



Upgrade-Retrofit

Make the right move...

A large industrial turbocharger is being lifted by a chain in a workshop. The turbocharger is yellow and red, and is being held by a chain. A person in a blue shirt is visible in the background, working on the engine. The scene is dimly lit, with the main light source coming from the left, highlighting the turbocharger and the chain.

What is Upgrade-Retrofit

Upgrade-Retrofit is mainly focused on owners of older diesel engines who want to extend the useful life time of their vessel or power plant or want to sell it in higher price. In these cases the best and most suitable solution is the replacement of the old turbocharger model (retrofit) with a new unit of more modern technology with many economical, technical and environmental benefits.



Economical Benefits

- Reduced fuel oil consumption
- Lower investments compared to new buildings
- Longer time between overhauls
- Extending the useful life of the vessel or power plant
- Cheaper spare parts
- Extension of time between replacement of engine components
- Reduction or avoidance of engine downtime



Technical Benefits

- Higher T/C efficiency
- Higher speed margin
- Lower exhaust gas temperature
- Higher scavenging air pressure
- Less contamination
- Increase of engine's output power





BEFORE



AFTER



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Environmental Benefits

- Compliance with latest emission regulations Tier II and III
- Greater flexibility in varying environments conditions
- Lower particulates, NO_x and CO₂ emissions

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When you do Upgrade-Retrofit



If you face one of the below situations the only solution is to retrofit your old turbocharger:

- Your vessel max speed is low with high fuel consumptions due to ageing resulting change of slip factor.
- The components of turbocharger are quickly worn and the time between the overhauling is shorter than normal.
- You can not find any more spares, the delivery time of spares is very long or the spares are very expensive.
- The fuel consumption is very high.
- Your engine does not respond quickly to load changes.
- When an owner wants to increase the vessel's or power plant profit with a low investment.
- Low scavenging air pressure or high exhaust gas temperatures causes also worn to the engine's and turbocharger's components.
- Your vessel is prohibited to navigate to certain ports and routes due to environmental restrictions.



Why to choose Turbomed for your Upgrade-Retrofit

- Big experience-know how
- Has performed many successful retrofits
- Competitive prices
- Warranties
- Low delivery time of new unit
- Classification
- After sales and technical support 24/7
- Undertake turn-key project
- Low downtime of vessel
- All case studies are carried out and approved in cooperation with the National Technical University of Athens

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Our Procedure of a successful Upgrade-Retrofit What we can do for you



A successful retrofit is depending from many and various factors. The same engine can be matched with different types of turbochargers according to its operation. Therefore, in Turbomed we undertake each retrofit as unique and the solution we propose is tailor-made to the needs of our clients.

A retrofit case is handled with special care. Our retrofit expert team to identify the feasibility of each case has first to discuss with the customer to clarify exactly their needs and a make visit on board to evaluate all the factors that are needed for completion of the works.

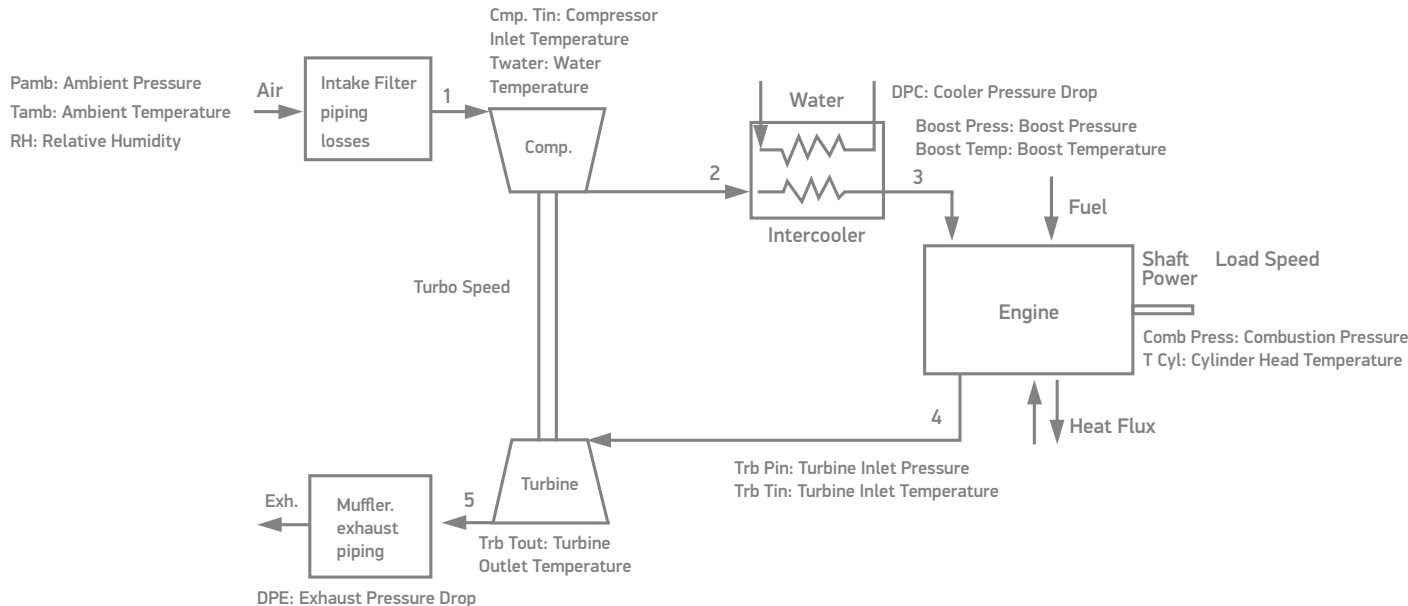
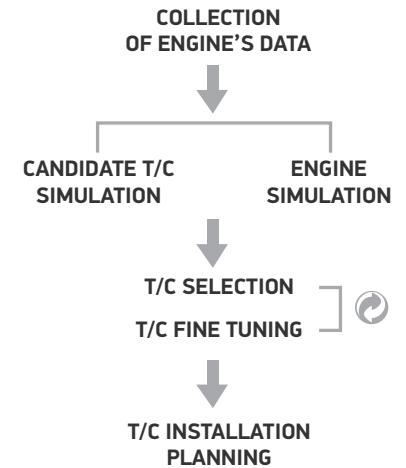
In the following pages you can find the procedure we have established to ensure the best result of a successful retrofit.

Upgrade-Retrofit Process

When a client requires an Upgrade-Retrofit solution, a series of steps are necessary before a suggestion can be recommended. The main parameters of the engine and the operating conditions drive the T/C selection. Therefore, for the specific engine a list of candidate T/C solutions is considered. The next step of methodology is the simulation of the engine with these possible T/C solutions. The inappropriate turbochargers are excluded and a fine tuning on the selected T/C is performed. Finally, the modification work that may be needed is carefully planned, based on the engine layout restrictions and optimum aerodynamic performance.

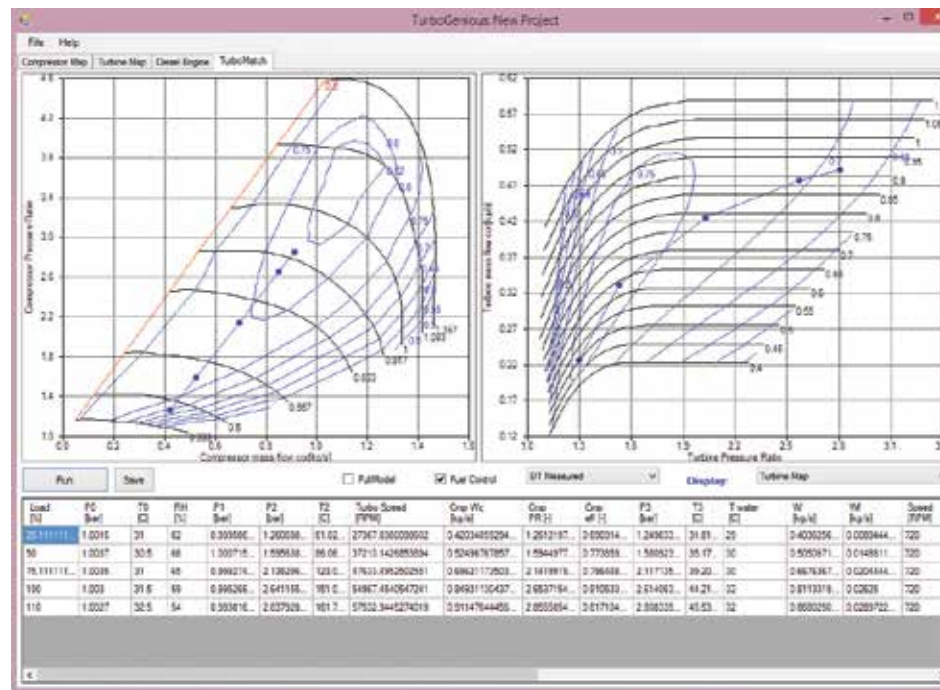
Turbo-genius Simulation Tool

A complex simulation is required, when conducting a study regarding the variation of engine's performance after T/C replacement. For the reason, the company has developed a Hellenic in-house simulation tool in cooperation with NTUA (National Technical University of Athens). The components of this system are as follows:

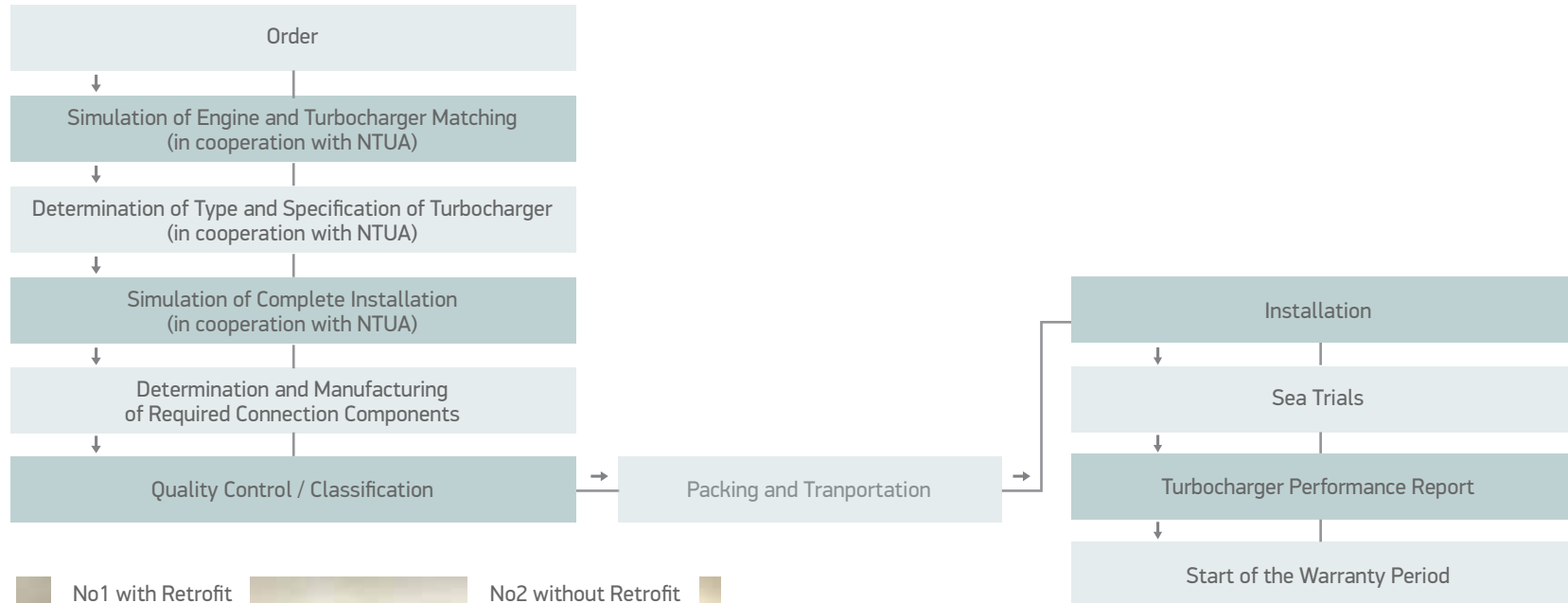


Turbo matching

All these components are simulated together as a system in order to estimate the performance of the engine and turbocharger after the retrofit. Furthermore, a fine tuning sensitivity analysis is carried out if the turbocharger has more than one specification.



Flow chart 2: Retrofit – Steps after the order (From our ISO 9001:2015 system, Procedure D118)



Pressure Indicators of a Passenger vessel with 2 M/E Pielstick 12PC2-5V.
 Monitoring both engines in the same load:

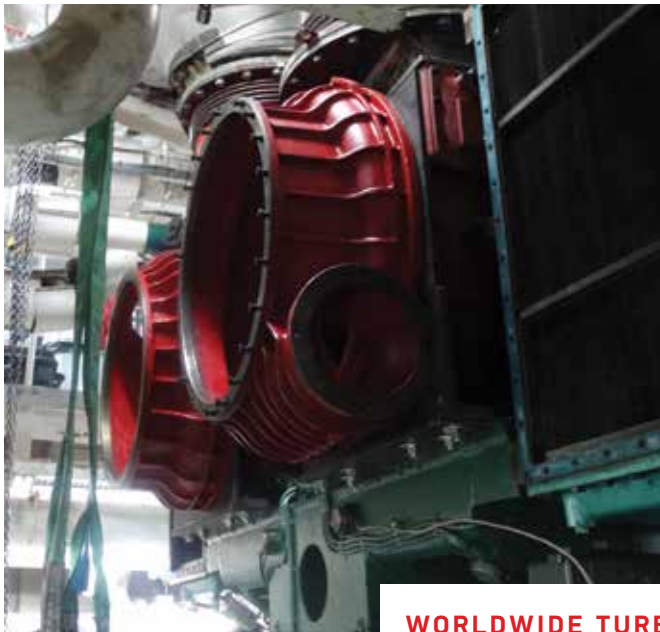
No.1 M/E (with Retrofit)
 Scavenging pressure 1 bar, low exhaust gas temperature and no smoke.

No.2 M/E (without Retrofit)
 Scavenging Pressure 0.75 bar, high exhaust gas temperature and smoke.



We give back the true value

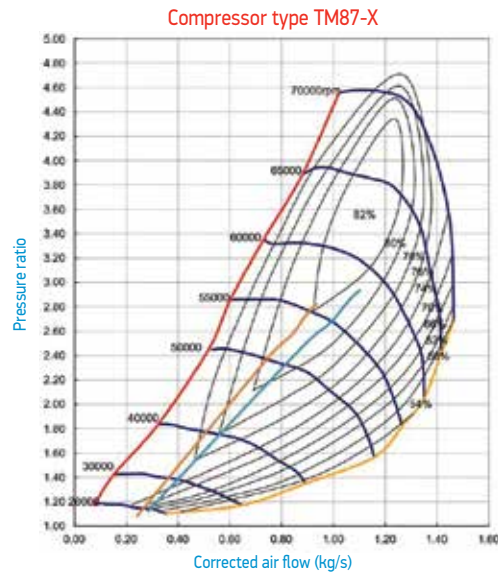
and reliability of your property



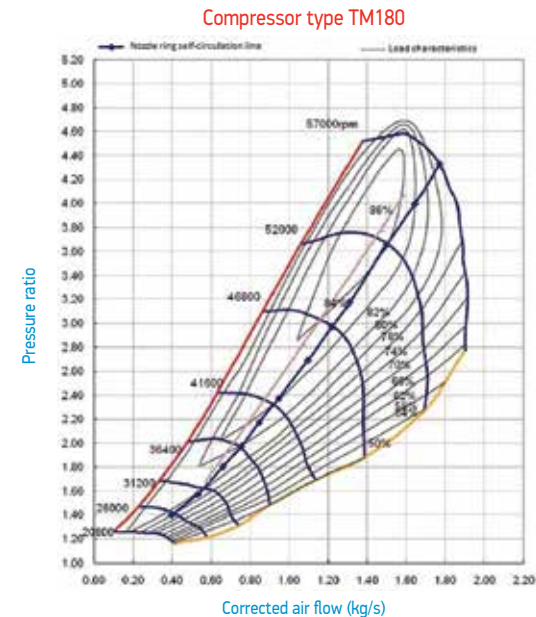
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Examples of Compressor Wheel

Efficiency Maps used in Navy's Diesel Generators



MODEL	Air flow rate (Kg/S)		Matching Power (kW)	Maximum Pressure Ratio	Maximum Efficiency factor n[%]
TM87-X	$\Pi=1.2$	$\Pi=4.5$	350 - 600	4.5	82
	0.1 - 0.35	1.0 - 1.35			



MODEL	Air flow rate (Kg/S)		Matching Power (kW)	Maximum Pressure Ratio	Maximum Efficiency factor n[%]
TM180	$\Pi=1.2$	$\Pi=4.5$	600 - 1100	4.5	86
	0.1 - 0.35	1.3 - 1.7			

Quality - Type approval Certificates

Turbomed is certified for Retrofit works from Lloyd's register of Shipping





State of the art workshop
and a fully equipped warehouse



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