

EN 206 - Power Electronics and Machines

Induction Motor

Suryanarayana Doolla
Department of Energy Science and Engineering
Indian Institute of Technology, Bombay
suryad@iitb.ac.in

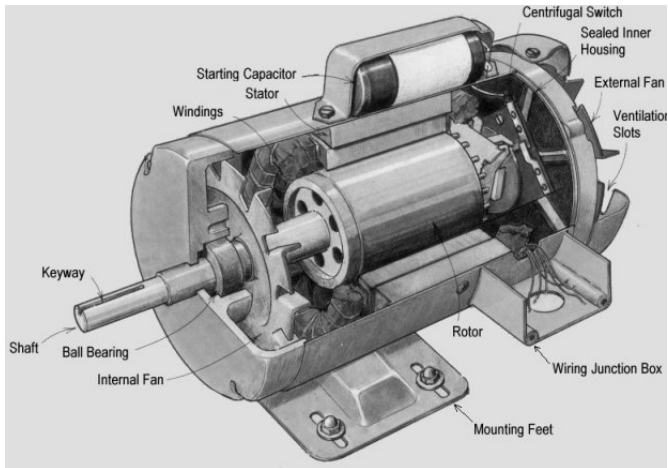


Lecture Organization - Modules

- Introduction and Power Semiconductor Switches
- Module 1: Transformers
- Module 2: AC/DC converter / Rectifier
- Module 3: DC machines and Drives
- Module 4: DC/DC converter
- **Module 5: Induction Machine**
- Module 6: DC/AC converter / Inverter
- Module 7: AC/AC converter / Cyclo converter
- Module 8: Synchronous Machine
- Module 9: Special Topics: Machines, HVDC, APF



Induction Motor Components

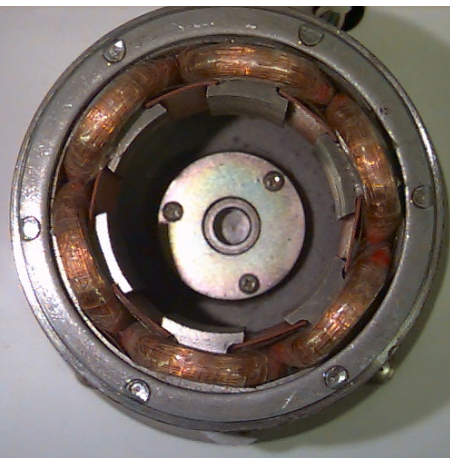
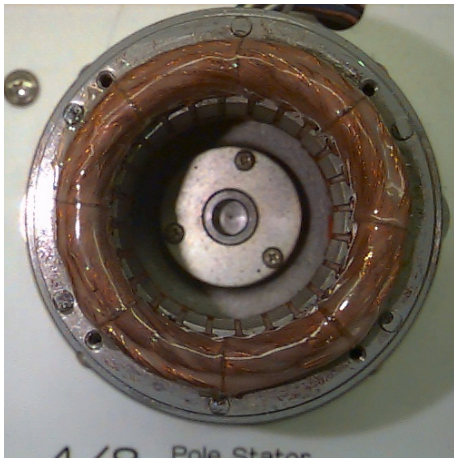


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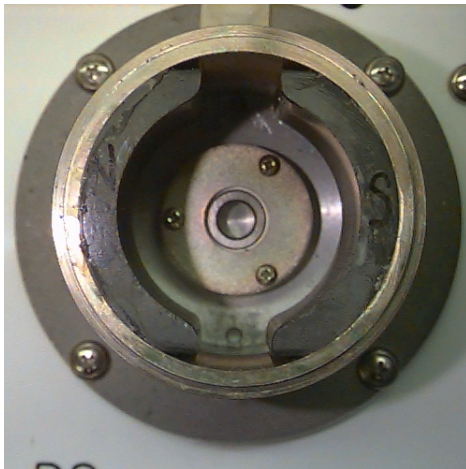
¹<http://www.sawmillcreek.org/articles/5/motor1.jpg>



Stator Winding



Permanent magnet stator

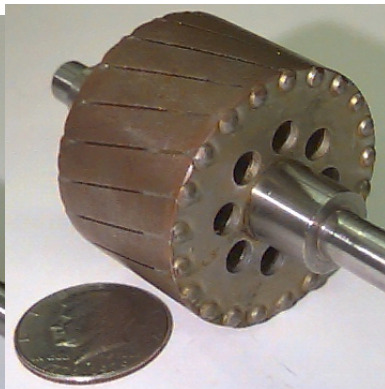
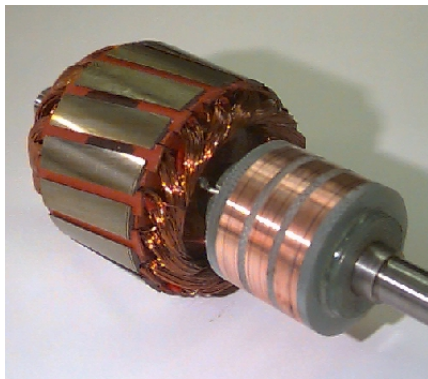


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³<http://ewh.ieee.org/soc/es/Nov1997/09/INDEX.HTM>



Rotor of Induction Motor



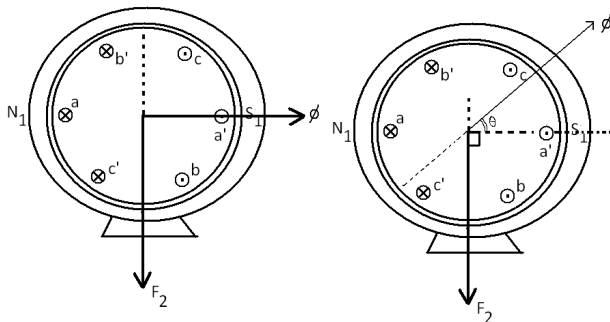
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⁴<http://ewh.ieee.org/soc/es/Nov1997/09/INDEX.HTM>



Torque in an Induction Motor

- The resultant mmf lies along the axis of that phase which has maximum current

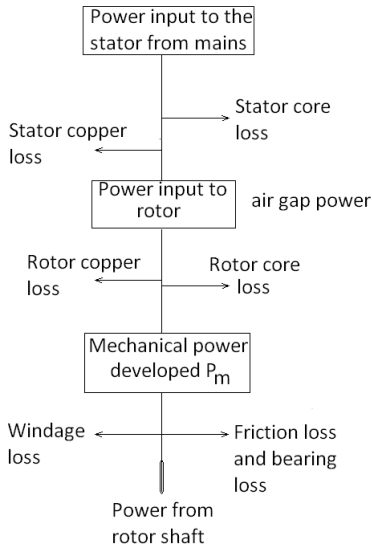


- The rotor mmf (F_2) is displaced from ϕ by a load angle of $90^\circ + \theta_2$.
- An external resistance can be adjusted in the rotor of slip ring induction motor to control the torque
- To develop maximum starting torque, θ_2 should be small



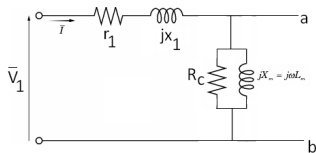
Power Stages in Induction Motor

- Fixed losses
(core losses, bearing friction loss, brush friction loss and windage loss)
- Variable losses
(stator ohmic loss, rotor ohmic loss, brush contact loss and stray load losses)

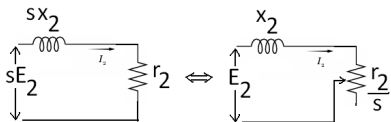


Equivalent circuit of an Induction Motor

- Stator equivalent circuit



- Rotor equivalent circuit



Equivalent circuit of an Induction Motor

- Equivalent circuit with Power Stages

