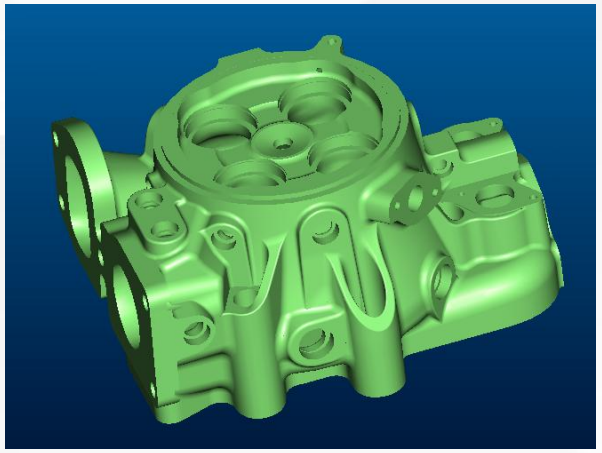
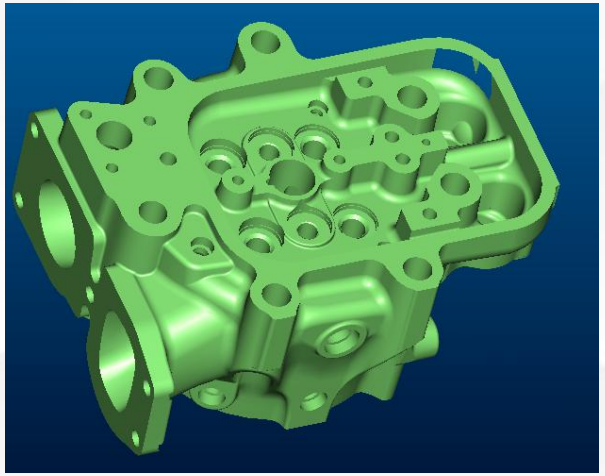
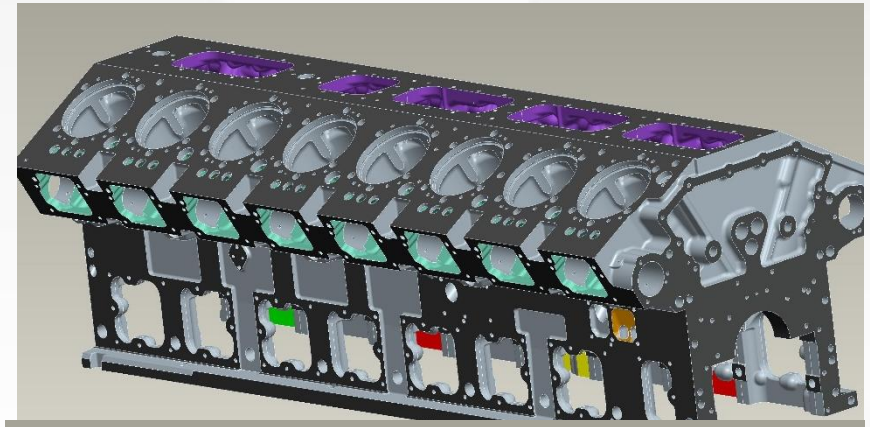
Large Bore Diesel Engine Development

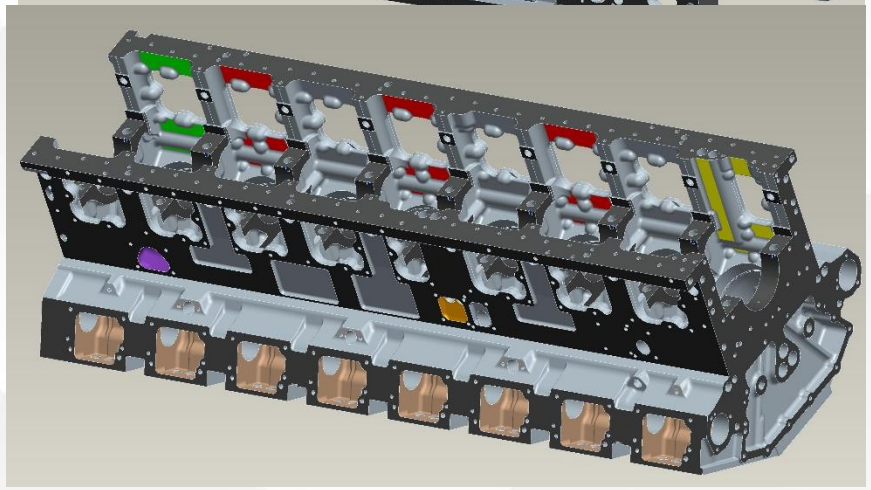
❑Heavy duty diesel engine development case

- **Heavy duty locomotive cylinder head-V16 cylinder block design**

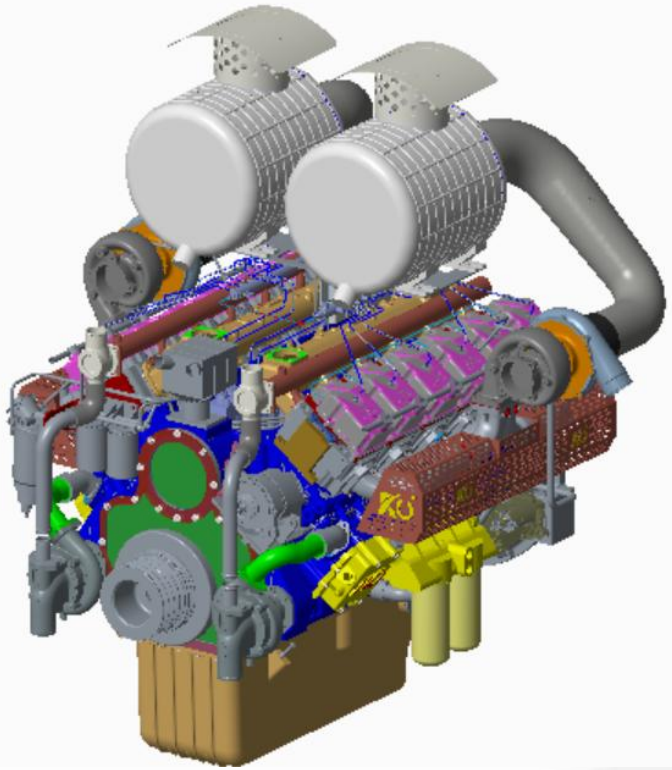








❑Development of 29L Marine engines



V12 engine (cylinder diameter 135)

Main work：

- **Whole machine 3D design, drawing design**
- **CAE analysis：**

-Thermomechanical analysis of cylinder block/head (evaluating deformation, stress, strength, and fatigue safety factor)

-Water jacket CFD analysis (evaluation of water jacket flow uniformity, heat transfer coefficient, etc.)

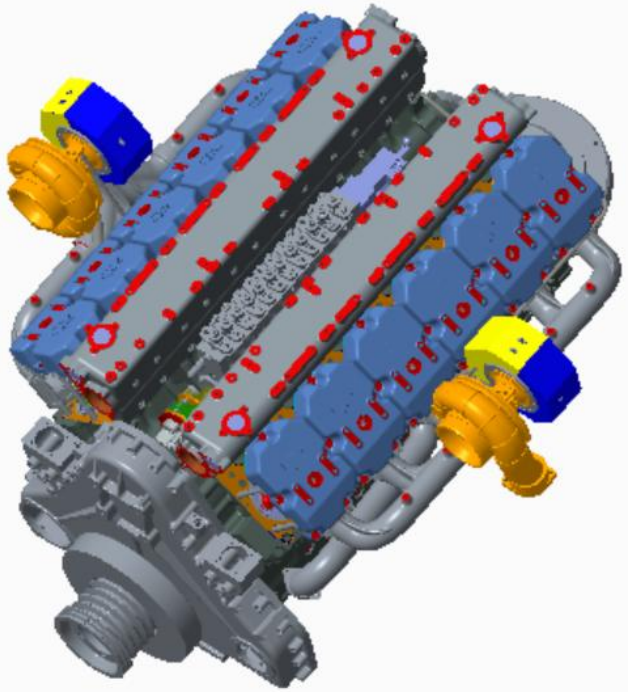
-1D thermodynamic simulation (assessing achievable performance, turbocharger matching, and design trade-offs)

-1D cooling and lubrication calculation (oil pump, water pump capacity evaluation, system pressure, flow distribution)

-EHD analysis of main bearing and connecting rod bearing (bearing contact pressure, total pressure and oil film thickness evaluation, etc.)

--Crankshaft connecting rod mechanism analysis (crankshaft strength, torsional vibration, balance, fatigue safety factor, etc.)

❑Development of 36L Marine engines



V12 engine (cylinder diameter 152)

Main work：

- **Complete 3D design and partial drawing design**
- **CAE analysis：**

-Thermomechanical analysis of cylinder block/head (evaluating deformation, stress, strength, and fatigue safety factor) (evaluation of cylinder deformation, stress, strength, fatigue safety factor, etc.)

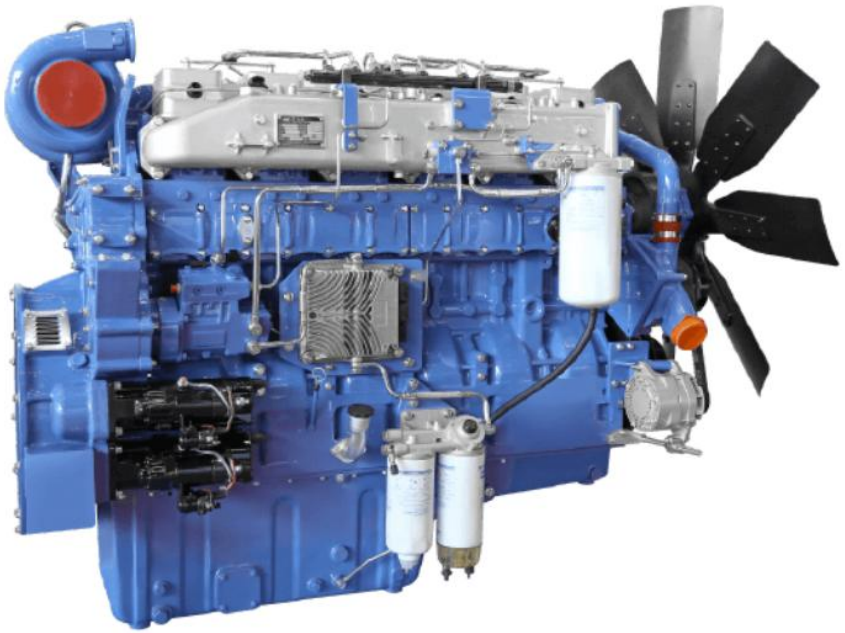
-Water jacket CFD analysis (evaluation of water jacket flow uniformity, heat transfer coefficient, etc.)

-1D thermodynamic simulation (assessing achievable performance, turbocharger matching, and design trade-offs)

-EHD analysis of main bearings and connecting rod bearings (evaluation of bearing contact pressure, total pressure and oil film thickness, etc.)

-Crankshaft connecting rod mechanism analysis (crankshaft strength, torsional vibration, balance, fatigue safety factor, etc.)

❑Development of 200L generator set engine



L6 engine (cylinder diameter 152)

Main work：

- **Cylinder head and valve train 3D design, drawing design**
- **CAE analysis：**

-Thermomechanical analysis of cylinder block/head (evaluating deformation, stress, strength, and fatigue safety factor) (evaluation of cylinder deformation, stress, strength, fatigue safety factor, etc.)

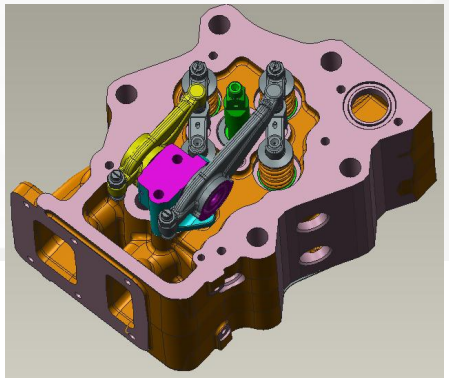
-Water jacket CFD analysis (evaluation of water jacket flow uniformity, heat transfer coefficient, etc.)

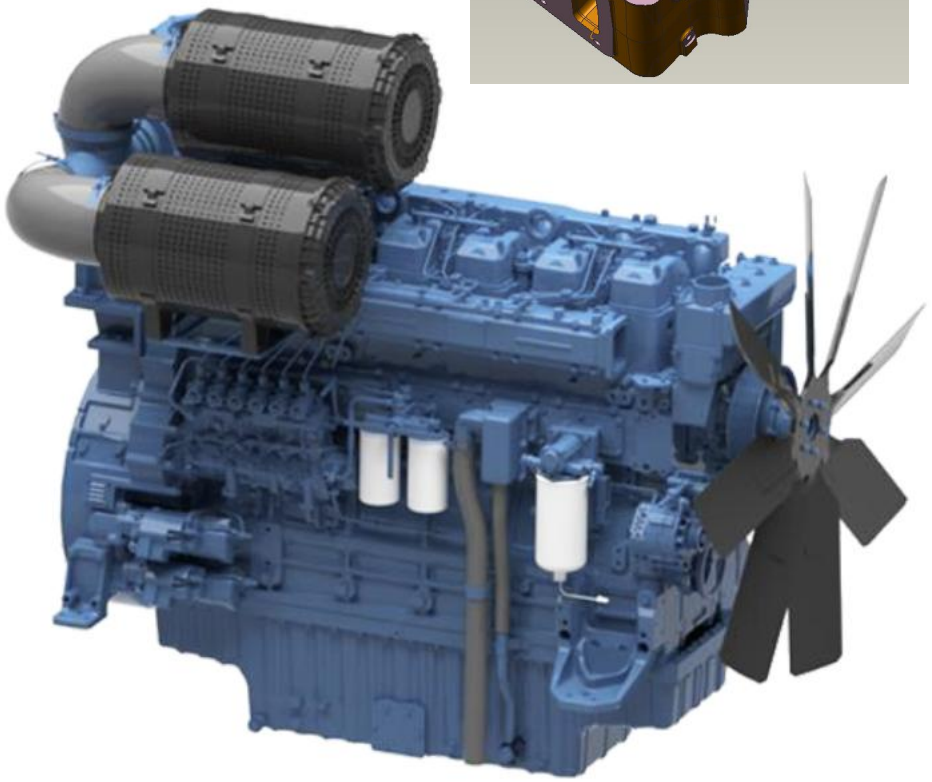
-CFD analysis of air intake and exhaust duct (evaluation of airflow vortex ratio, flow coefficient, etc.)

--Valve train kinematics/dynamics analysis (evaluating layout feasibility, cam stress, and valve bounce, etc.)

-Strength calculation of the valve train (evaluation of rocker, bearing seat, rocker shaft stiffness, strength and fatigue safety factor, etc.)

❑32L generator engine development





L6 engine (cylinder diameter 175)

Main work：

- **Cylinder head and valve train 3D design**
- **CAE analysis：**

-Thermomechanical analysis of cylinder block/head (evaluating deformation, stress, strength, and fatigue safety factor) (evaluation of cylinder deformation, stress, strength, fatigue safety factor, etc.)

-Water jacket CFD analysis (evaluation of water jacket flow uniformity, heat transfer coefficient, etc.)

-CFD analysis of air intake and exhaust duct (evaluation of airflow vortex ratio, flow coefficient, etc.)

-Motion and dynamic analysis of the valve train (evaluation of the arrangement and feasibility of the valve train, cam contact stress, valve bounce, etc.)

-Strength calculation of the valve train (evaluation of rocker, bearing seat, rocker shaft stiffness, strength and fatigue safety factor, etc.)

❑Generator engine development

Main work：

Reform and optimization design of cylinder body and cylinder head, 3D model and 2D drawing

CAE analysis：

-Cylinder block and cylinder head thermal coupling analysis;

-Water jacket CFD analysis;

-CFD analysis of combustion in cylinder;

-CFD analysis of intake and exhaust ducts

Item	Parameter
Engine Type	four stroke, direct injection, supercharged intercooler
Number of cylinders	inline 6
Power	800~1200kW
Bore× stroke	225 × 320mm
Compression ratio	15:1
Speed	1000 rpm

❑Development of 80-105 L generator set engine

- **V12-V16 engines**

Displacement: 80-105L

Bore: 200-230mm

- **Main work :**

-Structural optimization and 3D design

-CAE caculation

-Cylinder block and cylinder head thermal coupling analysis;

-Water jacket CFD analysis;

-CFD analysis of combustion in cylinder;

-CFD analysis of intake and exhaust ducts

-1D thermodynamic analysis

THANKS !

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