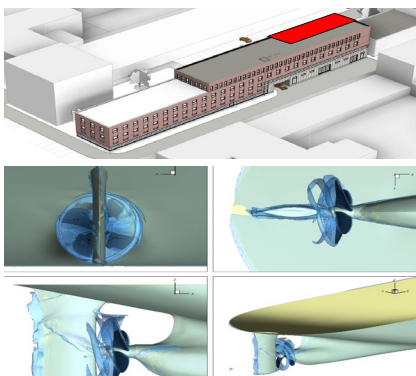


ReFRESKO-operation

Joint Maritime CFD development, validation and application

CFD plays an increasingly important role in the optimisation of maritime structures and the investigation of complex flow phenomena. MARIN has always supported this role for CFD with dedicated tool development (PARNASSOS and ReFRESKO), extensive validation and application. To facilitate the use of reliable CFD in the maritime design and engineering processes, MARIN has invested in a new large computer cluster at its premises. The total MARIN computing power together with the CFD code ReFRESKO, forms a new facility: the 'Maritime Cluster'.



Cluster + Code = CFD facility ('The maritime Cluster')

Naval architects and offshore engineers increasingly use CFD calculations themselves or plan to do so in the near future. To stimulate cooperation and interaction in this field, MARIN would like to invite its clients for the 'ReFRESKO-operation'. In this partnership, MARIN wants to share its dedicated maritime CFD code ReFRESKO, and wants to open up its computer clusters, so that we can jointly work on the reliable and robust application of CFD in our maritime field.

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Advantages

What does the MARIN ReFRESKO-operation offer?

- The specialised, verified and validated maritime ReFRESKO code on your office computers without limitations in the number of users and compute cores.
- The possibility to scale up calculations on the MARIN medium cluster (1600 compute cores) without large investments, and with the same input files.
- An extensive team of CFD specialists at MARIN around your own CFD team for advice and long-term continuity.
- Direct interaction with the MARIN CFD developers, and insight into the methodology and source code.
- Direct benefit from all ongoing MARIN developments on ReFRESKO, and for participants to have a say in prioritising developments financed by participation fees.
- Access to workshops with other participants for exchange on applications in your specific fields of interest (ships, offshore structures, renewable energy devices) and access to the resulting validation cases, tutorials and examples.
- Code developments and validation cases from other JIPs will become available after the confidentiality period of those JIPs has expired.
- Possibility to cooperate in further developing (modules of) the code, on condition that all developments are shared with the other participants in the ReFRESKO-operation.

ReFRESKO

ReFRESKO is an acronym for **Reliable&Fast Rans Equations** (code for) **Ships** (and) **Constructions Offshore** and resembles in several topics a general CFD commercial code. The code has been under development since 2005 and is based on state-of-the-art numerical algorithms and software features, and on the long lasting experience of MARIN in CFD. It has been verified, validated and optimised for numerous maritime industry problems in collaboration with the Technical University of Lisbon, the University of Sao Paulo, the Technical University of Delft, the University of Groningen, and the University of Southampton. Until now, ReFRESKO has been an in-house MARIN code used for clients. Often ReFRESKO was used in combination with model tests, so that the tool was validated step by step. MARIN has been investing in the hydrodynamic quality of the tool and has the flexibility to modify or extend it when needed. The code can handle any type of computational grid, it can easily be coupled to other tools such as geometry CAD packages, grid-generator tools, optimisation packages, BEM software and fast time-domain simulation tools. ReFRESKO does not come with dedicated grid generators and post-processing tools, but the code integrates with all major packages on the market. Furthermore, ReFRESKO can run complex massive parallel problems on large HPC clusters.



For more information contact MARIN:
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Background

To support the ReFRESKO-operation, MARIN is presently significantly extending its CFD development, validation and application team. By participating in the ReFRESKO-operation, you join us in the further development, validation and application of the maritime ReFRESKO code. So ReFRESKO is not a closed and finalised tool, but an open tool in development with an extending number of validated applications. Further development will go step by step in coordination with the partners in the ReFRESKO-operation. ReFRESKO does not replace generic commercial CFD codes, which also have their merits, and can be used for a wider range of applications. However, these codes are often not validated for maritime applications. ReFRESKO gives you the possibility to apply CFD reliably for specific maritime applications in direct open interaction with the developers and other users (at MARIN and at other companies). Compared to open-source initiatives, this cooperation has the advantage that you always start with a working and validated code. You are also sure that further developments are shared with the partners in the ReFRESKO-operation (whereas further developments based on open source are not always shared openly). This is why we propose a development within a partner group with real open sharing.

How does it work in practice?

- To get acquainted with the ReFRESKO code, you receive a 2 or 3-day training for a specific application. This is a paid and dedicated study and training. Of course the required training depends on the experience you may already have with ReFRESKO from previous projects and CFD in general.
- After the training you can use ReFRESKO freely on your own computers with an unlimited number of users and on an unlimited number of computing cores.
- You can use your own geometry and grids for the calculations as well as your own post-processing software. Within the partnership, further integration will be developed to serve your needs.
- MARIN can assist in the preparation of geometry and grids in a joint QA check and in the first runs.
- If you want to scale up your calculation, you can run it on MARIN's medium cluster (1600 cores) against a reasonable fee per CPU hour that includes the use of the cluster and the code.
- If you want to have MARIN's advice on a calculation or want to have MARIN performing an independent check on the large MARIN cluster, this step is easy as we are using the same programs and formats. For advice and reporting, regular manhours' fees of MARIN specialists apply. Independent and final checks can be done on a regular project basis.

Plan and participation fees

Currently several ReFRESKO-operation partnerships are running. A detailed and custom ReFRESKO-operation partnership plan can be provided upon request. It will give an overview of the present capabilities of the ReFRESKO code and the development plan for the next few years. Contact us to start discussing how a partnership will benefit your operation!

