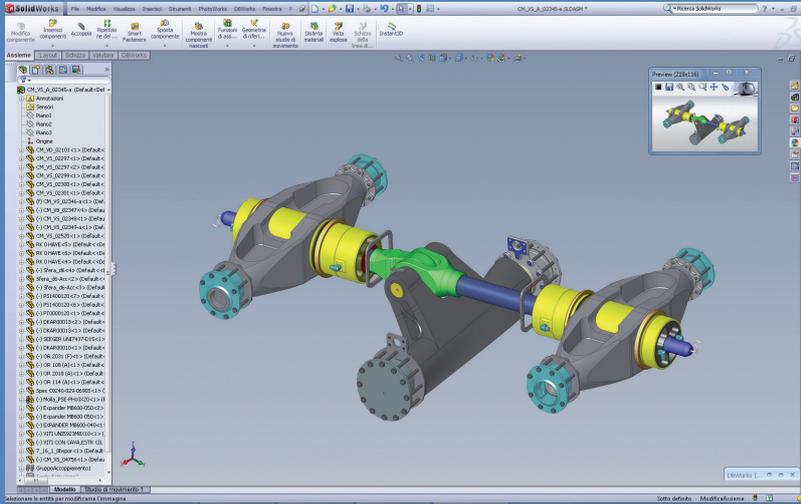


## CANTING KEEL SYSTEM



The canting keel feature dramatically improves the righting moment of the boat allowing more power for race yachts or more comfortable sailing for cruisers.

Cariboni's experience in canting keel systems dates back to 1996, when *Junoplano* was designed; this single ram system, with a +/- 55° canting angle, has been a milestone in sail history.

Cariboni designs and supplies canting keel system with:

- A single double acting cylinder
- Two double acting cylinders
- With integrated aluminium or stainless steel frame
- JIG system to build the keel bulkheads
- Aluminium, stainless steel and titanium rams

In every kind of canting keel, the system is watertight: the central part (where the keel head moves) is flooded, but the cylinders work in a dry area guarantee by special custom rubbers, placed between the rams and the longitudinal plates.

The keel frame allows to have a self-contained canting structure easily to be placed inside the boat. The shipyard has just to pick-up the structure and fix it between the two main bulkheads. The loads transmitted to the boat structures are exactly the same loads of a standard fixed keel. These kind of systems are installed on several Wally boats and on the 60' race-cruisers "*Junoplano*", "*Kratos*" and "*Anyway*".

In the image you can see the canting keel system of the 105' Wally "*Kauris III*" designed by German Frers.

In order to reduce the overall weight of the canting keel, we developed an integrated system which doesn't need a frame as all the parts are placed straight on the boat bulkheads. A JIG structure is supplied to the shipyard to place the bulkheads correctly aligned and drilled inside the boat.

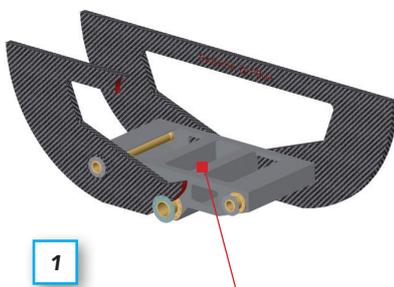
These canting keel mechanisms without frame are installed on most of the racers boats.



Cariboni's keel system with frame  
for a 105' sloop.  
This kind of system is fully tested  
in the firm before shipping.

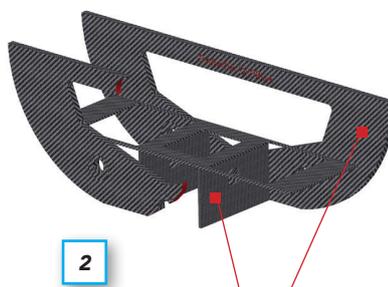


Soto 65' Camiranga



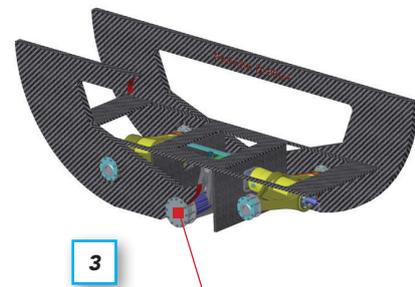
1

Mounting jig



2

Bulkheads and keel  
structure



3

Keel rams, bearings and  
keel bearings

Here above you can see how the shipyard made the structural part of the canting keel system.

- 1) The JIG is placed between the two main bulkheads and glued on the hull.
- 2) JIG is removed and longitudinal plates and floor are placed between the bulkheads
- 3) The canting keel system (rams, bearings and accessories) are placed on board

## MELGES 40

Our canting keel systems are not a feature only for mega yachts: we developed easy and reliable system also for small boat as Melges 40 race yacht.

Dimensions change but philosophy not: the highest performance with the best reliability of the system. Also this compact system has all the Cariboni's know-how on canting keel system: top materials (high strength aluminium alloy, stainless steel, bronzal bearings) and carefully design are the keys word for this new project.

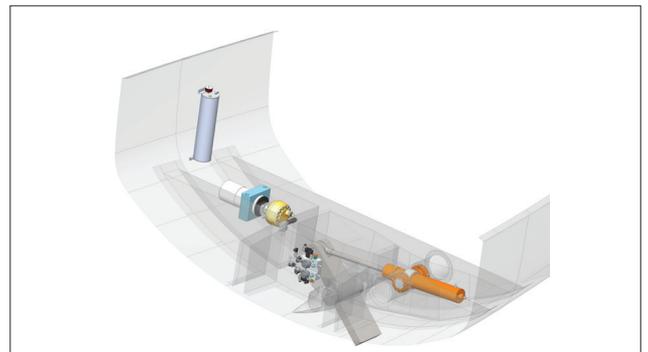
### **Melges 40 canting keel main specifications:**

- Bulb weight: 1500 Kg
- Fin length: 2300mm
- Canting angle:  $\pm 45^\circ$
- Keel ram dimensions: 90mm bore, 505mm stroke made of aluminium alloy with self-alignment bearings and linear sensor. Working pressure: 280 bar.

The package is complete with our hydraulic system. The main manifold has proportional valve for highest reliability and performance of the system and the electrical and manual by-pass for free swing of the fin. A compact PLC electronic board manages the hydraulic system and is linked to a deck electronic gauge for a real-time keel position status. The linear sensor fitted inside the ram is used to have an automatic tacking and canting keel movement.



Melges 40



Melges 40 canting keel

## KER 57

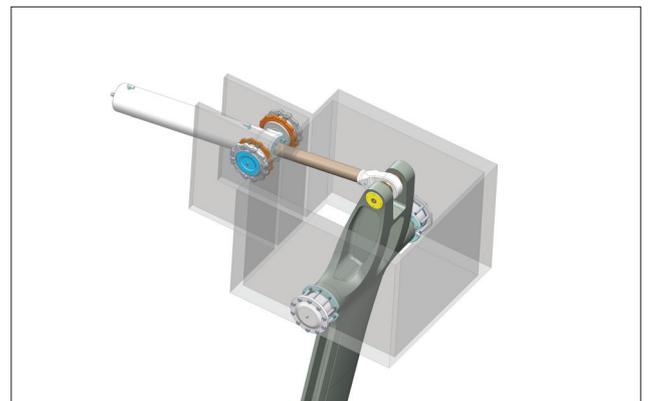
Built by Knierim Yachtbau in Germany, VARUNA VI is the latest generation racer designed by Ker Design with canting keel and daggerboards.

### **KER 57 canting keel main specifications:**

- Bulb weight: 2900 Kg
- Fin length: 3650mm
- Canting angle:  $\pm 40^\circ$
- Keel ram dimensions: 110mm bore, 578mm stroke, made on stainless steel alloy with self-alignment bearings and linear sensor. Working pressure: 350 bar.



Ker 57



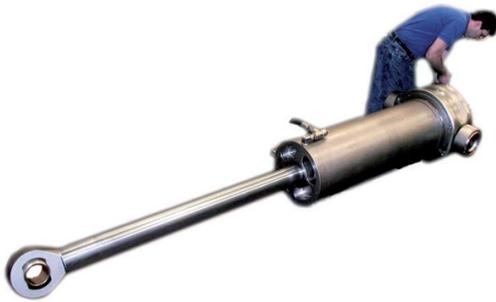
Ker 57 canting keel

## THE BIGGEST CANTING KEEL IN THE WORLD...

140' MARI-CHA IV is composed by a double acting cylinder with a bore of 380mm and a stroke of 1280mm (358 tons working load).

The particular shape of the boat bulkheads needs a special asymmetrical bearing to be machined.

Cariboni cares a lot about reliability of its system. That is proved by the long sailed before the first service, made after 25000NM.



140' MARI-CHA IV

## ...AND THE FASTEST

Only 6.5 seconds from  $-55^{\circ}$  to  $+55^{\circ}$ !

This is the outstanding performance of the Cariboni's canting keel system developed for the 90' "Genuine Risk".

The keel control is made by two double acting cylinders feed by PTO diesel engine pumps, with an extraordinary  $55^{\circ}$  canting keel angle.

The PLC system controls the performance of the boat in order to achieve performance, reliability and easy handling of the boat even with this huge amount of power. ACC manual control and deck equipment complete the hydraulic system of this milestone boat.



Genuine risk

**VOLVO CANTING KEEL SYSTEMS**

**VOLVO OCEAN RACE 2017 - 2018**



**Dongfeng Race Team**  
Winner



**Mapfre**



**Team Brunel**

**VOLVO OCEAN RACE 2014 - 2015**



**Abu Dhabi Ocean Racing**  
Winner



**Team Brunel**



**Dongfeng Race Team**

**VOLVO OCEAN RACE 2011 - 2012**



**Groupama Sailing Team**  
Winner



**Team Telefonica**



**PUMA Ocean Racing by BERG**



**Abu Dhabi Ocean Racing**

**VOLVO OCEAN RACE 2008 - 2009**



**Ericsson E4**  
Winner



**Puma "Il Mostro"**



**Ericsson E3**

**VOLVO OCEAN RACE 2005 - 2006**



**ABN AMRO ONE**  
Winner



**BRASIL 1**



**ABN AMRO TWO**