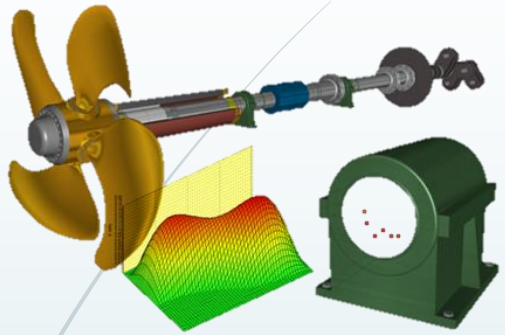
TECNAVIN S.A.®
Naval Projects



ShaftDesigner
The Shaft Calculation Software
www.shaftdesigner.com

Propulsion system

Design, vibration calculations and alignment

ShaftDesigner
The Shaft Calculation Software

Franklin Jhonny Dominguez Ruiz, PhD. Naval Eng.
Tecnavin S.A. Manager
jdominguez@tecnavin.com

TECNAVIN S.A.®
Naval Projects

ShaftDesigner
The Shaft Calculation Software

CONTENT

- Importance of propulsion systems engineering
- ShaftDesigner software for propulsion system design
- Study cases
  - Re-powering of passengers yacht, length 64 m; RINA classification
  - Re-powering of patrol boat, length 32 m- axial resonance
  - Re-powering of tanker, length 103 m; LLOYD'S REGISTER classification
  - Re-powering of corvette, length 62 m
  - Frigate propulsion system design, length 86 m
  - Patrol boat design, length 46 m; LLOYD'S REGISTER classification

TECNAVIN S.A.®
Naval Projects

ShaftDesigner
The Shaft Calculation Software

Importance of propulsion systems engineering

What is the study of propulsion systems engineering?

- Calculations:
  - Propulsive and propeller design;
  - Propeller damping, hydrodynamic and vibratory forces
  - Equipment support bases and hull deflection;
  - Connection circuits for supply and discharge of propulsion engines;
  - Vibration analysis and alignment calculation;
- Study of:
  - Components selection and configuration;
  - Bearing tribology and load analysis.

TECNAVIN S.A.®
Naval Projects

ShaftDesigner
The Shaft Calculation Software

Importance of propulsion systems engineering

Advantages of the correct selection of propulsion system components :

- Greater efficiency;
- Avoid operation break off due to failures;
- Longer components life;
- Avoid ship structure damage;
- Avoid vibration.

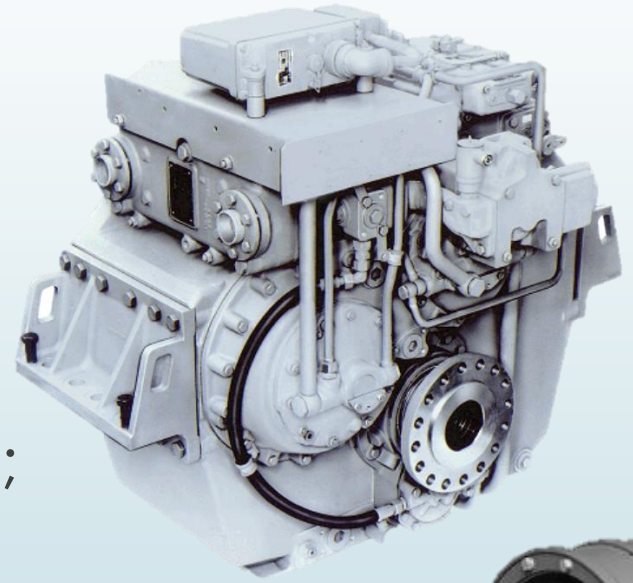
TECNAVIN S.A.®
Naval Projects

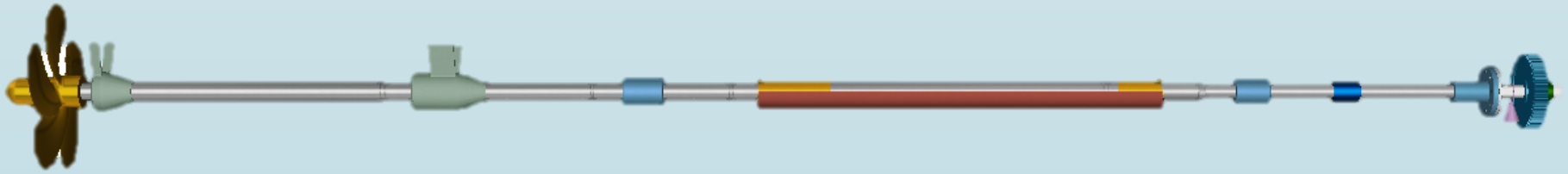
ShaftDesigner
The Shaft Calculation Software

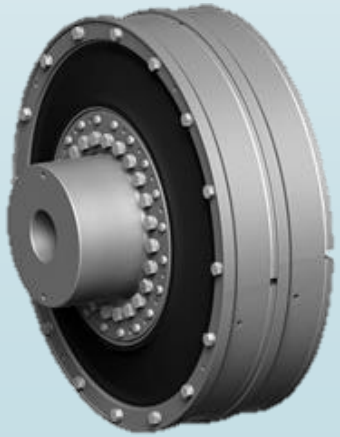
Importance of propulsion systems engineering

Design of a new propulsion line :

- Flexible coupling selection;
- Gearbox selection;
- Propulsion shaft;
- Propeller and number of blades;
- Bearing type and location;
- Stiffness of flexible mounts.







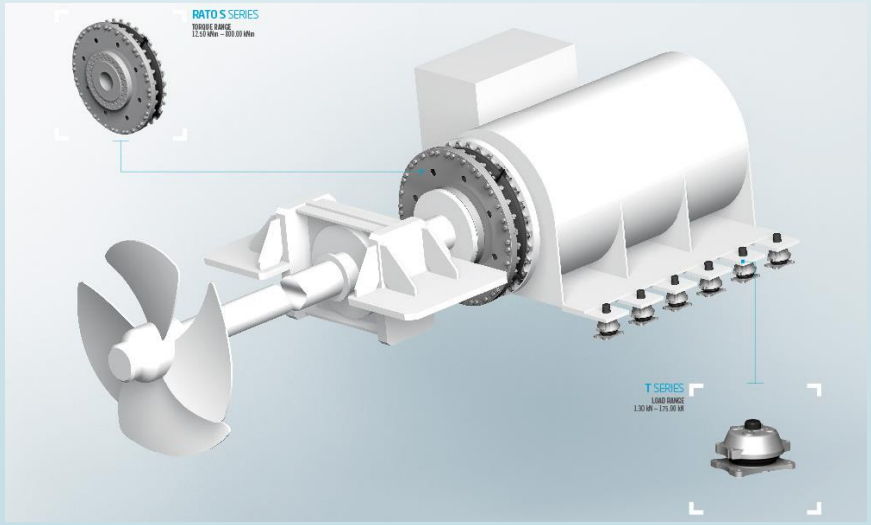
TECNAVIN S.A.®
Naval Projects

ShaftDesigner
The Shaft Calculation Software

Importance of propulsion systems engineering

Reverse engineering of existing propulsion lines:

- Re-powering;
- Presence of vibrations or fractures;
- Accelerated wear of bearings or components.



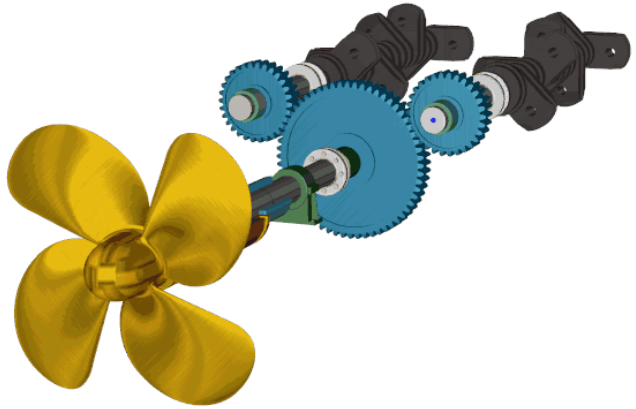
TECNAVIN S.A.®
Naval Projects

ShaftDesigner
The Shaft Calculation Software

ShaftDesigner software for propulsion system design

- Specialized software for propulsion systems;
- Intuitive and easy-to-use 3D environment, with drag-and-drop system components;
- One 3D model works for all calculation modules;
- Reports automatically generated for approval;
- Continuous development and technical support;
- Used by recognized clients worldwide.

Lloyd's Register
KOREAN REGISTER
WÄRTSILÄ
MAN Diesel & Turbo
ZF
CENTA
MAPROM ENGINEERING B.V.
THORDON BEARINGS INC.

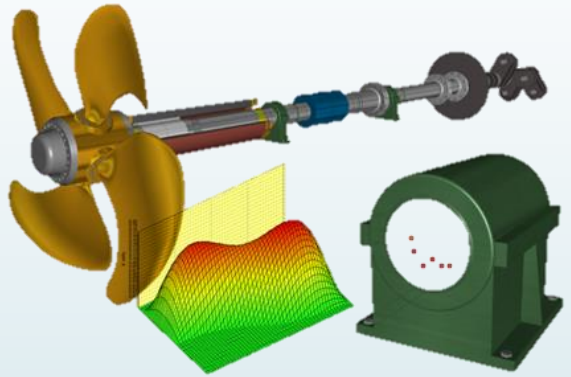


TECNAVIN S.A.®
Naval Projects

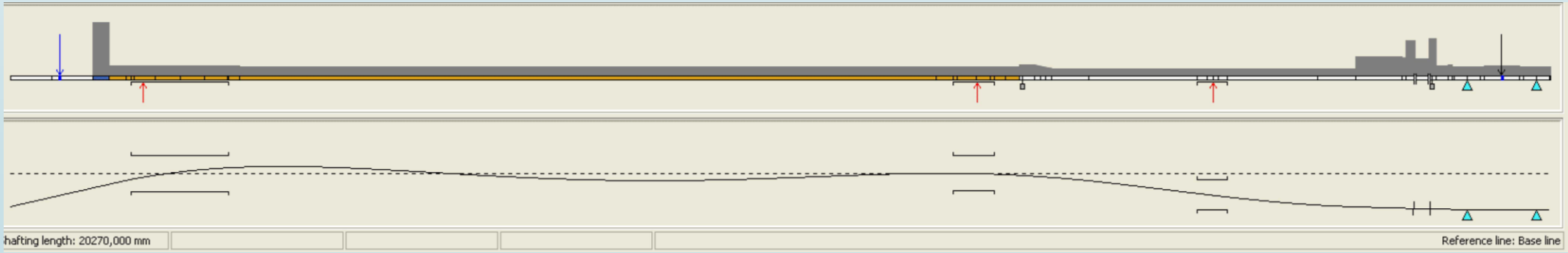
ShaftDesigner
The Shaft Calculation Software

ShaftDesigner software for propulsion system design

Propulsion line alignment module



- Loads on bearings and misalignment;
- SAG / GAP, offsets;
- Reverse calculation, Jack up tests, strain gauges;
- Hydrodynamic lubrication, hull deflection, hydrodynamic propeller loads.



Propeller shaft deflection curve

TECNAVIN S.A.®
Naval Projects

ShaftDesigner
The Shaft Calculation Software

ShaftDesigner software for propulsion system design

Lateral vibration module (whirling)

- Estimate possible resonances in the driveline;
- Calculation of free vibrations (Campbell Diagram) and forced vibrations;
- Link to alignment module for accuracy;
- Analyze proper location of supports (bearings).

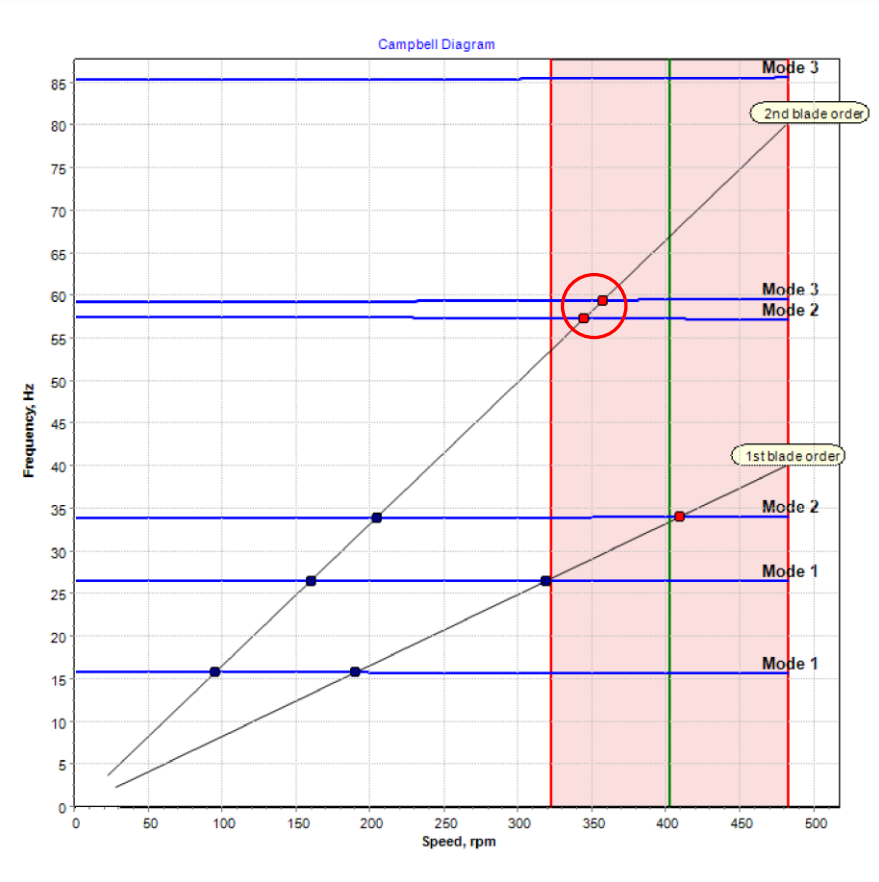


Diagrama Campbell

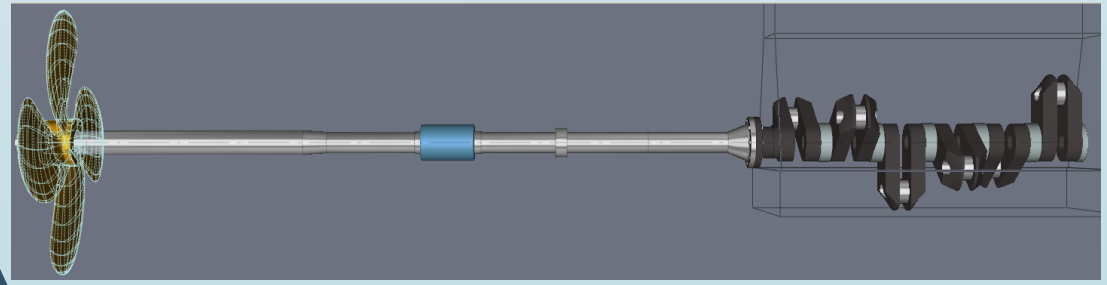
TECNAVIN S.A.®
Naval Projects

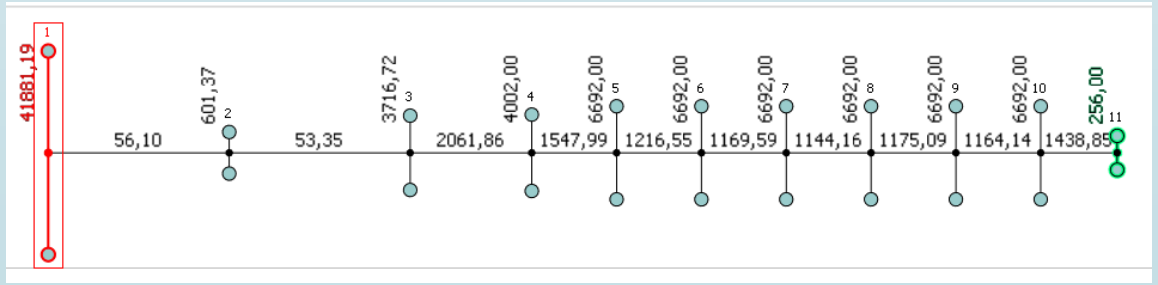
ShaftDesigner
The Shaft Calculation Software

ShaftDesigner software for propulsion system design

Torsional vibration module

- Free and forced vibrations;
- Components vibratory deformation, torque and stress;
- Standard ignition and misfiring of engine cylinders;
- Power loss (Damper and flexible coupling);
- Gear hammering (Gearbox).





TECNAVIN S.A.®
Naval Projects

ShaftDesigner
The Shaft Calculation Software

ShaftDesigner software for propulsion system design

Axial vibration module

- Free and forced vibration analysis;
- Deformation and load in thrust bearing;
- Avoid resonances in the working range;
- Analysis includes stiffness of supports and equipment support mounts.

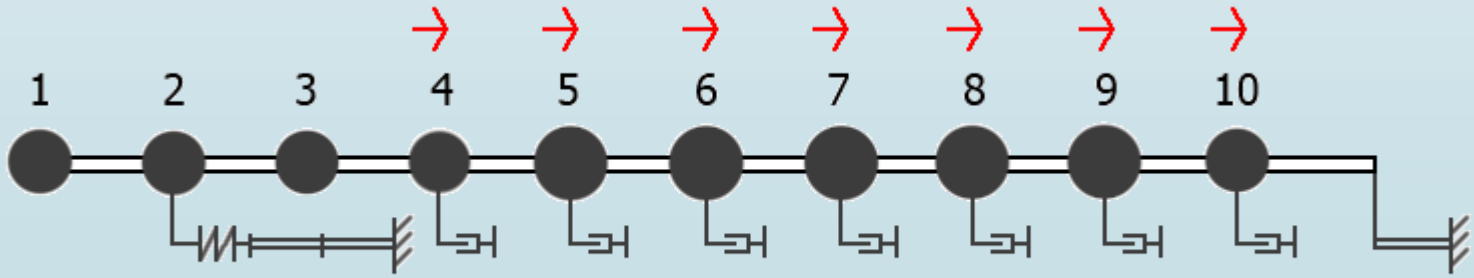


Diagrama de masas axiales

TECNAVIN S.A.®
Naval Projects
www.tecnavin.com

ShaftDesigner
The Shaft Calculation Software
www.shaftdesigner.com

THANK YOU
FOR YOUR ATTENTION

RICE
www.ricepropulsion.com

To guarantee our Engineering work and studies, we look for the approval and agreement with international classification rules emitted by the most prestigious Classification Societies member of the IACS.

García Goyena 600 & Chimborazo - Guayaquil - Ecuador

CEL: (593) 984166936 e-mail: jdominguez@tecnavin.com

Skype: franklin.johnny.dominguez.ruiz1