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**Edgard B. Malta  
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# EVALUATION OF SHIP RESISTANCE AND SEAKEEPING PERFORMANCE OF A HIGH SPEED TRIMARAN FOR THE PRE-SALT LAYER IN BRAZIL

Edgard B. Malta<sup>1</sup>, Felipe Ruggeri<sup>2</sup>, André M. Kogishi<sup>3</sup>, Claudio M. P. Sampaio<sup>4</sup>,  
Kazuo Nishimoto<sup>4</sup>

<sup>1</sup> Technomar Engenharia Oceânica, São Paulo, Brazil

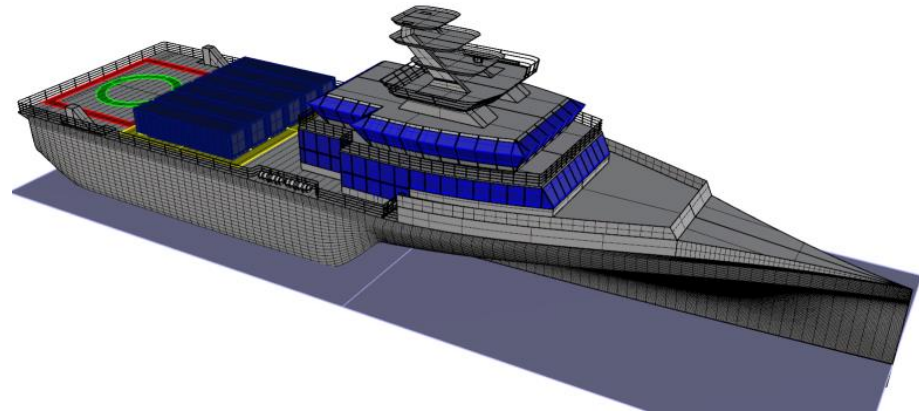
<sup>2</sup> Argonáutica Engenharia e Pesquisas, São Paulo, Brazil

<sup>3</sup> Instituto de Pesquisas Tecnológicas (IPT), São Paulo, Brazil

<sup>4</sup> Universidade de São Paulo (USP), Departamento de Engenharia Naval e Oceânica (DENO),  
São Paulo, Brazil



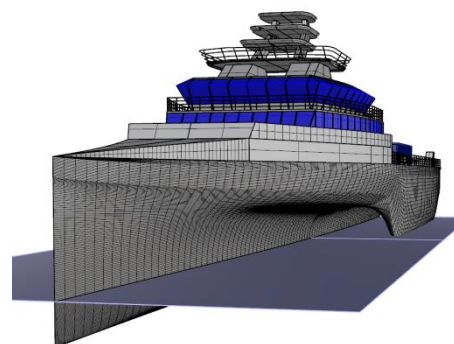
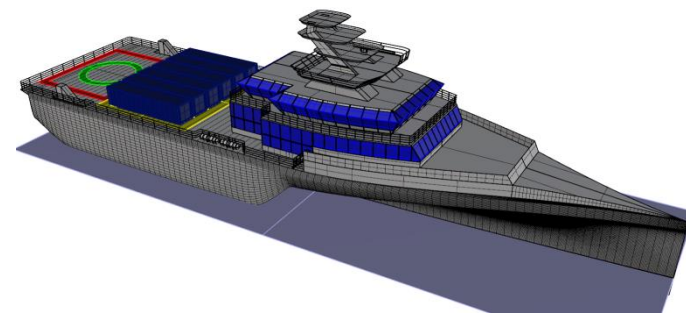
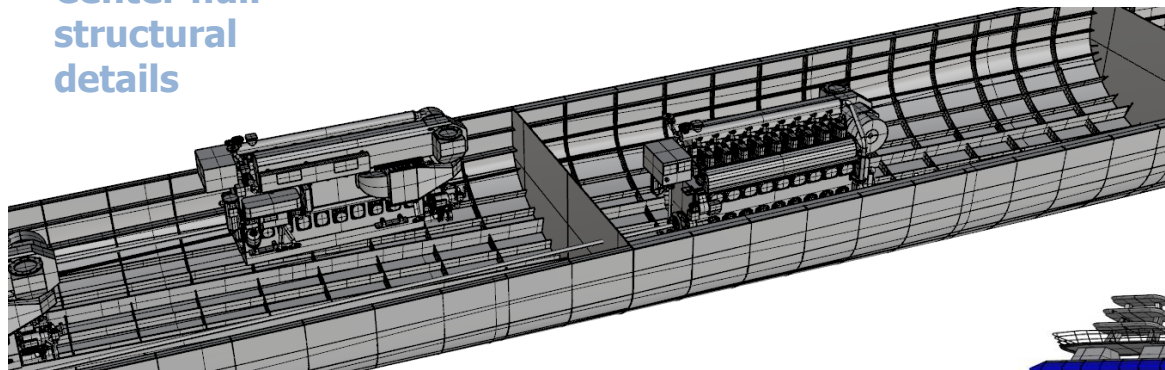
- 300 passengers
- Deck cargo: 150 t
- Water: 100 m<sup>3</sup>
- Diesel: 60 m<sup>3</sup>
- Range: 700 nm
- Design speed:



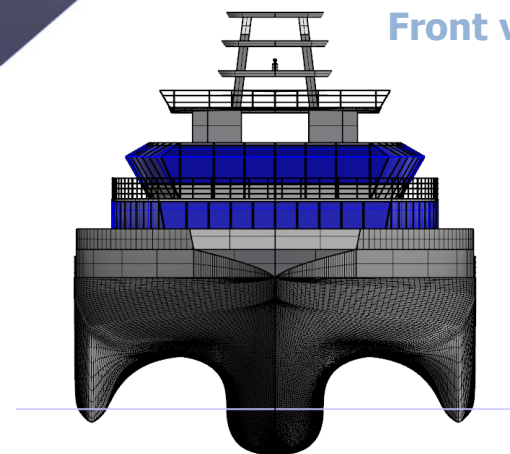
	Hs = 2m	Calm water
Full load (300 t)	25	~30
Partial load (100 t)	30	~35

- Max draft: 3 m

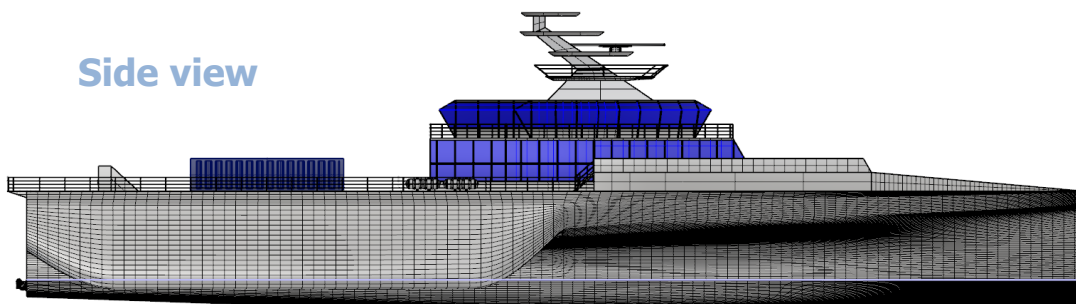
Center hull structural details



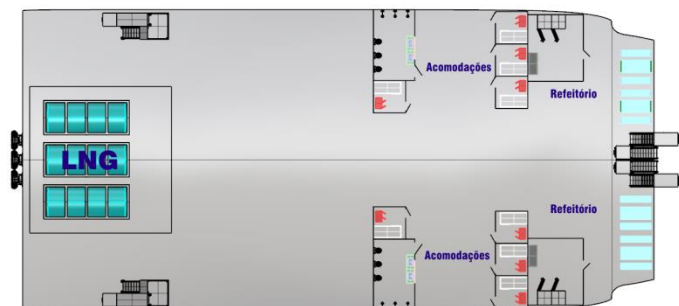
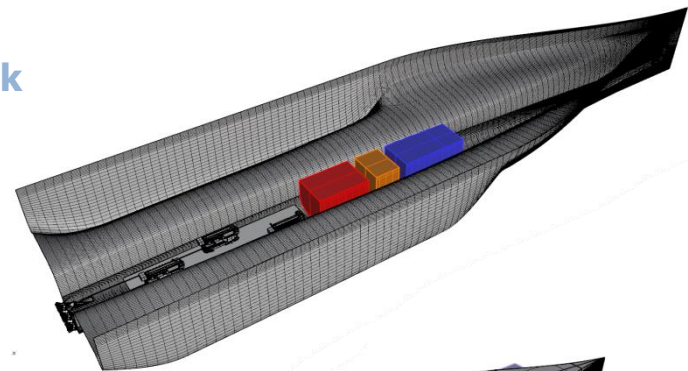
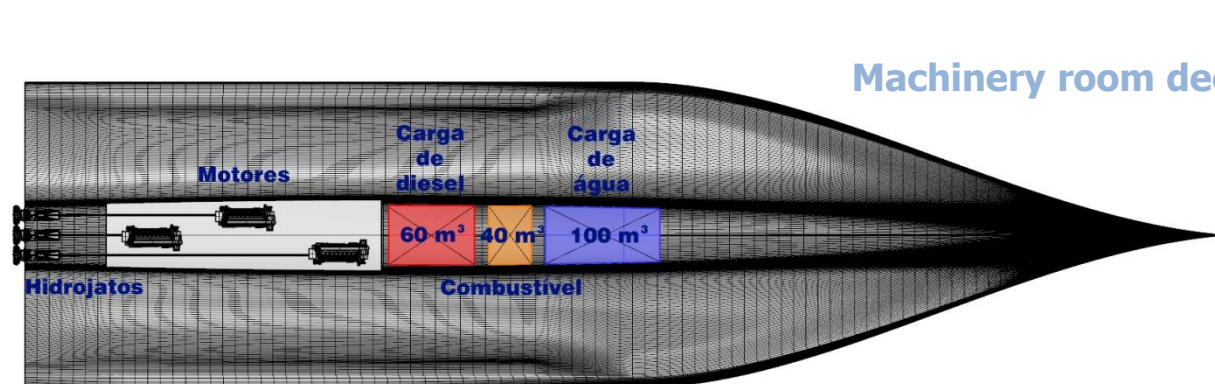
Front view



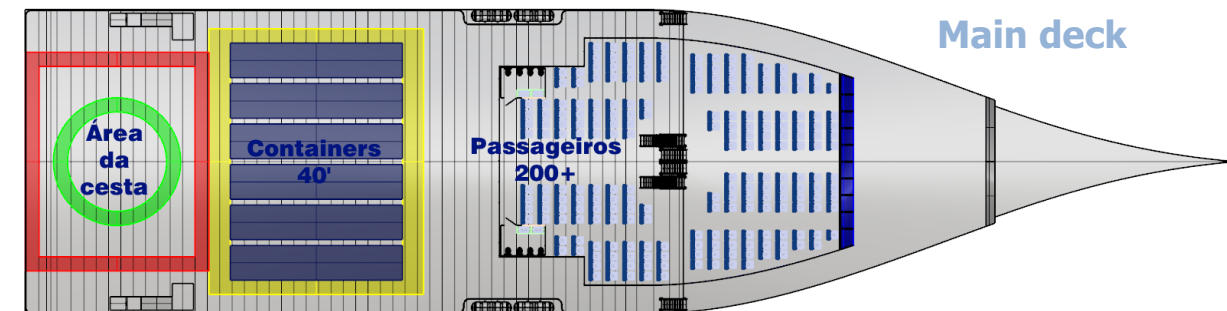
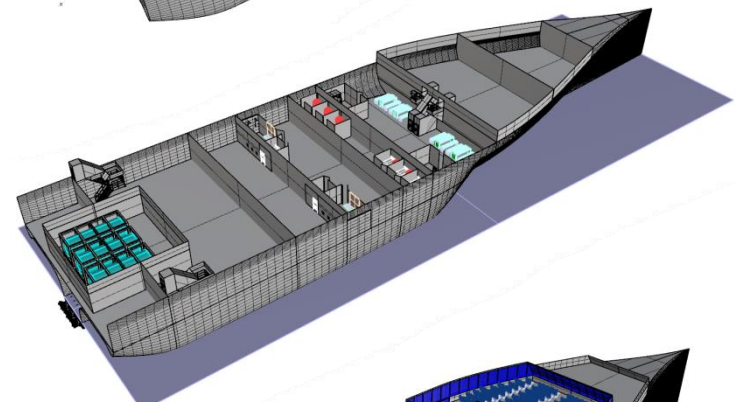
Side view



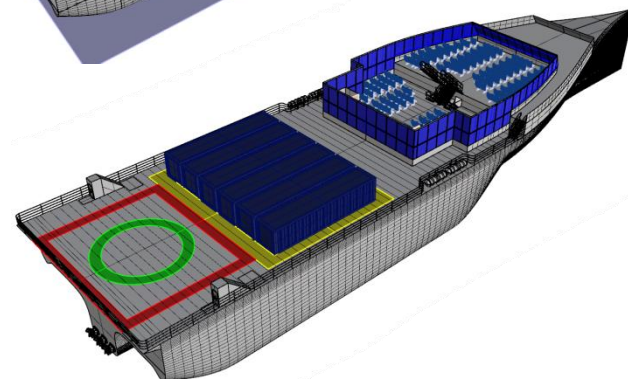
## Machinery room deck



- Intermediate deck
- accommodation
  - dinning hall
  - ISO LNG containers



## Main deck



## Design variables:

- $L_{ch}$  → Center hull length
- $(L/B)_{ch}$  → Center hull length to breadth ratio
- $(B/T)_{ch}$  → Center hull breadth to draft ratio
- $(C_b)_{ch}$  → Center hull block coefficient
- $(L/B)_{sh}$  → Side hull length to breadth ratio
- $(C_b)_{sh}$  → Side hull block coefficient
- $SP$  → Transverse separation coefficient
- $ST$  → Longitudinal separation coefficient
- $\gamma$  → Side hull displacement to total displacement ratio
- $\lambda$  → Side to center hull length ratio

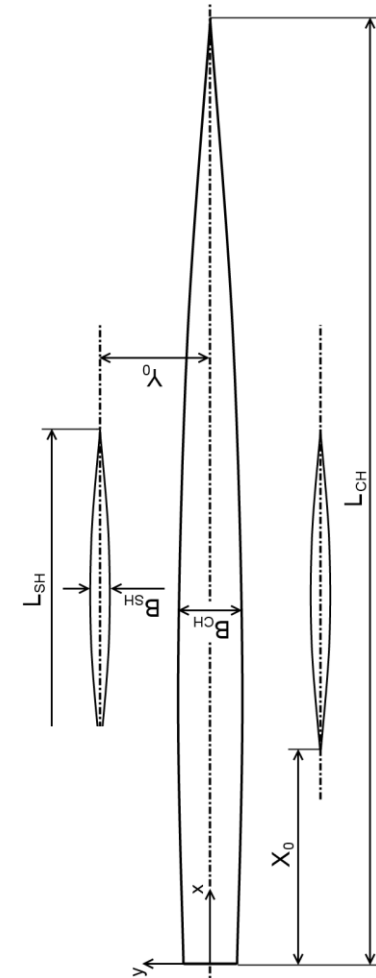




Figure 3 Mold in high density foam for building the model in fiberglass.



Figure 4 Model in the scale of 1:35 built in fiberglass.

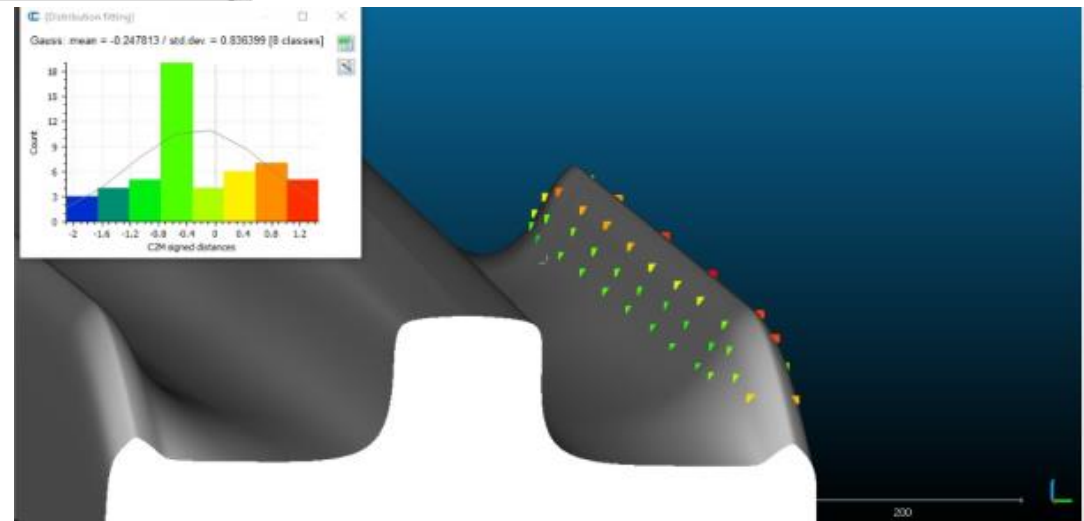
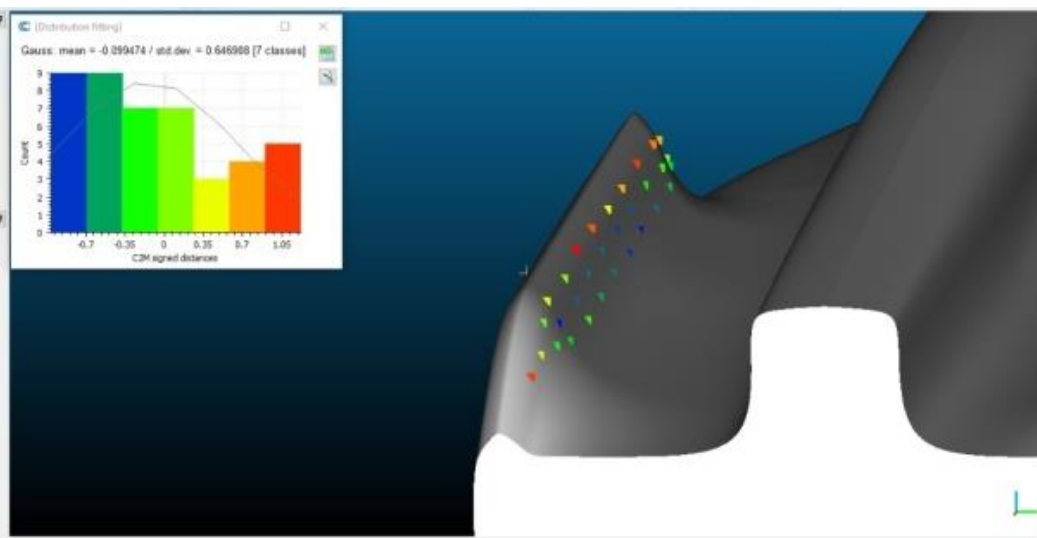
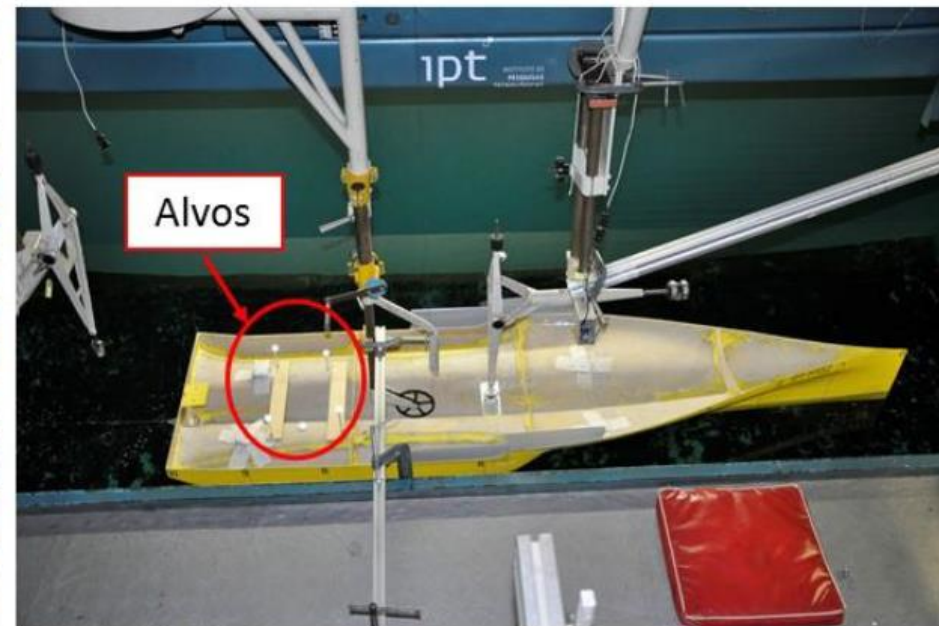
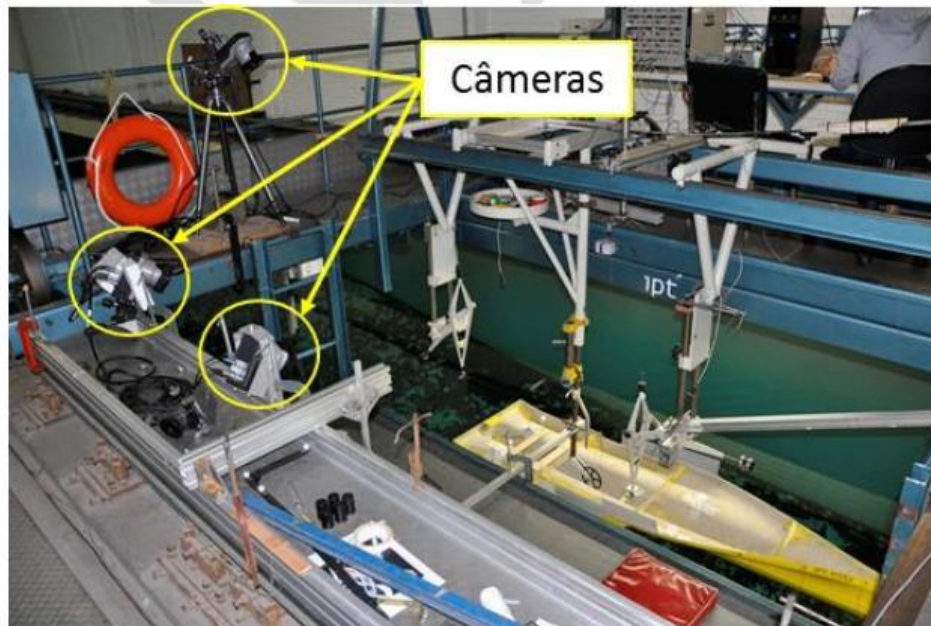
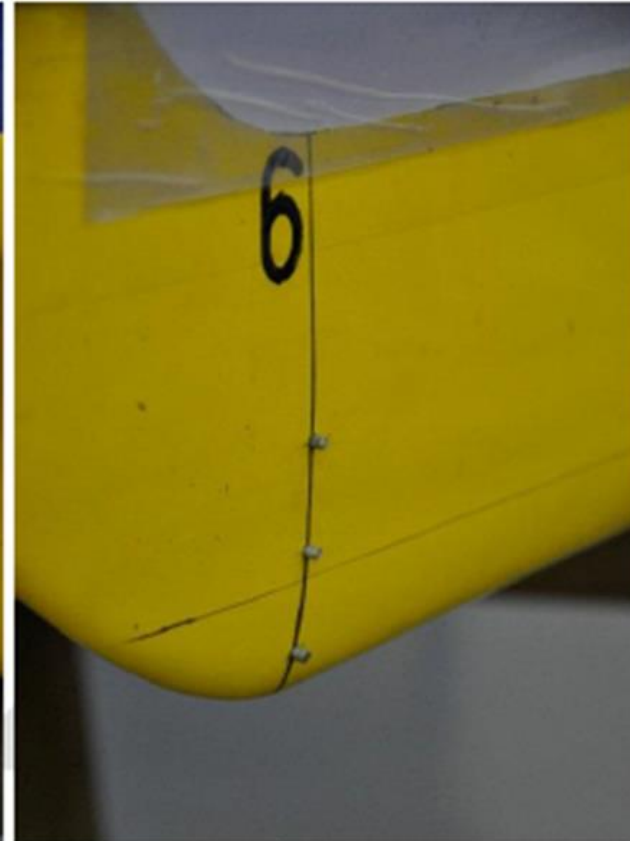
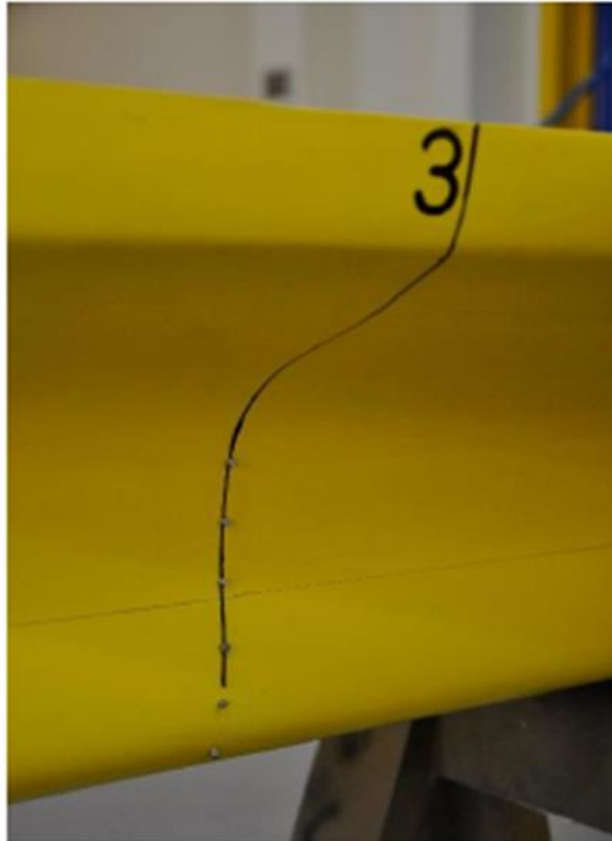
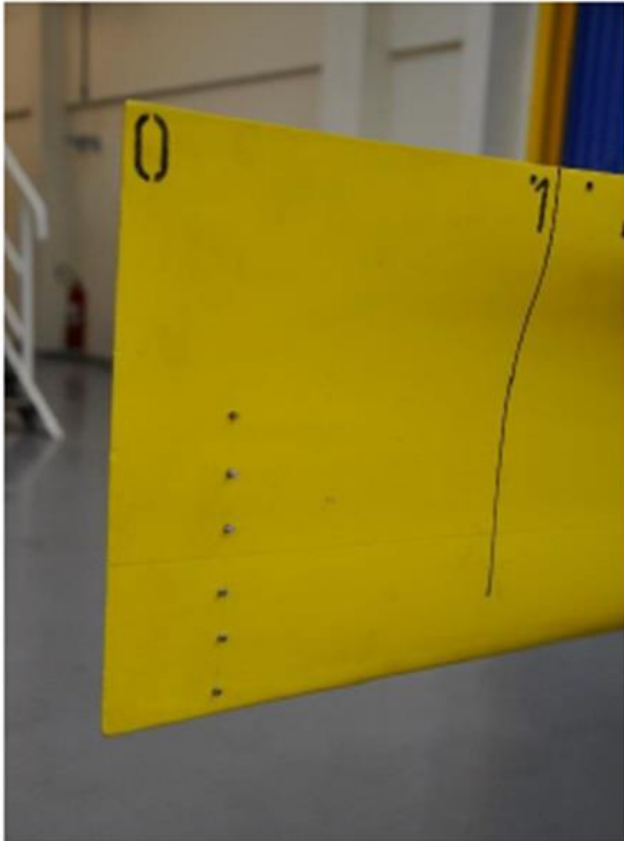


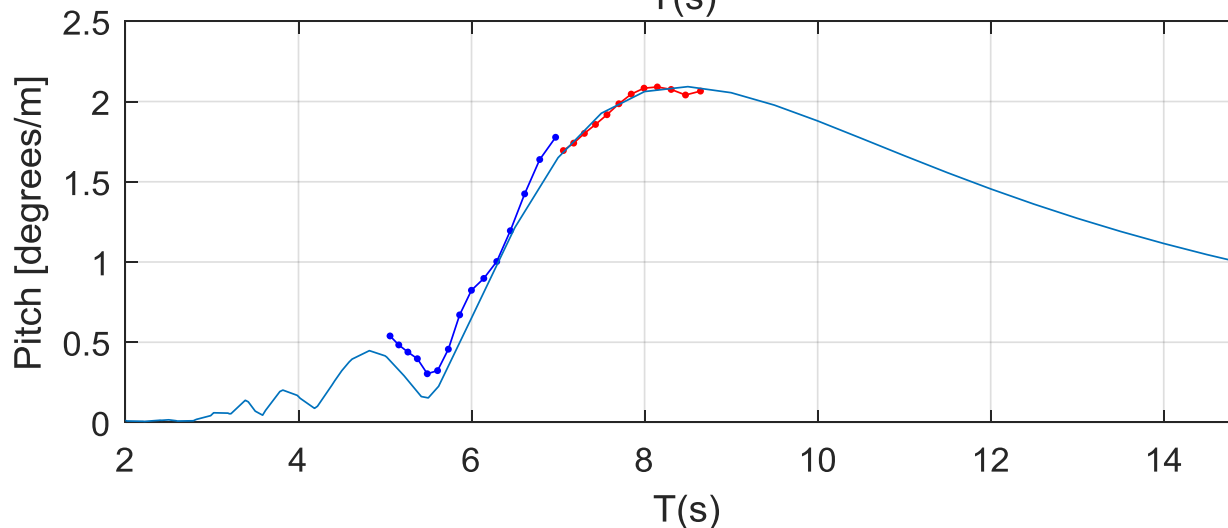
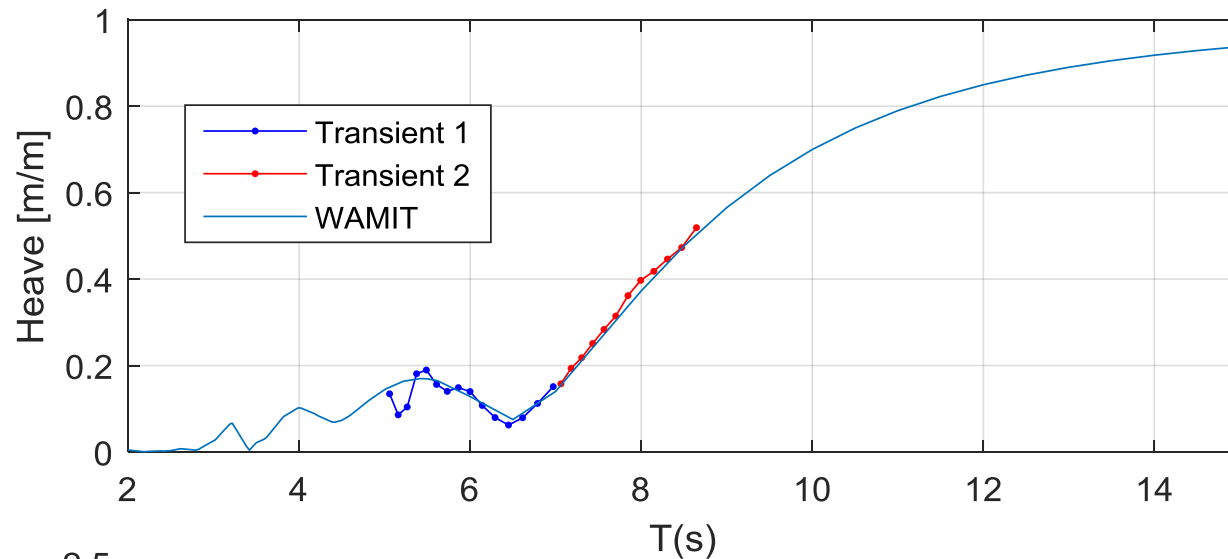


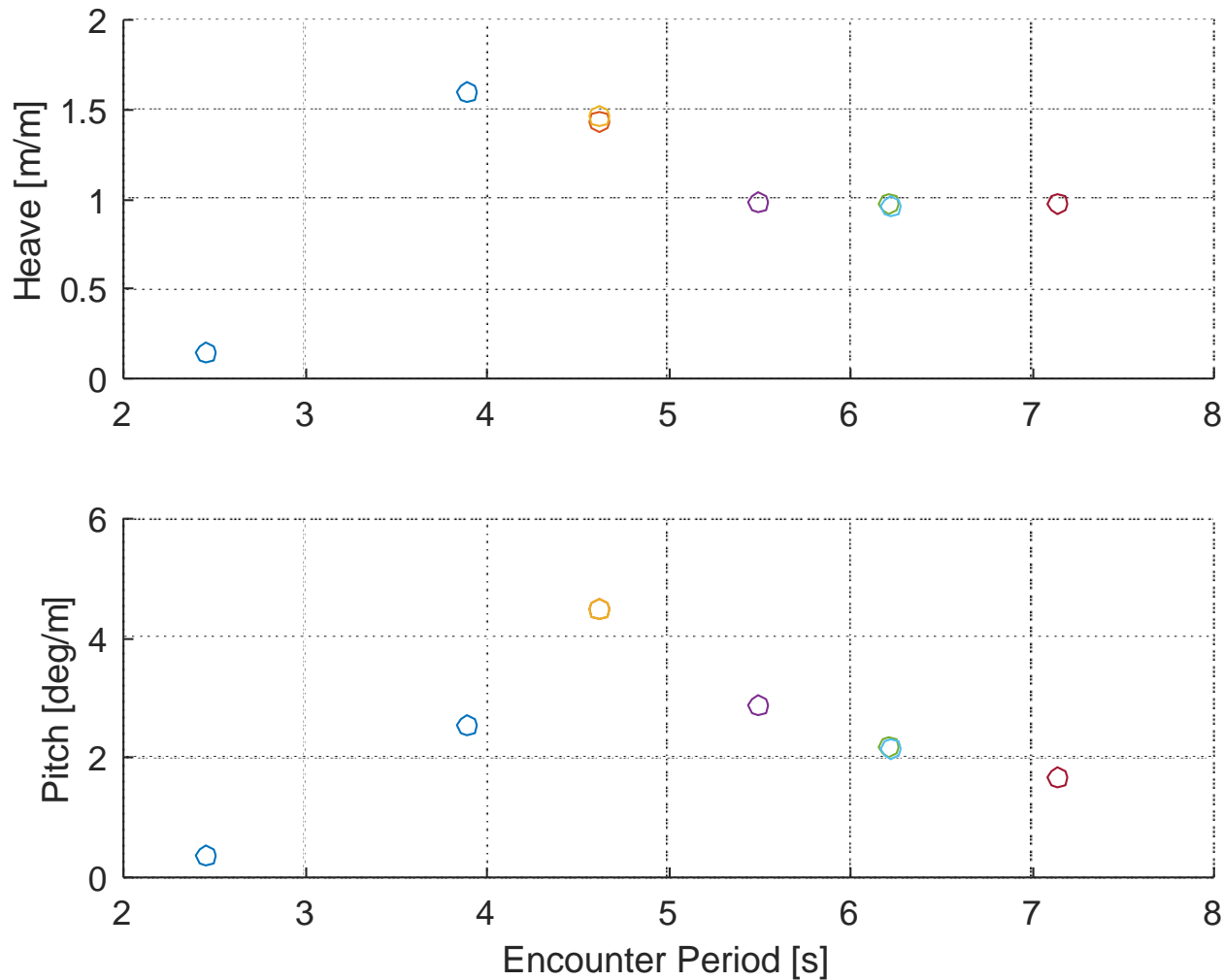


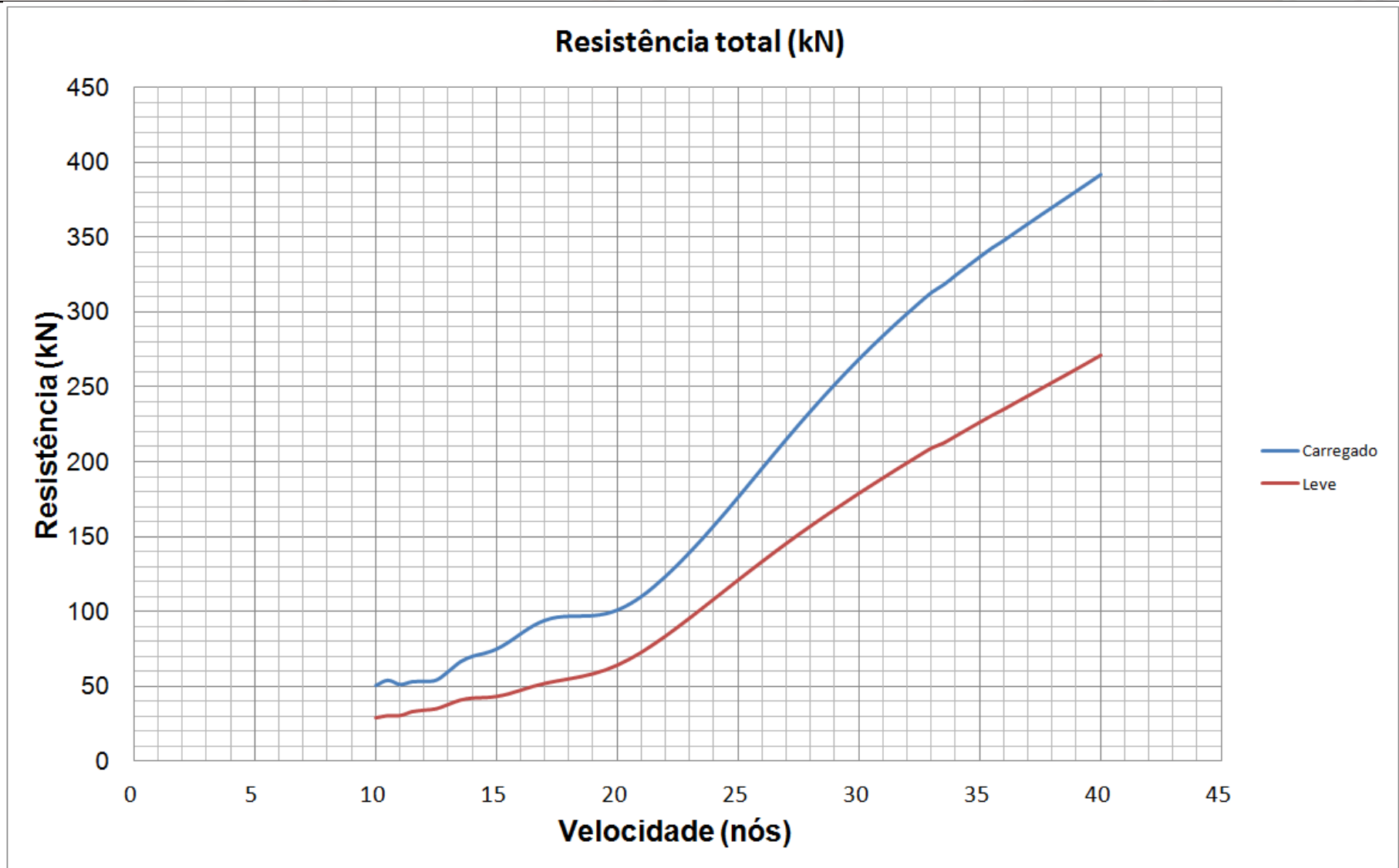
Figure 6 Model in the IPT towing tank.

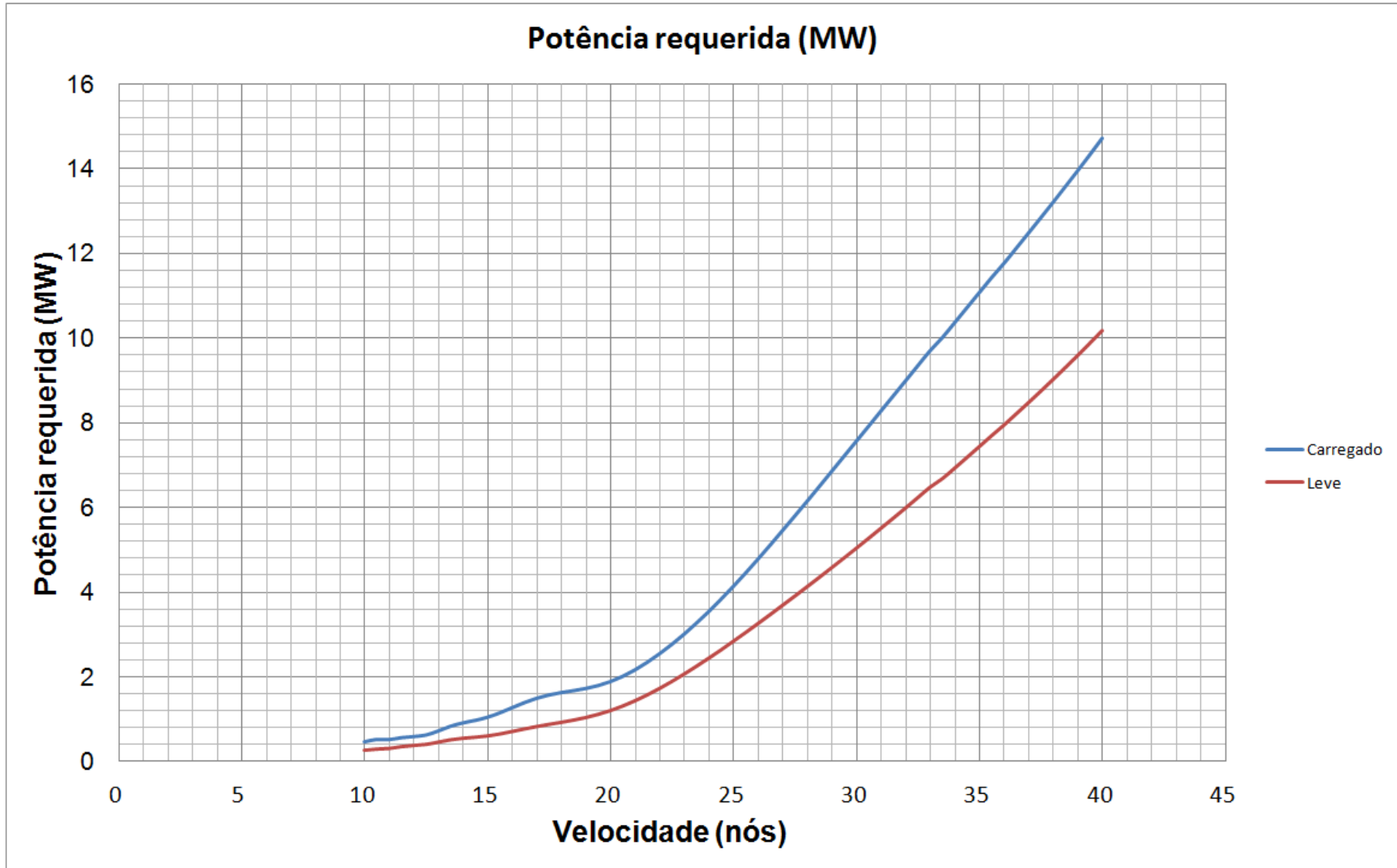




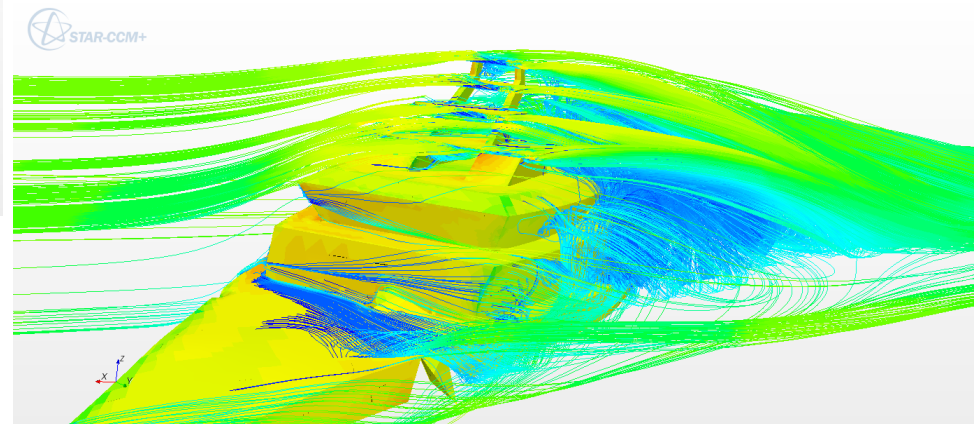
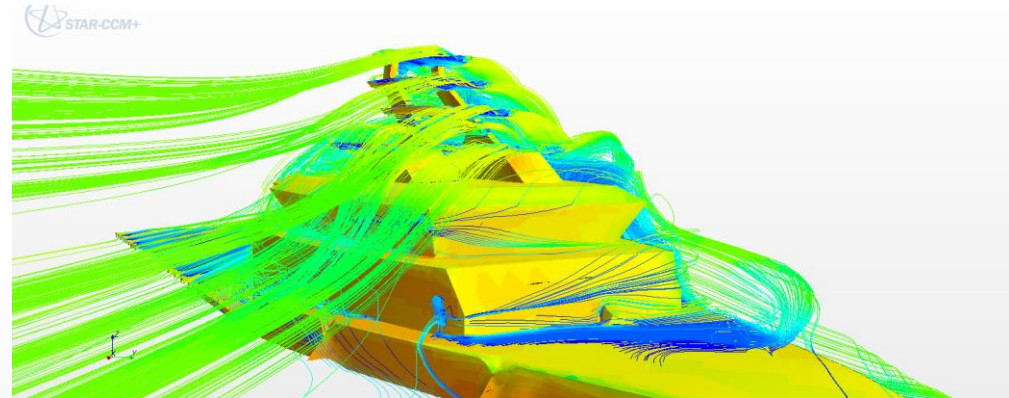
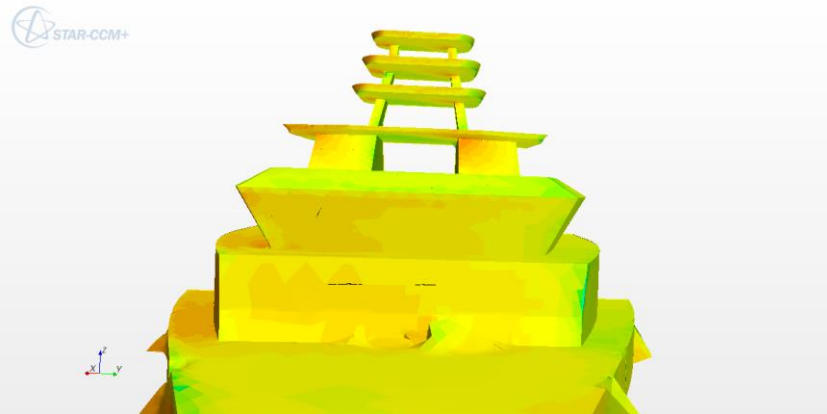




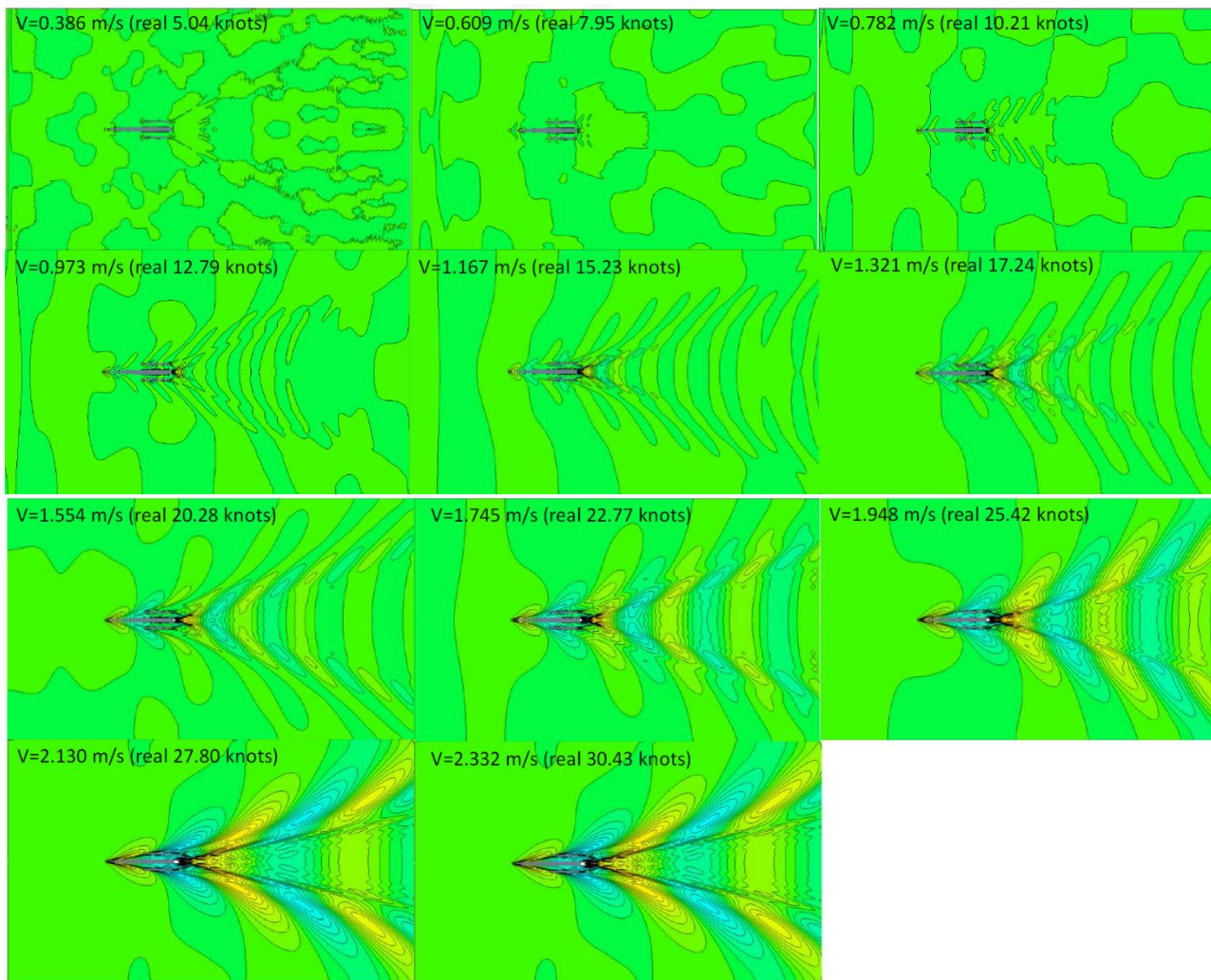


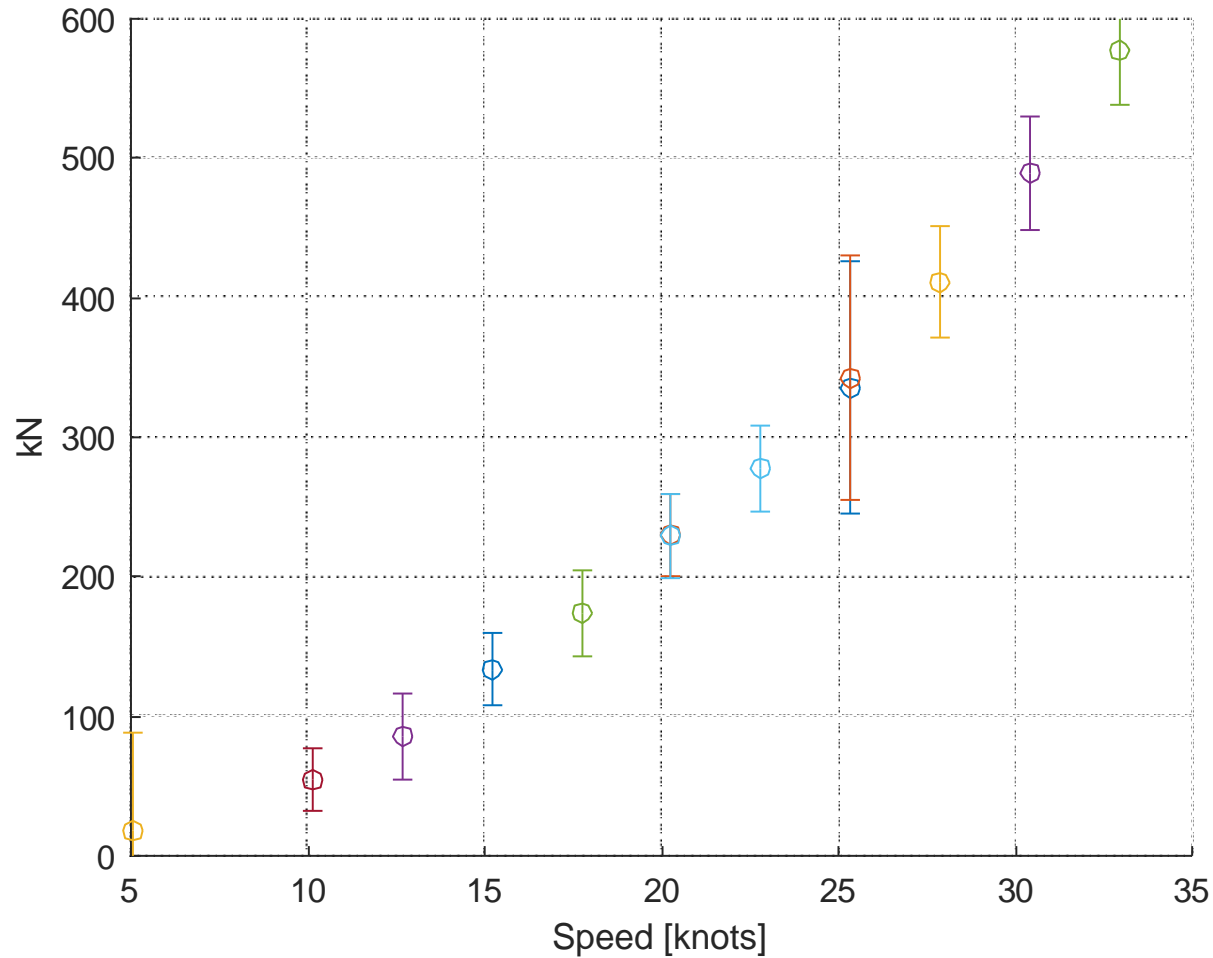


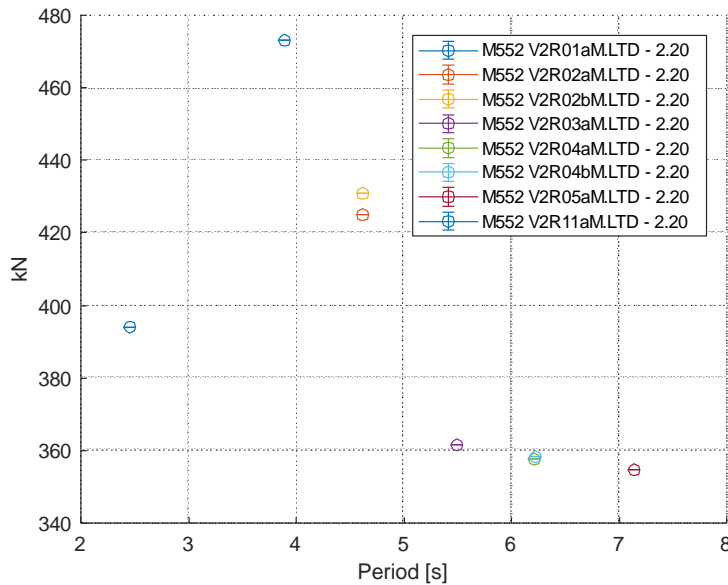
- **StarCCM+ (trimaran hull)**
- Full scale
- Turbulent flow



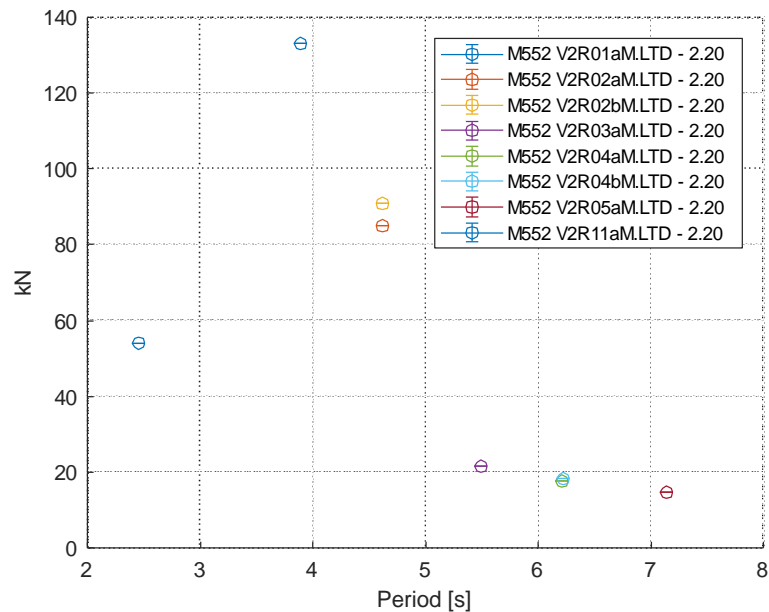








Mean



Added

- Seakeeping performance and ship resistance of a trimaran high speed vessel
- RAO motions at the zero forward speed and at the 25 knots cruise speed with head seas. From this last simulation, the wave added resistance was obtained.
- The overall result presented uptimes higher than 70%.
- Trim angles increase and sinkage reduces at high speed.
- The ship resistance at 25knots had a mean value of 400kN
- Sinkage of 0.3m and trim angle of 0.6 degrees.
- Heave motion is amplified more than 1.6x
- Pitch motion is almost 5x degrees per wave amplitude in.
- Wave added resistance of 150kN at an encounter period of 3.9s close to the pitch resonance period.

# Thank you

[edgard@technomar.com.br](mailto:edgard@technomar.com.br)