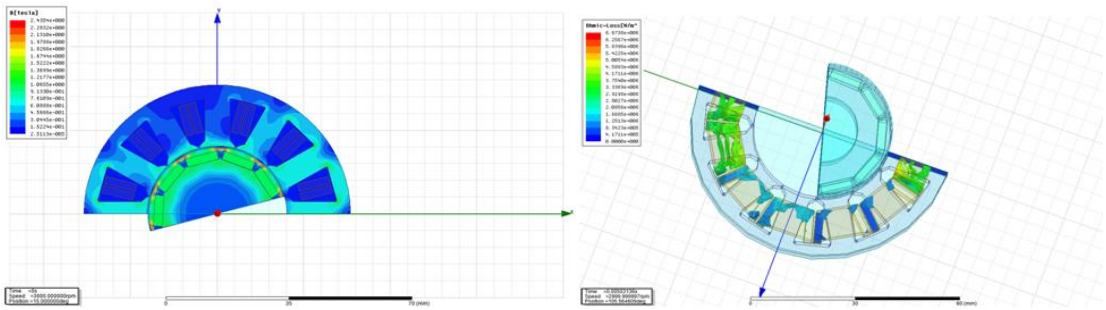
# Our Motor Design and Material Selection

## 1. Electromagnetic Simulation

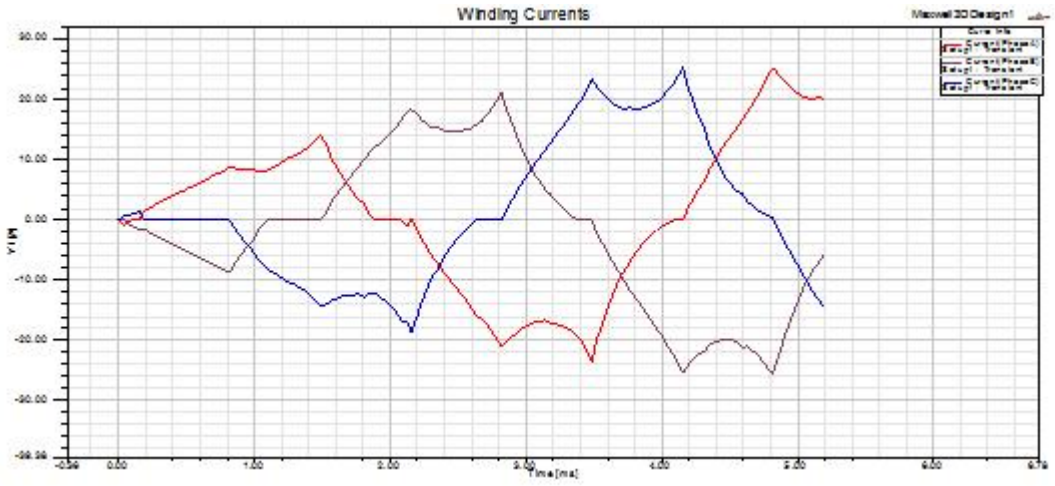
Adopt Ansoft Maxwell to conduct 2D and 3D electromagnetic field simulations, following the specific process and objectives below:

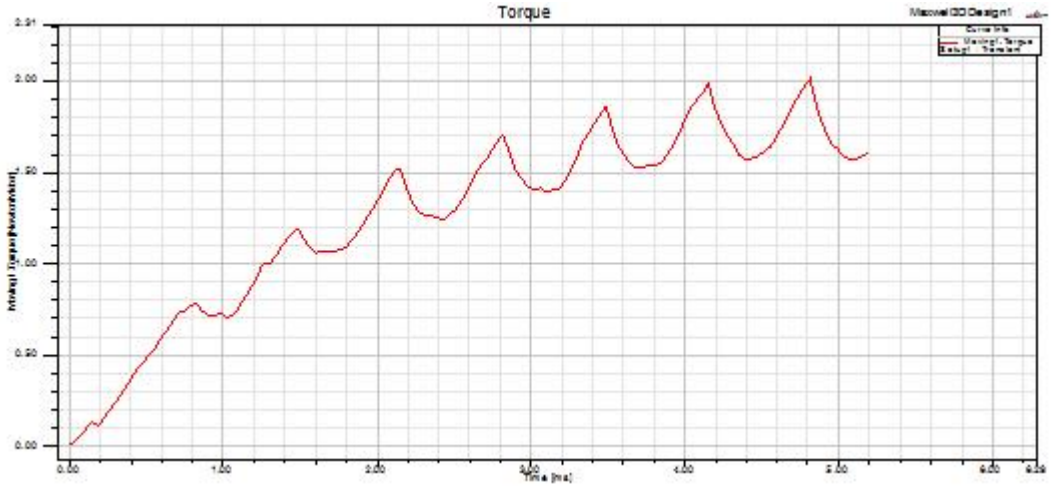
1. **Determination of Basic Parameters**: Calculate based on the required performance indicators of the motor to confirm the overall size of the motor, select a reasonable stator-rotor coordination method and air gap size. Through 2D electromagnetic field calculation, choose suitable magnetic steel to meet the magnetic load requirements. To determine the pole arc coefficient, use different grades and specifications of magnetic steel.
2. **Performance and Structural Optimization**: Determine the motor's performance parameters and cogging size according to the Maxwell simulation results. Comprehensively consider the noise, vibration, and torque ripple during the motor's operation, and optimize the motor structure to reduce the cogging torque. Confirm the cooling method adopted by the motor based on the temperature rise and electrical load.
3. **Thermal Load and Iterative Optimization**: Collaborate with Ansoft Workbench to conduct thermal load analysis on each component of the motor. For the projects that fail to meet the requirements in the simulation results, re-simulate and optimize until the design requirements are met.



## 2. Secondary Check Based on Performance and Curve Plotting

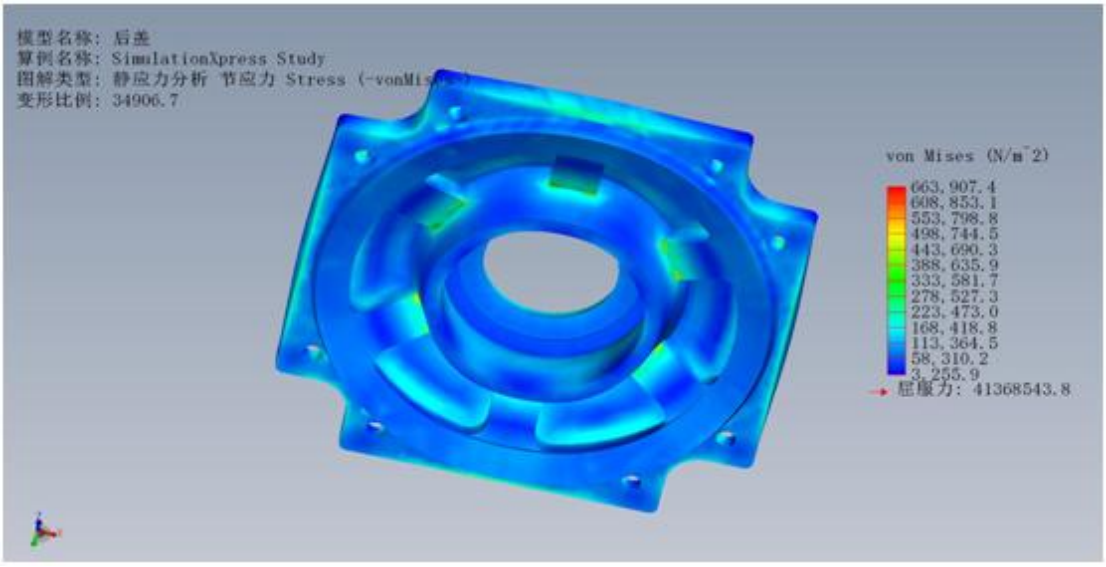
Conduct a secondary check according to the motor's design performance indicators, and plot the key performance curves through testing and analysis to ensure the motor's performance meets the design expectations.




# 3. Mechanical Structure Design Based on Electromagnetic Scheme

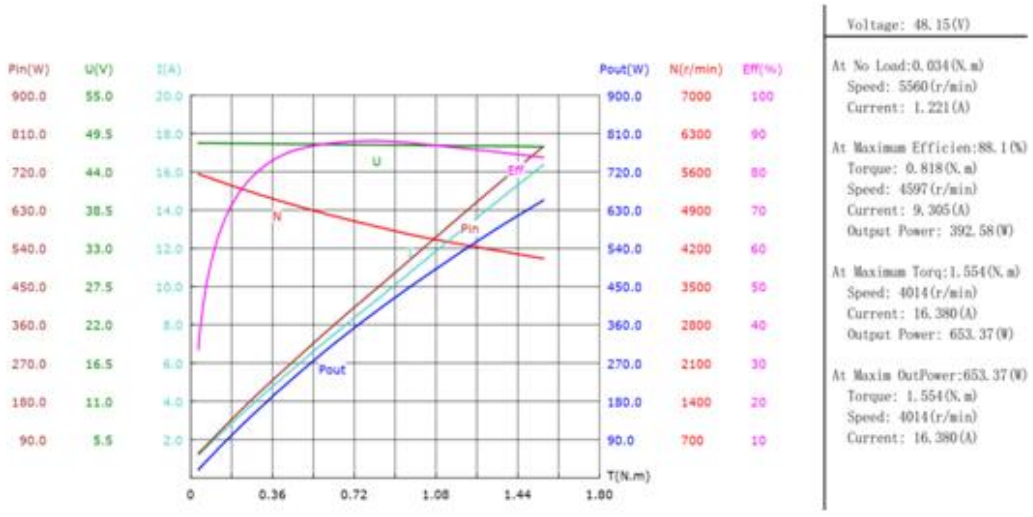
1. **3D Modeling and Design Elements**: Use SolidWorks for 3D modeling according to the determined electromagnetic scheme. Focus on the motor quality, material selection, gap control, and tolerance requirements during the design process to ensure the mechanical structure matches the electromagnetic performance.
2. **Mechanical Performance Analysis**: Utilize the mechanical performance analysis module (SimulationXpress) built in SolidWorks to conduct static stress analysis on the motor's material strength and structural stability, and verify the structural reliability.




# 4. Prototype Production and Test Verification

1. **Prototype Production**: Manufacture the motor prototype according to the design drawings to ensure the precision of parts and assembly quality.
2. **Performance Testing**: Conduct tests on the prototype under working conditions such as no-load, rated load, maximum efficiency, and maximum torque, record key data, and compare the test results with the design data to verify the accuracy of the design scheme.

## Key Data of Motor Performance Test




# 5. Reliability Testing

After the motor meets the design performance requirements, further conduct reliability tests to verify the long-term operation stability. The specific test items include:

- Durability Test: Simulate long-term working conditions to test the motor's service life and component wear.
- Vibration Test: Test the vibration amplitude and frequency of the motor during operation to ensure it meets the vibration standards.
- Noise Test: Measure the operating noise of the motor in a standard environment to control the noise level.
- Temperature Rise Test: Monitor the temperature change of the motor under rated load to verify the effectiveness of the cooling system.