

SANJIVANI RURAL EDUCATION SOCIETY'S SANJIVANI COLLEGE OF ENGINEERING KOPARGAON

DEPARTMENT OF ELECTRICAL ENGINEERING



Report

On

Design A 3 phase Induction Motor on Ansys

Prepared by:

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Introduction:-

1. Define Requirements: Determine the motor's specifications such as power rating, speed, voltage, frequency, efficiency, operating conditions, and any special requirements.

2. Select Core Material: Choose the appropriate core material based on factors like magnetic properties, cost, and efficiency. Common materials include silicon steel or amorphous steel for high-efficiency applications.

3. Design the Stator: Calculate the number of stator slots and winding distribution based on desired performance characteristics. Design the stator winding to achieve the required magnetic field and torque.

4. Design the Rotor: Select the type of rotor (squirrel cage or wound rotor) based on the application requirements. Design the rotor bars or conductors to optimize torque production and efficiency.

5. Magnetic Circuit Design: Design the magnetic circuit to ensure proper flux distribution and minimize losses. This involves selecting appropriate dimensions for the stator and rotor cores, as well as designing the air gap.

6. Thermal Analysis: Perform thermal analysis to ensure the motor can dissipate heat effectively and operate within temperature limits. This involves evaluating materials, cooling methods, and operating conditions.

7. Mechanical Design: Design the mechanical components of the motor such as the frame, bearings, shaft, and housing to withstand mechanical stresses and ensure reliable operation.

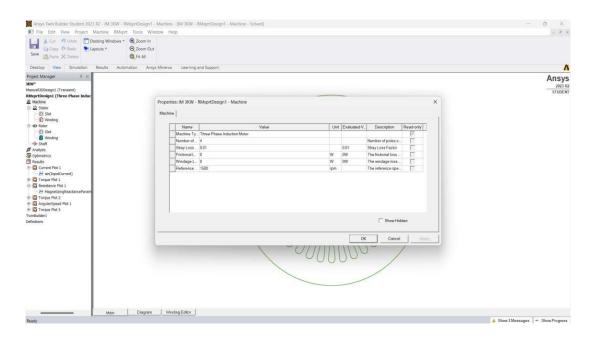
8. Performance Evaluation: Use simulation tools or mathematical models to evaluate the motor's performance under

various operating conditions, including starting, running, and transient states.

9. Prototype and Testing: Build a prototype of the motor and conduct rigorous testing to validate the design and ensure it meets performance and reliability requirements.

10. Optimization and Iteration: Iterate on the design based on testing results and feedback to optimize performance, efficiency, and reliability.

STEP 1 :- Select Machine properties. i.e, type of machine, number of slots, etc.



STEP 2 :- Select stator properties

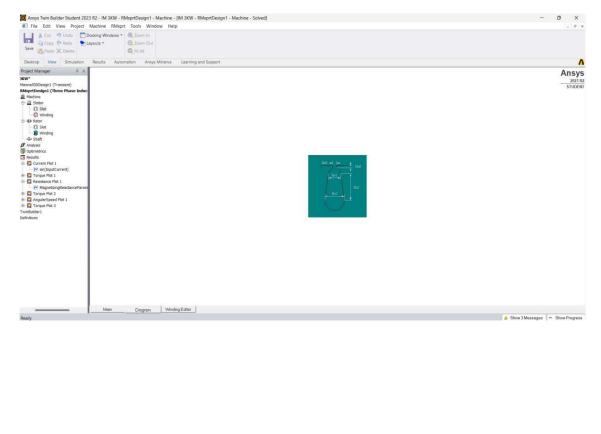
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STEP 3: select slot properties. Put values of Hs0, Hs2, Bs0, Bs2 etc

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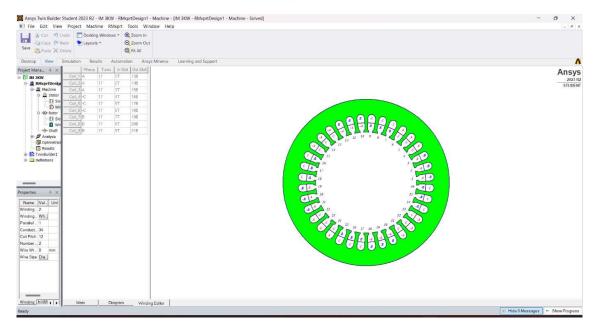
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STEP 4 :- Select slot type or shape according to requirement



STEP 5 : lets see how Stator design looks

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STEP 6 :- Select winding properties

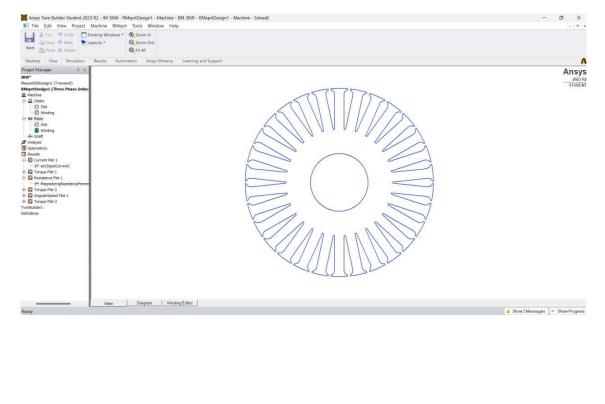
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STEP 7 : Select rotor properties

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STEP 8 :- Design of Rotor

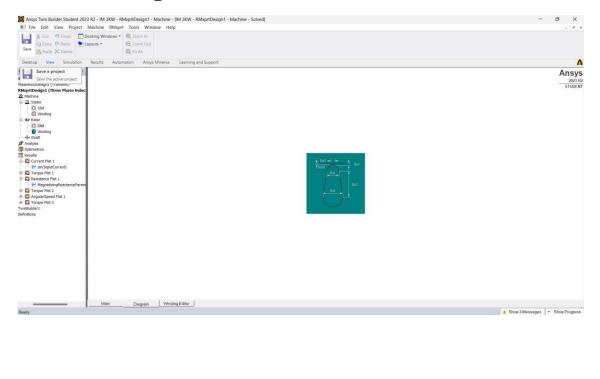


STEP 9 : Properties of Slots

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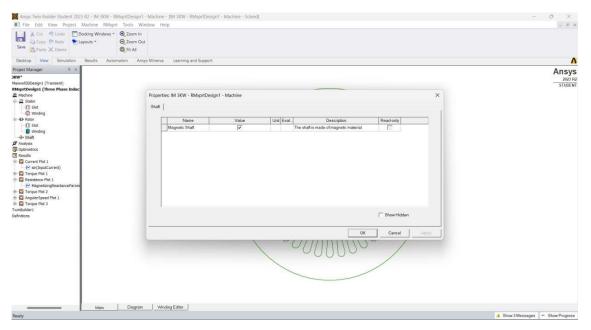
STEP 10 :- Design of Rotor Slots



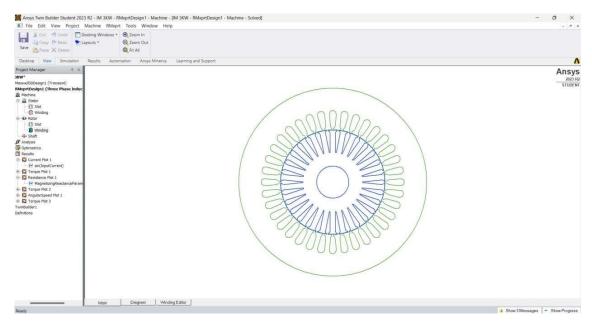
STEP 11 :- Select winding properties

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STEP 12 :- Select shaft properties

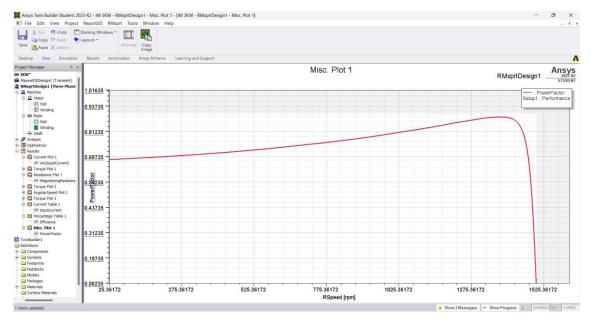


STEP 13 :- Overall look of stator, rotor and shaft

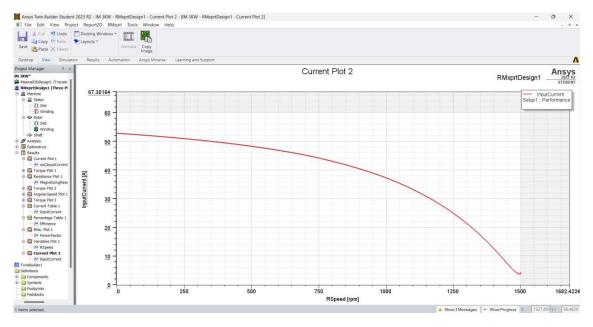


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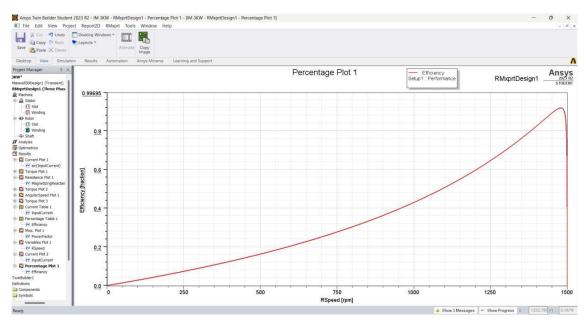
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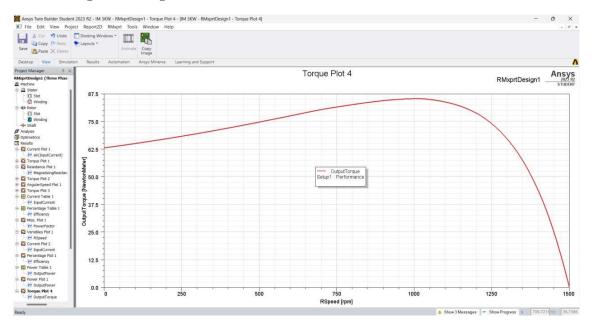
2. Input Current



3. Efficiency



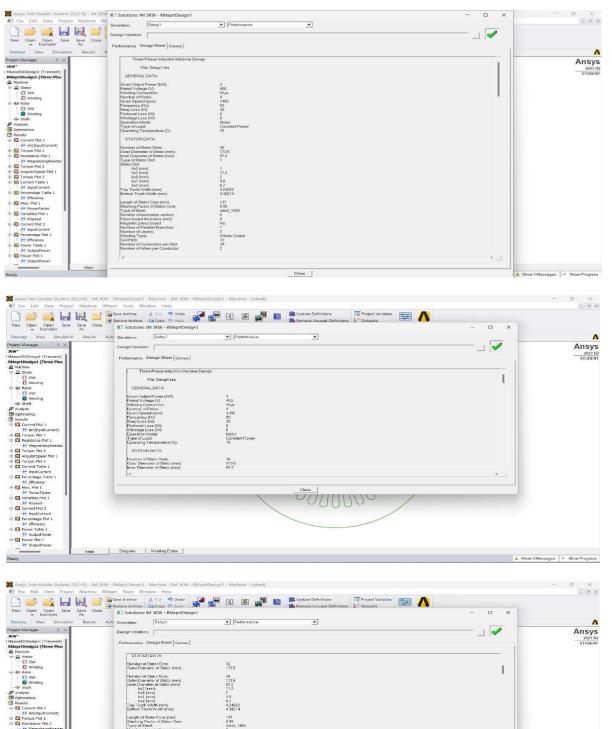
4. Output Torque



5. Breakdown Operations

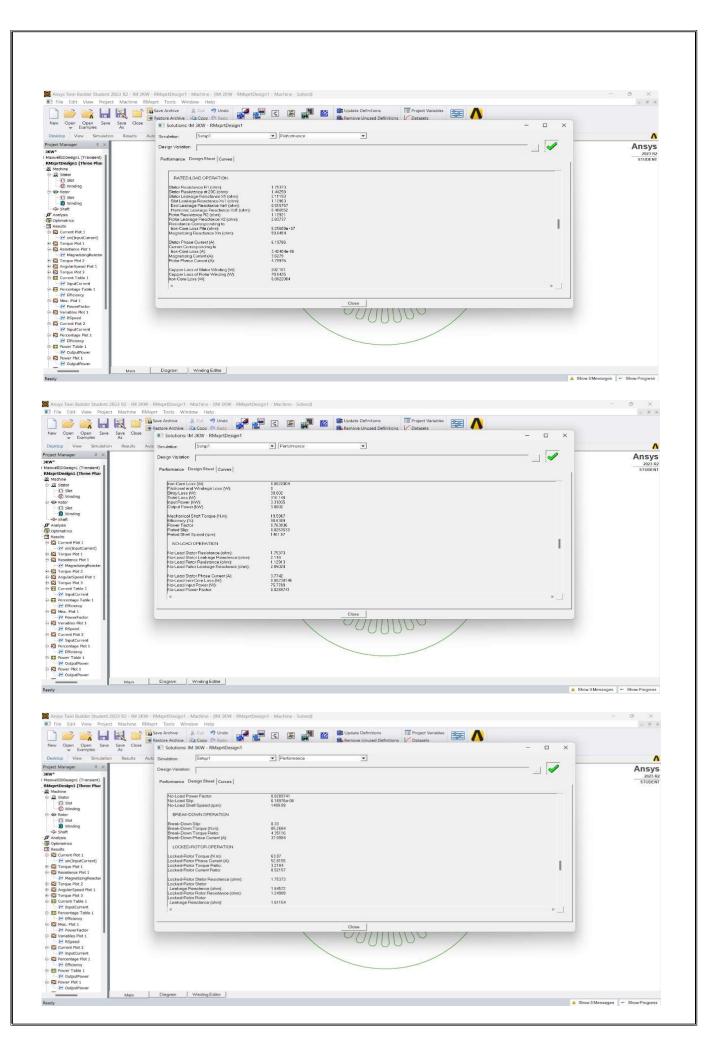
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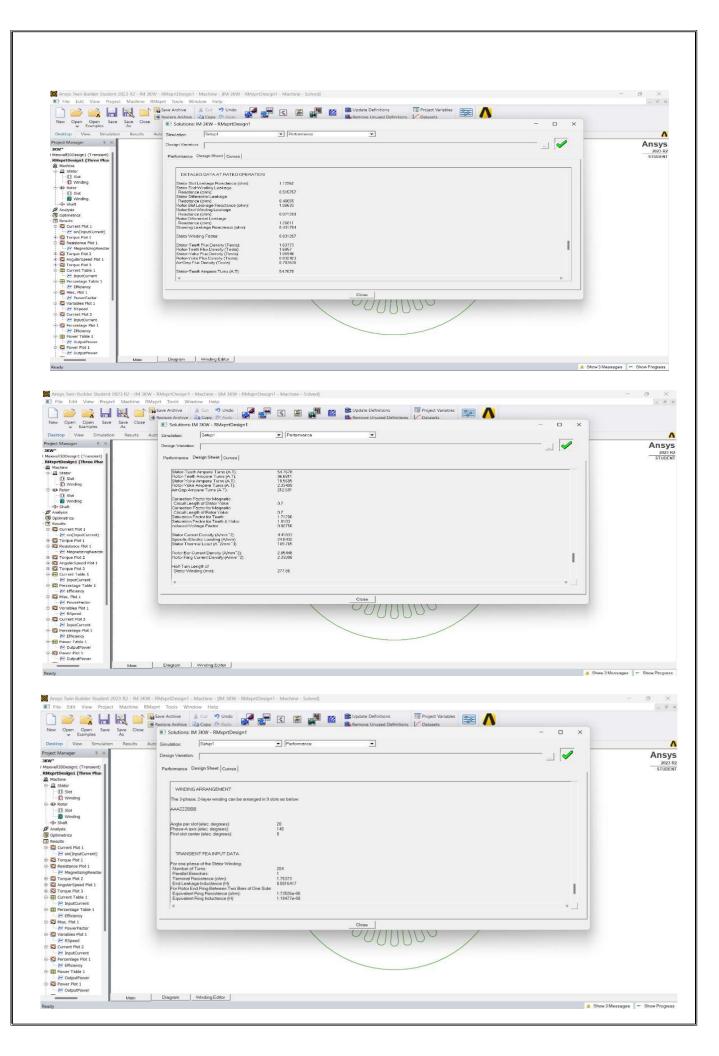
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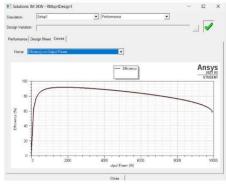
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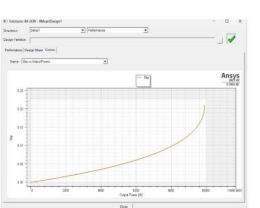


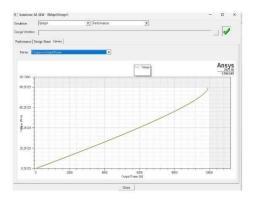


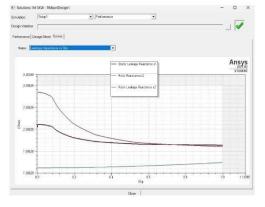
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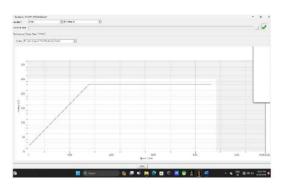
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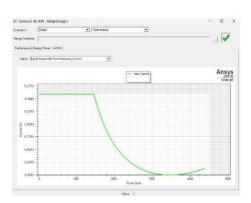


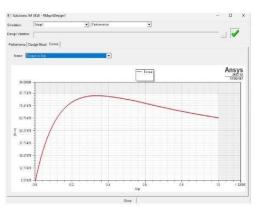


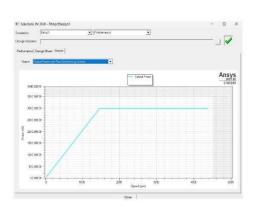


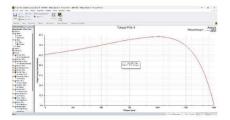


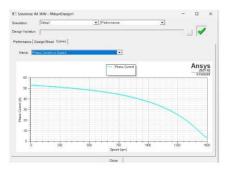


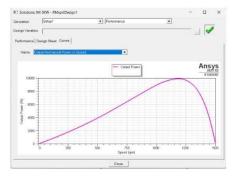


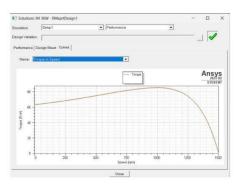


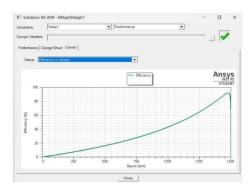


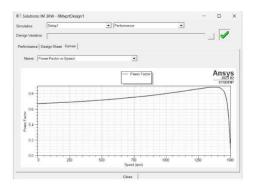


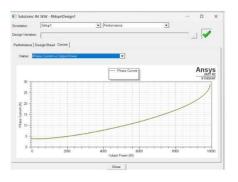


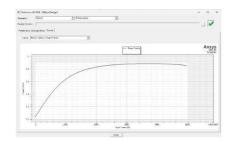


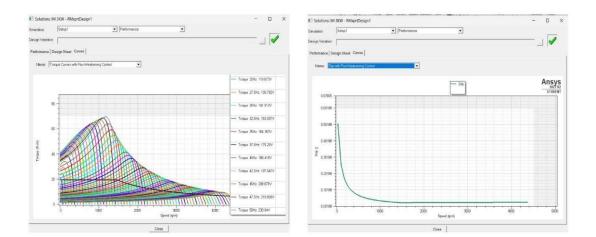


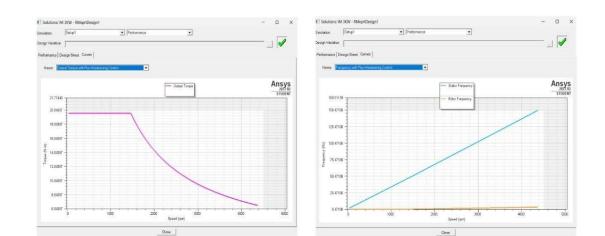


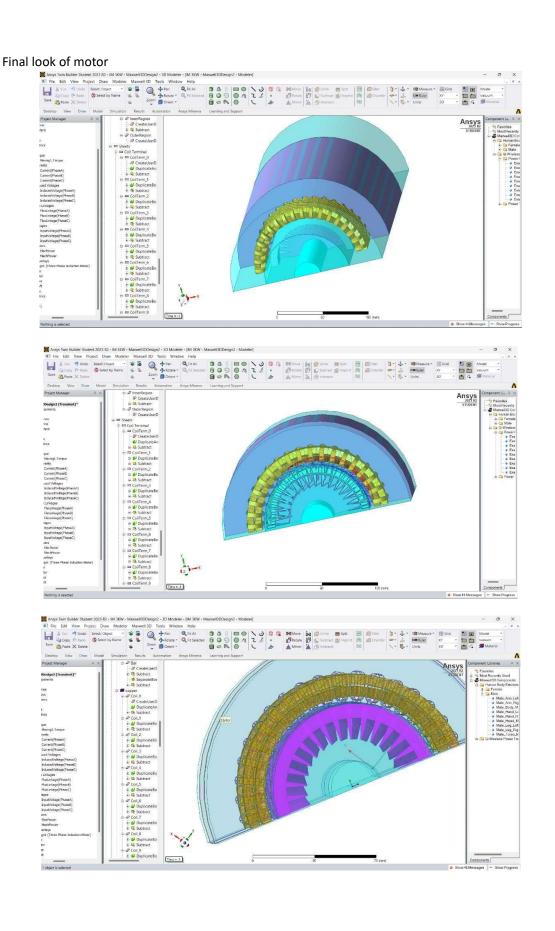


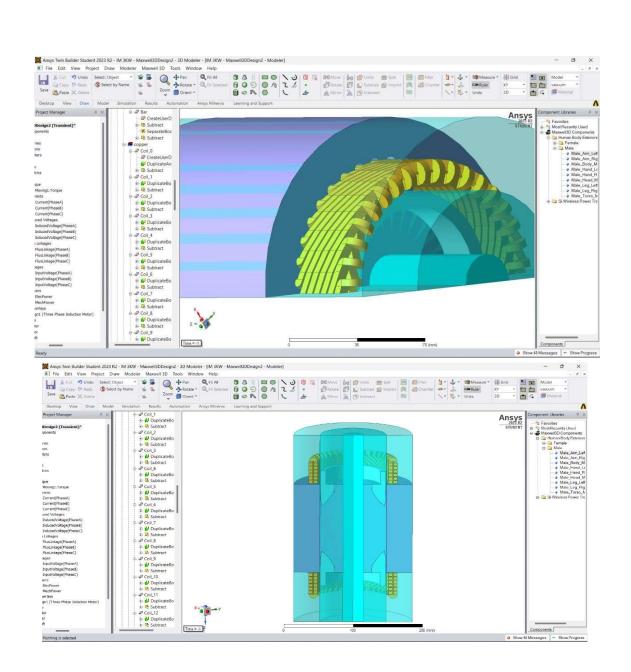












Conclusion:-

The ANSYS simulation successfully modeled the electromagnetic performance and operational characteristics of the 3-phase induction motor. The analysis provided detailed insights into the motor's magnetic flux distribution, torque, efficiency, and thermal behavior under various load conditions. By simulating real-world scenarios, we identified potential areas for performance improvement and optimized the motor design for better efficiency and reduced losses. The design process demonstrated the capability of ANSYS to accurately predict the motor's performance, enabling the creation of a reliable and efficient motor suitable for industrial applications. This project highlights the effectiveness of using advanced simulation tools like ANSYS in the design and optimization of electrical machines.