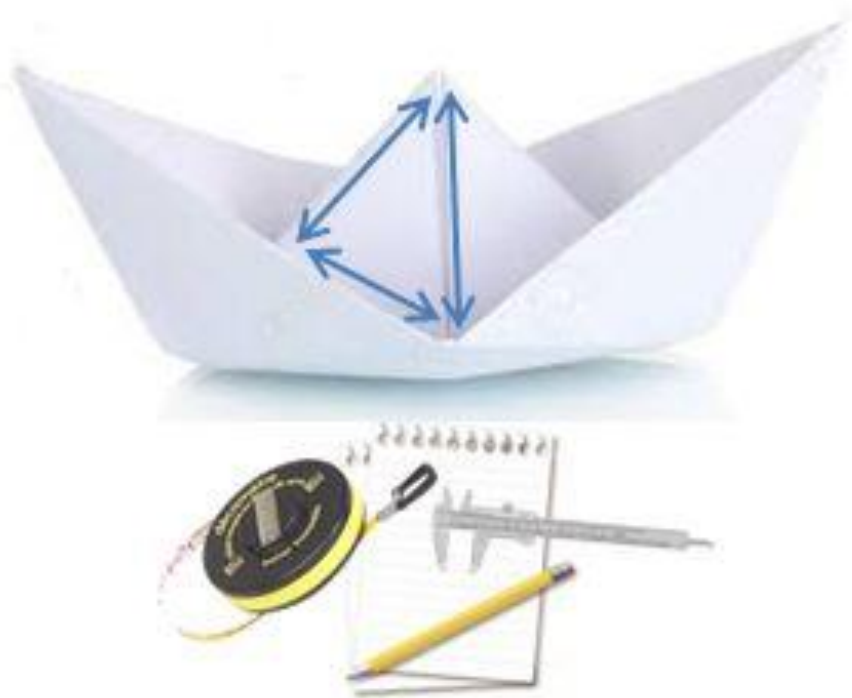
Tervezés

- Versenyző igényei, konzultáció
- Hajó paraméterei
- Felmérés
- Osztályelőírás!
- Kiválasztott anyag
- Fizikai, matematikai törvényszerűségek
- Rutin, vitorlázó, versenyző tapasztalat
- Programok, software, Smare-Azur, SailPack

Felmérés

- Több módszer kézi mérőszalag-digitális
- Felmérőlap
- Főbb méretek: I, J, P, E
- Speciális mérések pl. Árbócgörbület
- Vitorla felmérés (ISAF Measurement proces)

Felmérés



Adatok nagyvitorla

LoongSails Mainsail Measurement



Customer: _____
 Boat name: _____
 Order No.: _____
 Date: _____

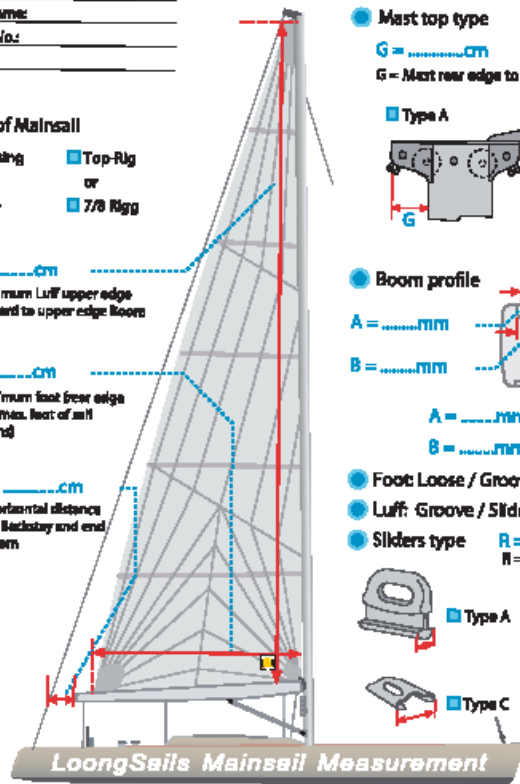
Type of Mainsail

- Cruising Top-Rig
 or
 Race 7/8 Rig

P = _____cm
 P = Maximum Luff upper edge heel board to upper edge Boom

E = _____cm
 E = Maximum foot (rear edge mast to max. foot of sail length)

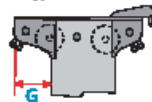
MLG = _____cm
 MLG = horizontal distance between Backstay and end of the boom



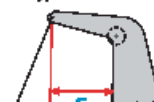
Mast top type

G = _____cm
 G = Mast rear edge to backstay top pin

Type A



Type B



Boom profile

A = _____mm

B = _____mm

Mast profile

Type A



Type B



A = _____mm

B = _____mm

C = _____mm

Foot Loose / Groove / Sliders

Luff: Groove / Sliders

Sliders type

R = _____mm
 R = Diameter



Type A



Type B



Type C



Type D

Leech reef

R1 = _____cm

R1 = Rear edge mast to 2nd reef fitting (at the boom)

R2 = _____cm

R2 = Rear edge mast to 1st reef fitting (at the boom)

Clew Cut up = _____%

Tack knock

F = _____cm

F = Top of luff groove or track to top of leech.

H1 = _____cm

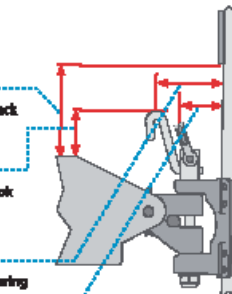
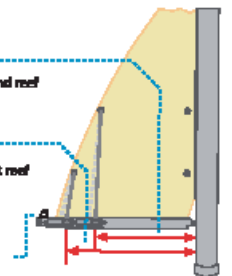
H1 = Height of the Reef hook to the top of the boom

H2 = _____cm

H2 = Aft face of mast to bearing point of reef hook.

H3 = _____cm

H3 = Aft face of mast to bearing point of tack fitting.



Adatok Orrvitorla

LoongSails Headsail Measurement



Customer: _____
 Boat name: _____
 Order No.: _____
 Date: _____

Type of headsail

- Cruising or Race
 Top-Rig or 7/8 Rig

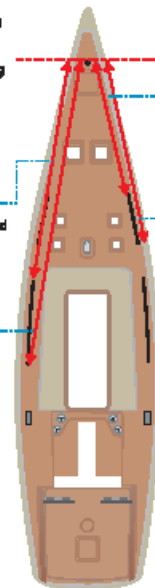
Track system

GA = _____cm

GA = Distance between head pin and at the beginning of the track

GE = _____cm

GE = Distance between head pin and end of the track



FA = _____cm

FA = Distance between head pin and at the beginning of the track

FE = _____cm

FE = Distance between head pin and end of the track

Size of sail _____%

I = _____cm

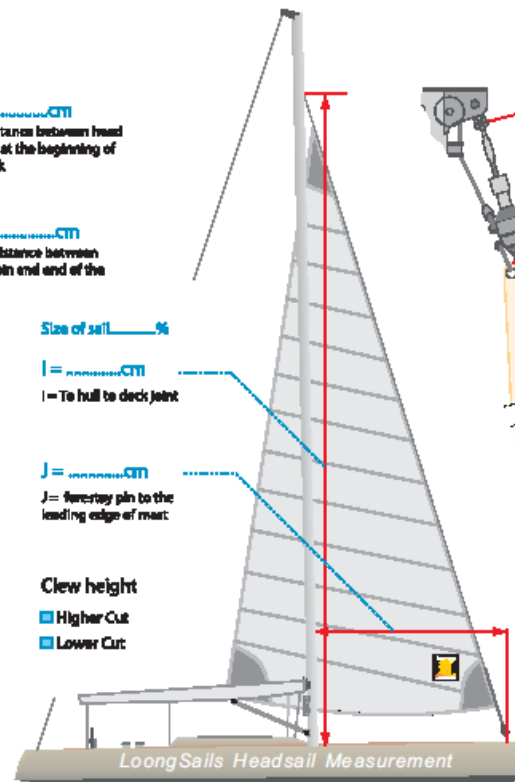
I = To hull to deck joint

J = _____cm

J = forestay pin to the leading edge of mast

Clew height

- Higher Cut
 Lower Cut



- Hanks sail Furling sail
 Sail furling in. drum rotate:
 Clockwise Anti Clockwise

Fmax = _____cm

Fmax = To intersection of headstay and deck

T = _____cm

T = To the foiler (if any)

A = _____cm

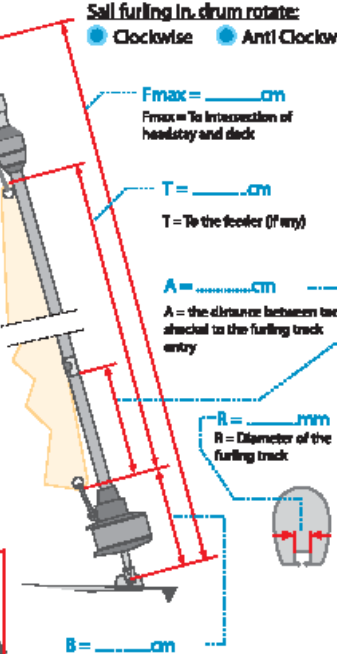
A = the distance between track ahead to the furling track entry

R = _____mm

R = Diameter of the furling track

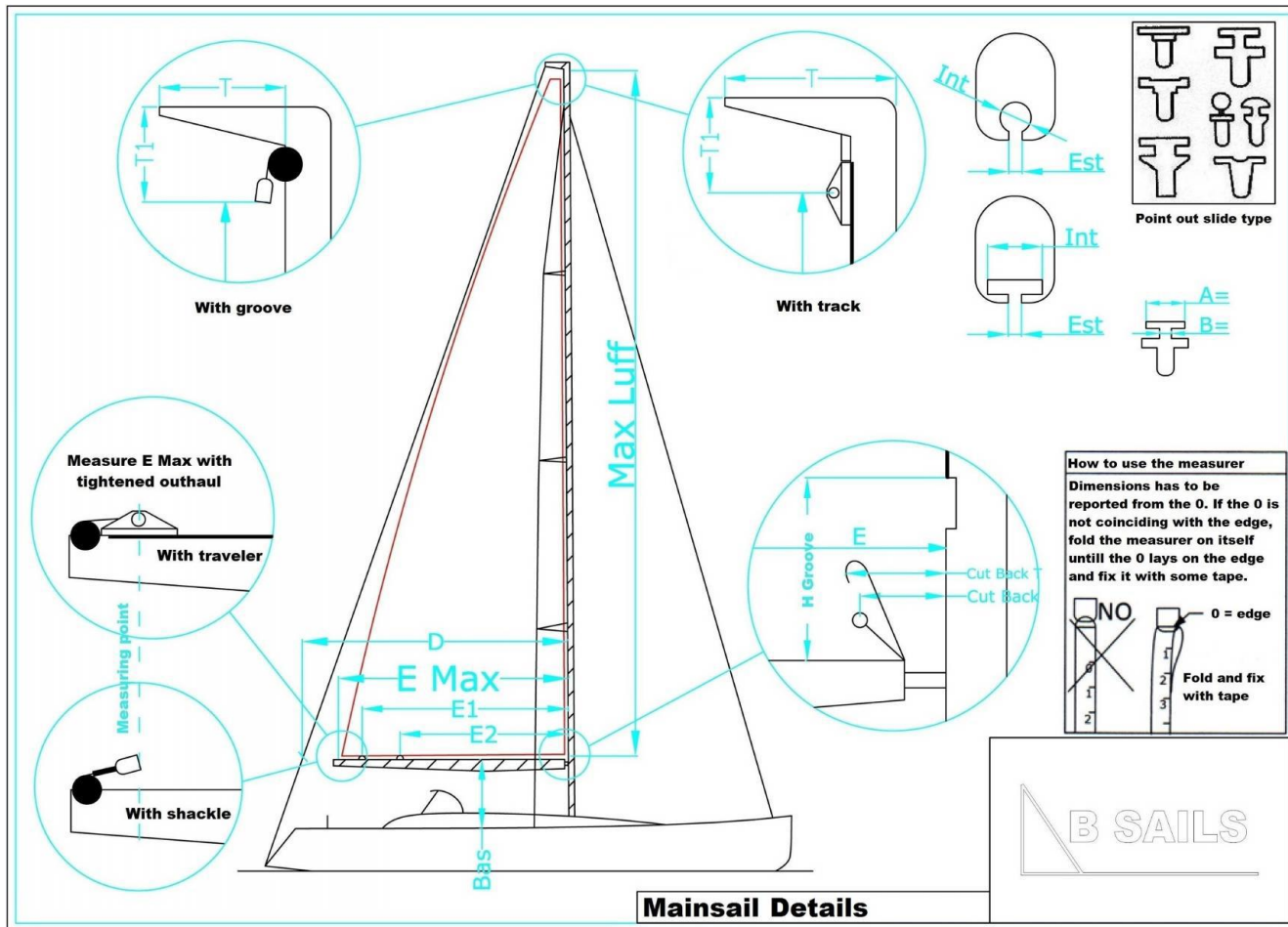
B = _____cm

B = Height of tack sheeve over deck



LoongSails Headsail Measurement

Felmérőlap





Mainsail: Race Integration

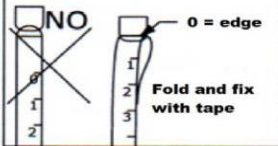
Measure the mast bend with very light back stay load (PRE)

Measure the mast bend with full back stay load (MAX)

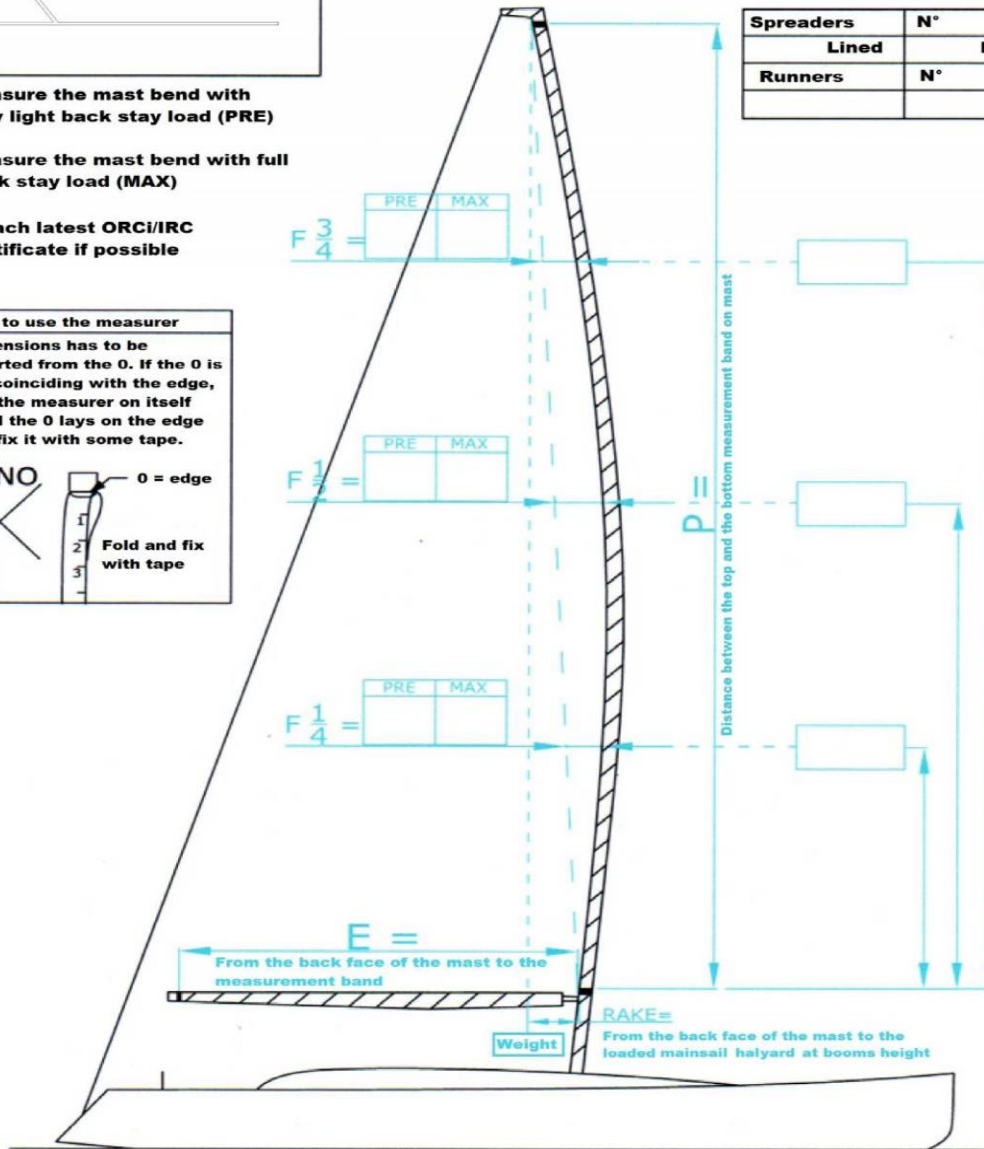
Attach latest ORC/IRC certificate if possible

How to use the measurer

Dimensions has to be reported from the 0. If the 0 is not coinciding with the edge, fold the measurer on itself until the 0 lays on the edge and fix it with some tape.



Spreaders	N°
Lined	Raked
Runners	N°



Name		Boat	
Surname		Sail Number	

Rig Measurements

Max Luff	From tack point to head point with tightened halyard	
E Max	From the back face of the mast to the clew point with tightened outhaul	
E1	From the back face of the mast to the exit point of the 1st reef earing	
E2	From the back face of the mast to the exit point of the 2nd reef earing	
D	From the back face of the mast to the back stay at boom height	
Bas	Distance between boom and deck	
H Groove	From the upper face of the boom to the luff groove on the mast	
Cut Back	From the back face of the mast to the tack point	
Cut Back T	From the back face of the mast to the reef luff earing	
T	Longitudinal length of the mast head	
T1	Vertical distance between the head point and the back stay fixing point	

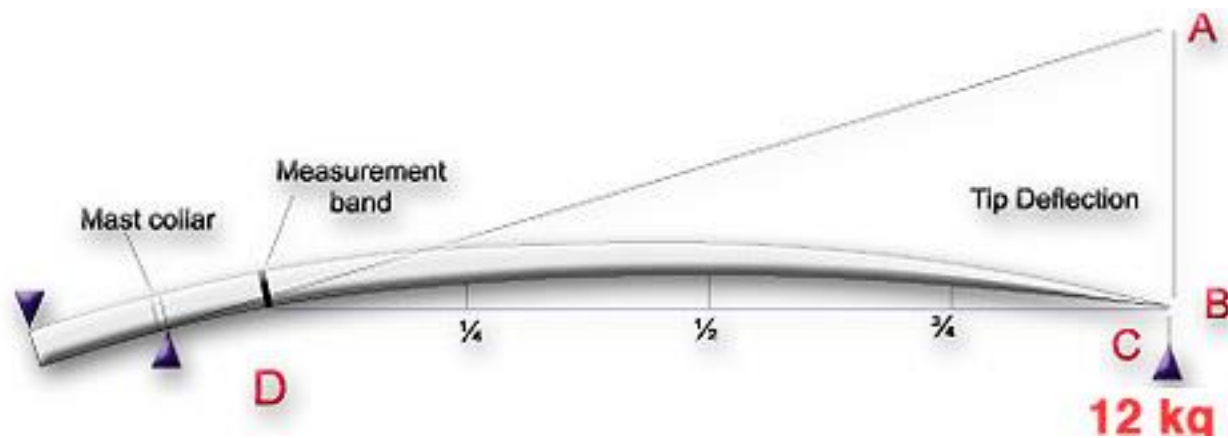
Rig details

Brand and type of mast track		
Brand and type of boom track		
Number of batten cars		
Number of intermediate cars		
Mast groove type (flat or round)	Est:	
	Int:	
Boom groove type (flat or round)	Est:	
	Int:	
Back stay type (fixed, hydraulic, manual, tackle etc)		

Measures of the old mainsails

Foot		Battens N°	
Leech		Reefs N°	
Luff		Others	

Árbóc görbület





Comments

Parameters

Parameter	Value
TWS	
TWA	
BS	

Measurements

Parameter	Value	Export...
tool_1		
Length	3.15 %	
Pos	47.78 %	
Angle	90.87 °	
AbsLength	0.03	
RefLength	1.00	

www.onesails.com

0.81%
@75.03%

0.49%
@49.99%

0.24%
@25.00%

77

Comments

Parameters

Parameter	Value
TWS	
TWA	
BS	

Measurements

Parameter	Value	Export...
tool_1		
Length	0.49 %	
Pos	49.99 %	
Angle	89.89 °	
AbsLength	0.00	
RefLength	1.00	
tool_2		
Length	0.81 %	
Pos	75.03 %	
Angle	90.56 °	
AbsLength	0.01	
RefLength	1.00	
tool_3		
Length	0.24 %	
Pos	25.00 %	
Angle	90.16 °	
AbsLength	0.00	
RefLength	1.00	

X:4471.1 Y:797.8 Right-click on the profiles, tools or bitmaps for more options...

Kézi mérőszalagos



Osztályelőírás

G.2. SAILMAKERS

G.2.1. The sailmaker is optional.

G.3. MAINSAIL

G.3.1. Construction

G.3.1.1. The construction shall be: soft, single ply sail. Double luff sail is prohibited.

G.3.1.2. The body of the sail shall consist of the same woven ply throughout. The ply fibres shall be of polyester. It is allowed to use resin-reinforced woven. Alternatively it shall be made of polyester substrate/polyester film laminate (including PENTEX). The sail shall be made of pieces, 3DL is not allowed.

G.3.1.3. The sail shall have maximum 4 equally spaced batten pockets in the leech. The centerline of the 4 batten pockets shall divide the leech into five equal parts, +/- 50mm. The angle of the batten pockets shall be optional.

G.3.1.4. The following are permitted: Stüching, gluing, taping, bolt ropes, corner eyes, headband with fixings, Cunningham eye/pulley, batten pocket end caps, mast and boom slides, leech line with cleat, unlimited piece of windows placed according to G.3.2. chart of these class regulation, sail maker label, royalty button, sail button, tell tales.

G.3.1.5. At least one reef shall be built into the mainsail. The bearing surface of the cringle, delta ring or reefing device in the leech shall be fitted not less than 1000 mm, measured in a straight line, from the clew.

G.3.1.6. The tack must be fixed.

G.3.1.7. The foot shall be optionally set in the boom groove.

G.3.2. Dimensions

	min.	max.
Luff length (-P)		10450 mm
Foot length (-F)		3800 mm
Leech length		11000 mm
Quarter width		3320 mm
Half width		2530 mm
Three-quarter width		1470 mm
Upper width 1250 mm from Head Point		740 mm
Top width		150 mm
Ply weight of the body of the sail except for a foot shelf not exceeding 300 mm in width		
	woven	230 g/m ²
	film laminate	150 g/m ²
Primary reinforcement		450 mm
Secondary reinforcement		
from corner measurement points		1400 mm



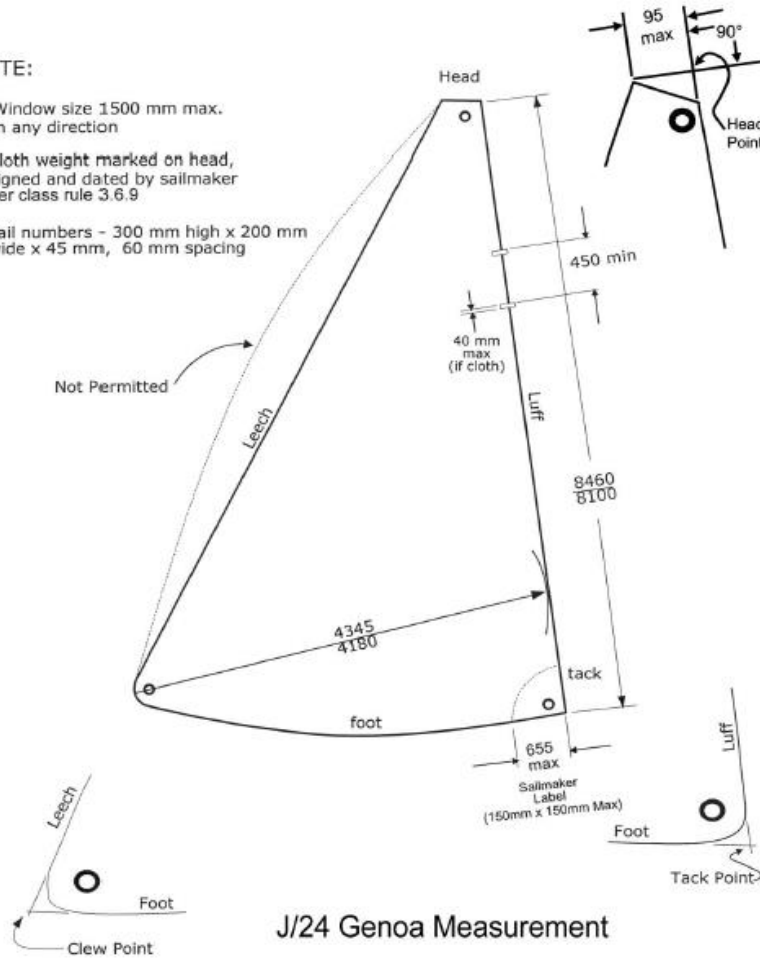
APPENDIX A

NOTE:

Window size 1500 mm max.
in any direction

Cloth weight marked on head,
signed and dated by sailmaker
per class rule 3.6.9

Sail numbers - 300 mm high x 200 mm
wide x 45 mm, 60 mm spacing

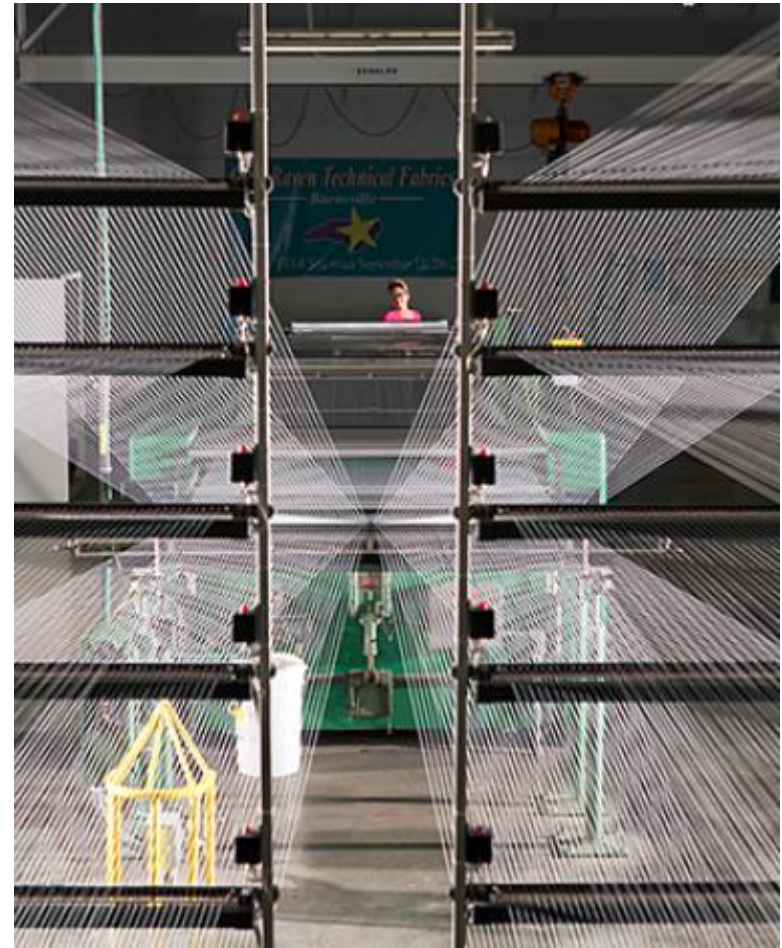


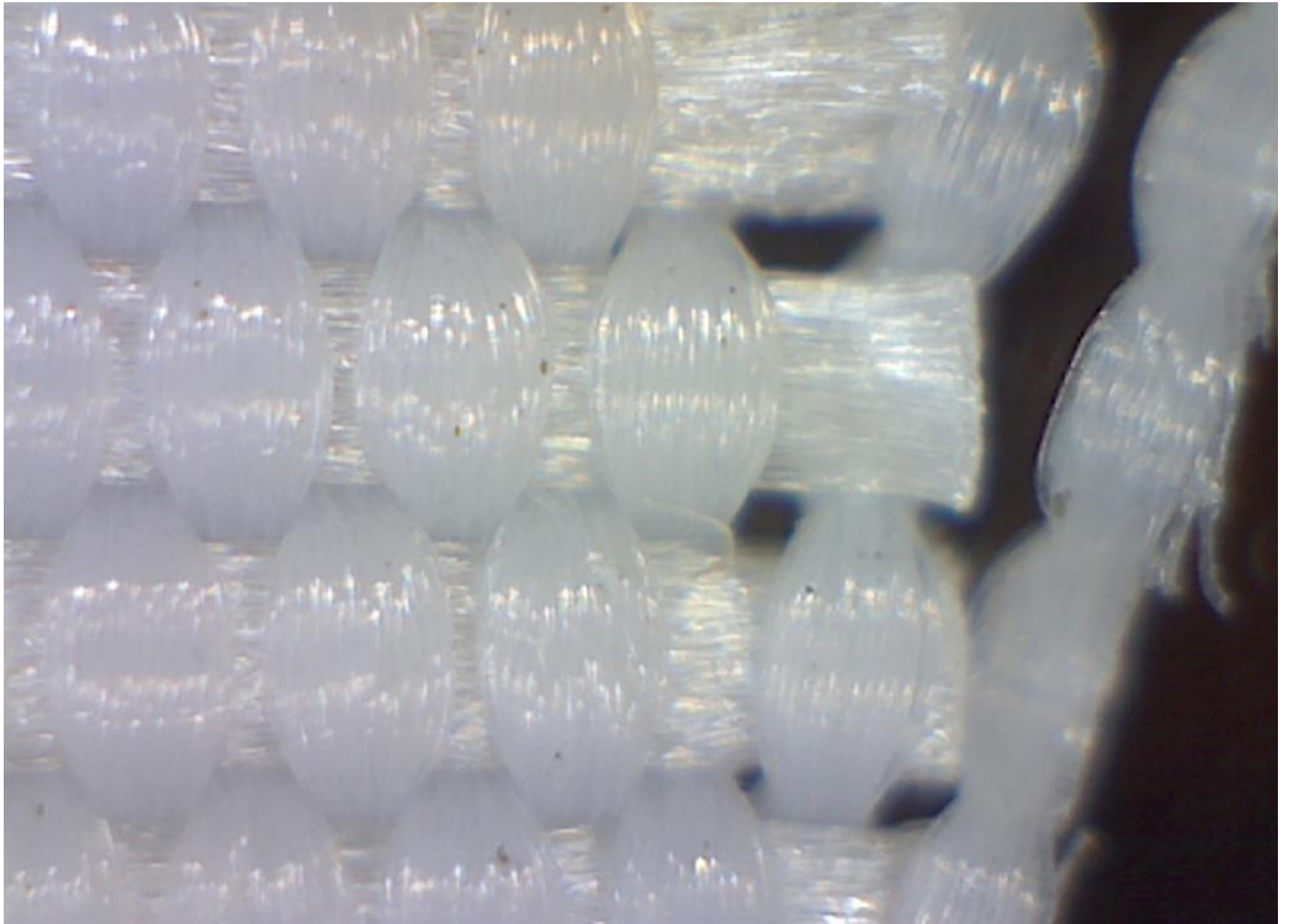
J/24 Genoa Measurement

Anyagválasztás

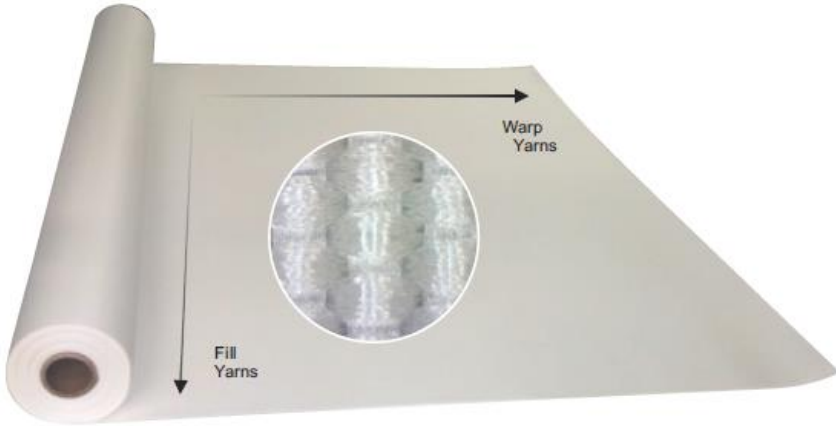
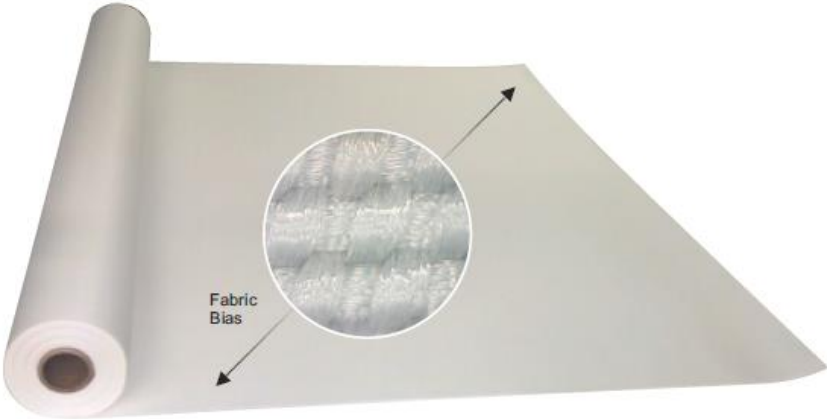
- Gyártótól anyag specifikációk
- Szövés
- Szálak
- Szabás

Szövés

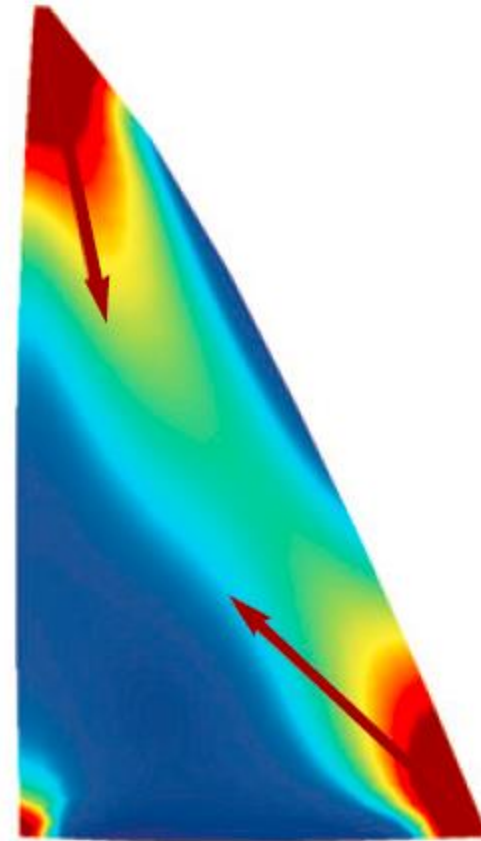
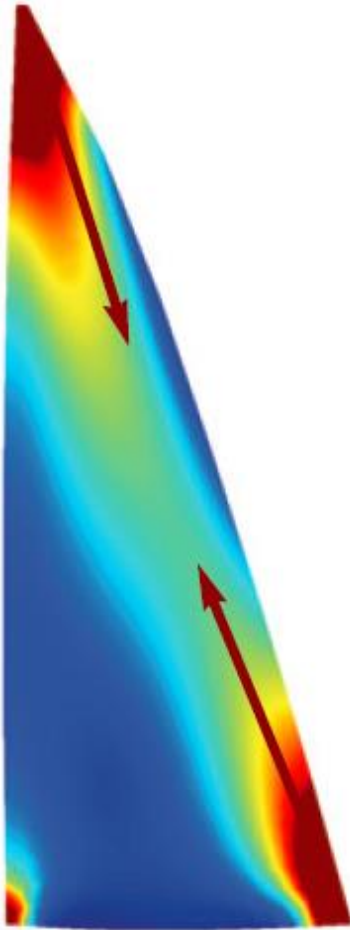




Fill/Warp

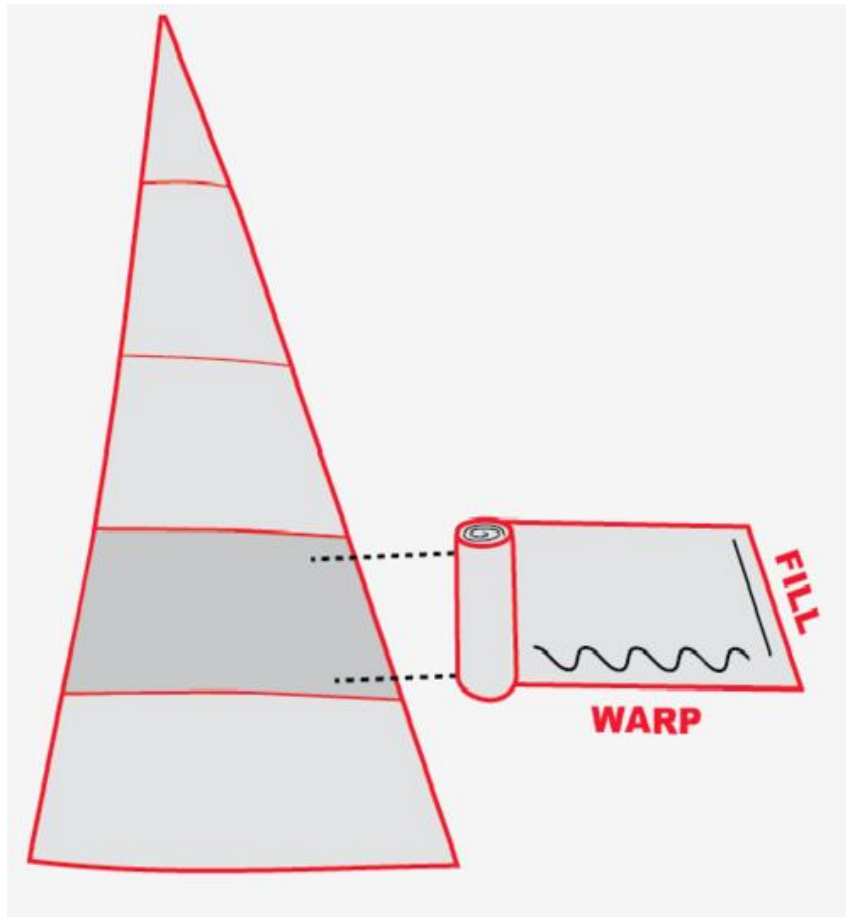


High Aspect/Low Aspect

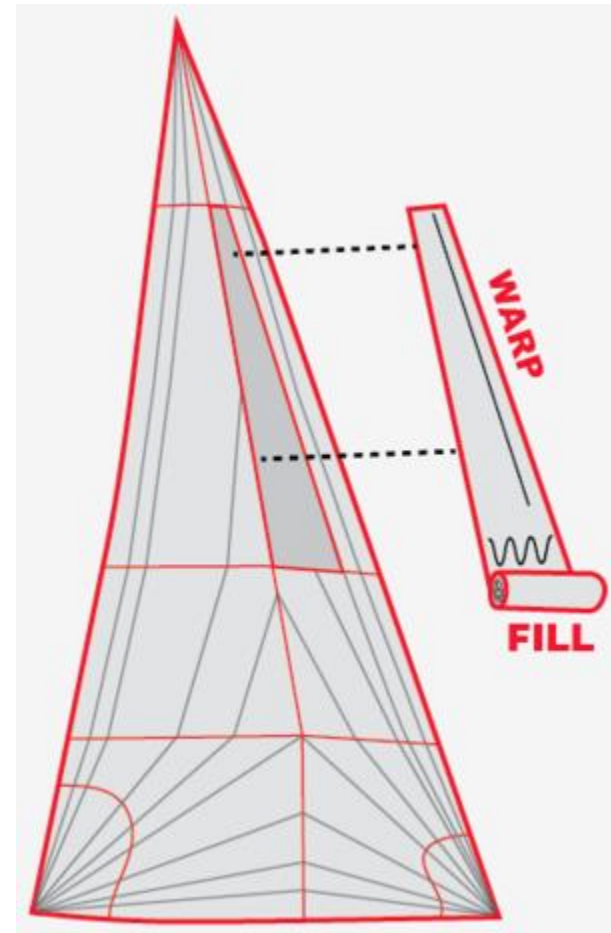


Szabás fajták

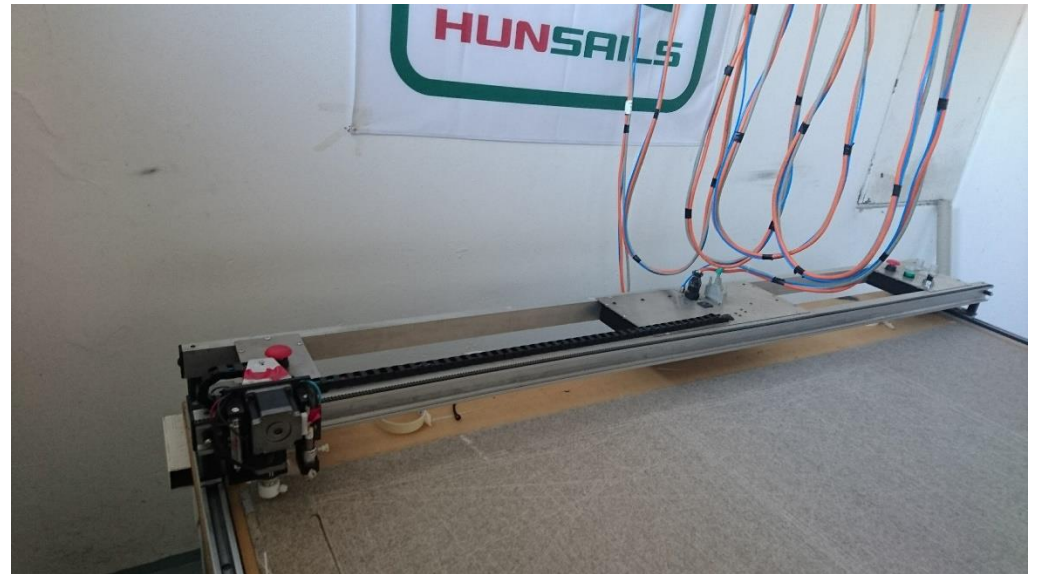
Horizontál



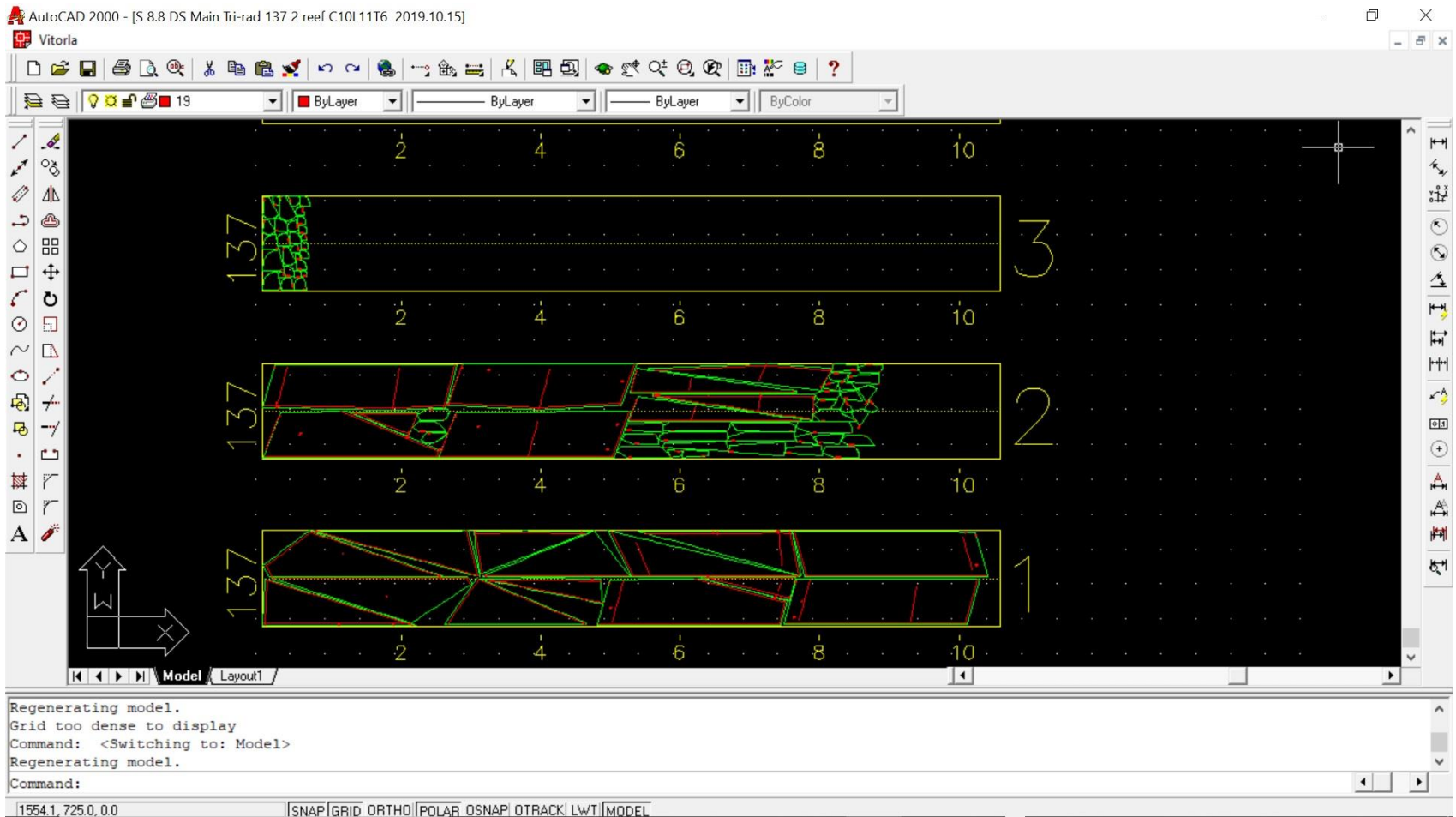
Radiál



Szabás

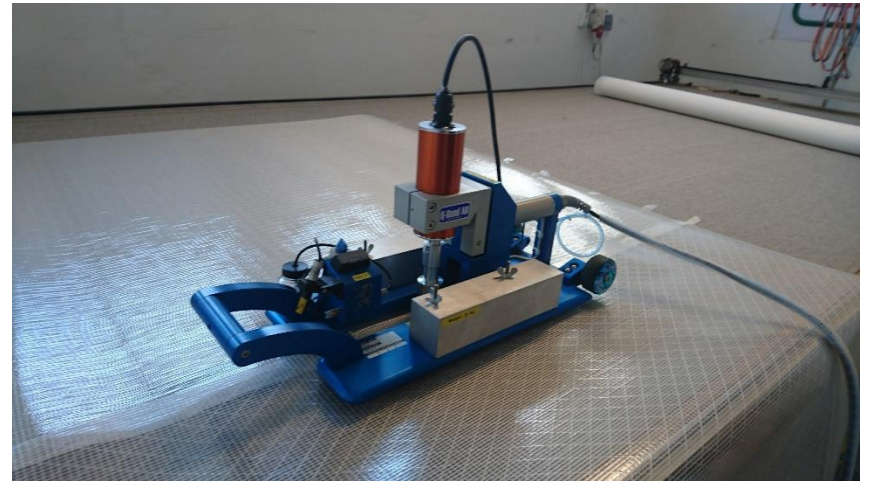


Terítési rajz



Ragasztás





Összevarrás



Szerelvények





Kézi befejezés



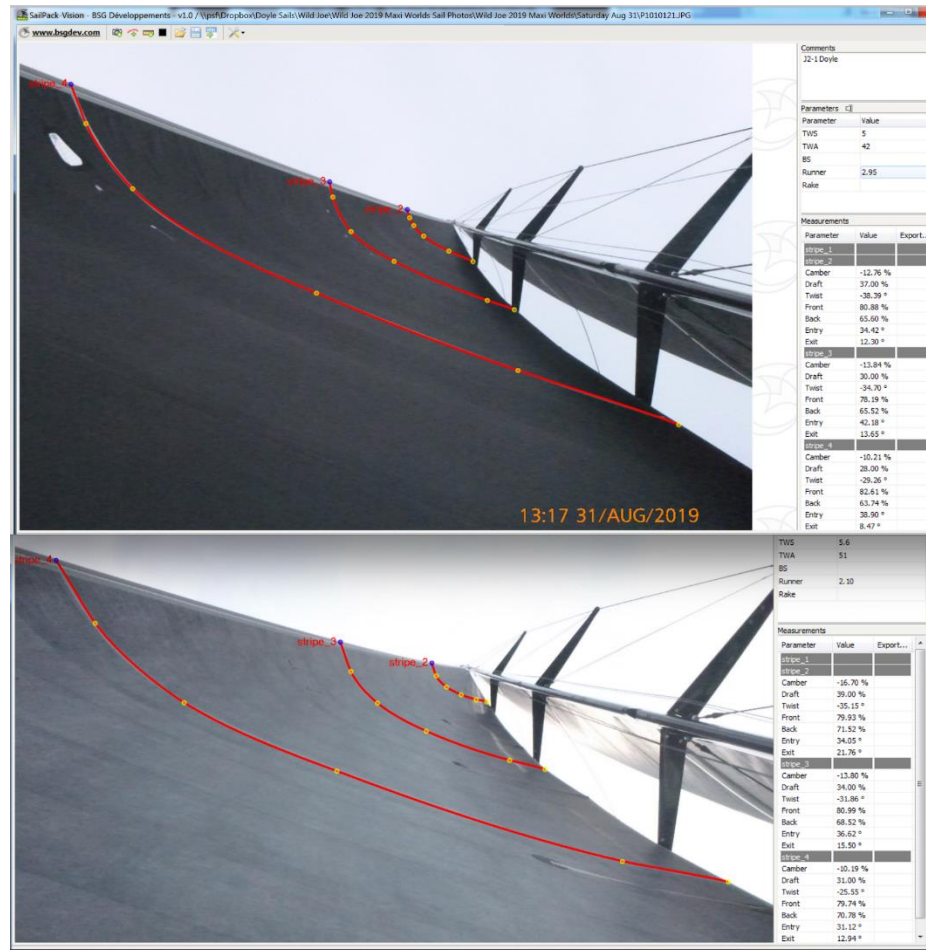
Műszaki ellenőrzés



Átadás



Analízis





Comments
Doyle mainsail, Aug 31 2019

Parameters

Parameter	Value
TWS	5.6
TWA	upwind
BS	
Runner	2.10

Measurements

Parameter	Value	Export...
stripe_1		
Camber	-9.42 %	
Draft	38.00 %	
Twist	-36.47 °	
Front	83.15 %	
Back	68.77 %	
Entry	30.17 °	
Exit	9.93 °	
stripe_2		
Camber	-12.26 %	
Draft	38.00 %	
Twist	-34.73 °	
Front	78.75 %	
Back	67.95 %	
Entry	32.26 °	
Exit	13.09 °	
stripe_3		
Camber	-12.51 %	
Draft	38.00 %	
Twist	-30.12 °	
Front	72.82 %	
Back	67.20 %	
Entry	26.85 °	
Exit	13.46 °	
stripe_4		
Camber	-9.85 %	
Draft	42.00 %	
Twist	-25.71 °	
Front	70.64 %	
Back	66.09 %	
Entry	18.03 °	
Exit	11.21 °	
stripe_5		
stripe_6		

Köszönöm a figyelmet!