

TurboMatch™ Turbocharger Design System

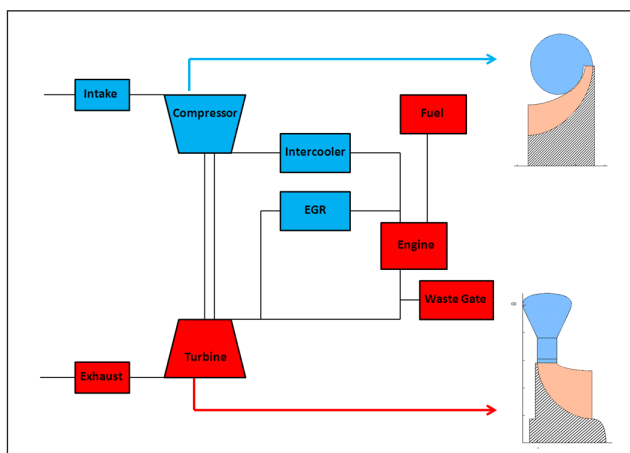
THE MOST EFFECTIVE TURBOCHARGER DESIGN IS TIGHTLY LINKED WITH THE overall engine system. The complex interaction between the compressor, turbine, internal combustion engine, and other components in the overall system requires an integrated approach to design. Concepts NREC's new Turbocharger Design System package provides users with the ability to lay out and analyze a turbocharger design that is optimally matched to the specific engine system.

Component Matching Capability

TurboMatch™ allows users to study the match between the engine and turbocharger at a fundamental level, and to size the turbocharger to the engine. In the 'design' mode of the system, users can size the compressor and turbine to the required pressure ratios and automatically match the power and rotational speed of the two. The



TurboMatch™ provides system-level modeling of key components in a turbocharger system.



Perform preliminary design of compressor and turbine in context of a turbocharger system.

Turbocharger Design System

ouples with design tools for map generation: COMPAL® for radial compressors and RITAL™ for radial turbines. Engine, intercooler, wastegate, and exhaust gas recirculation characteristics can easily be modelled by first-order equations or by specific user input. The design mode provides the starting point for the geometry using built-in, time-tested design rules. The second mode of operation, the 'analysis' mode, allows the user to manipulate the overall geometric characteristics of the compressor and/or turbine and examine the performance of the overall system as it interacts with the compressor and turbine maps.

Compressor and Turbine

TurboMatch links dynamically to COMPAL and RITAL and allows the user to do the preliminary design of a new compressor and turbine, generate performance maps, and study the matching of the components interactively. Alternatively, TurboMatch will read in SAE maps of existing components, allowing the user to extrapolate incomplete maps using established physical models and then edit the maps directly.

Engine Operating Line

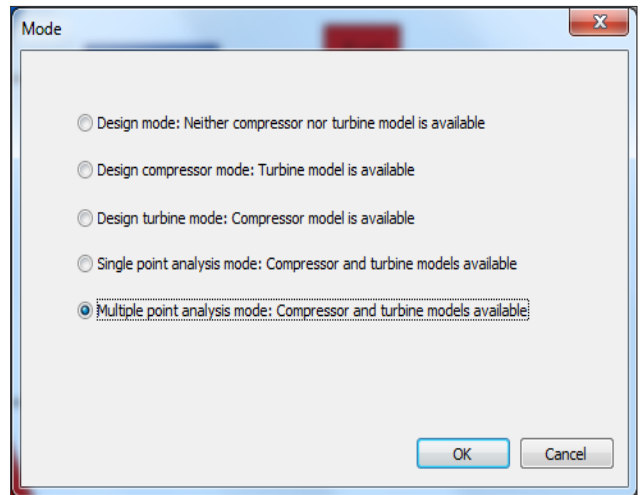
Run a complete engine operating line and plot the results on the compressor and turbine maps.

Turbocharging Systems

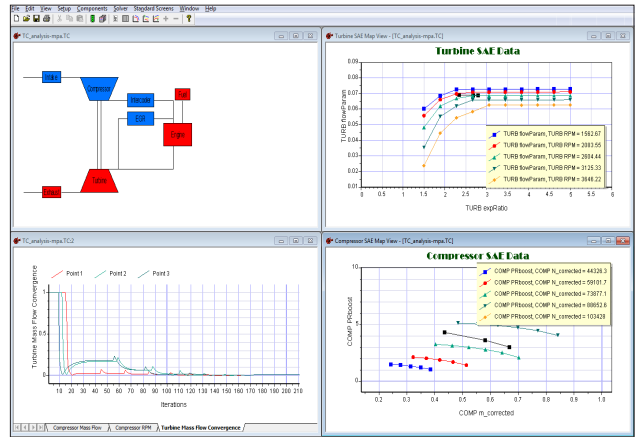
TurboMatch handles turbines with wastegates, variable geometry turbines, intercoolers, and high- and low-pressure exhaust gas recirculation (EGR) systems.

TurboMatch Benefits

- Select a turbocharger to match a given engine
- Design new turbochargers with assurance of engine matching at every design stage
- Readily change compressor and turbine sizes; then predict the effect on the match
- Rapidly make a preliminary optimization of the turbocharging system
- Study the effect of wastegates, variable geometry, exhaust gas recirculation (EGR), and component losses on the match and performance
- Easy to use; does not require a large setup time or detailed input of the system



Multiple solver options are available for design and analysis of a turbocharger system.



Identify the complete operating range of a turbocharger system.

Agile Engineering
Design System®
Applications

		Radial		Axial			
		Pumps	Fans & blowers	Compressors	Pumps	Fans & blowers	Turbines
Preliminary design	COMPAL®		✓				
	PUMPAL®		✓				✓
	RITAL™				✓		
	FANPAL™			✓			✓
Detailed design	AXIAL™				✓	✓	✓
	AxCent®	✓	✓	✓	✓	✓	✓
CFD	Pushbutton CFD®	✓	✓	✓	✓	✓	✓
FEA preprocessor	STRESSPREP™	✓	✓	✓	✓		
	AXISTRESS™					✓	✓
Optimization	TurboOPT II™	✓	✓	✓	✓	✓	✓
CAM	MAX-PAC™	✓	✓	✓	✓	✓	✓

Concepts NREC design software is compatible with all commercial design packages.

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