SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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Chennai

DEPARTMENT OF AEROSPACE ENGINEERING

19ASZ301– ROBOTICS & AUTOMATION IN SPACE

III YEAR VI SEM

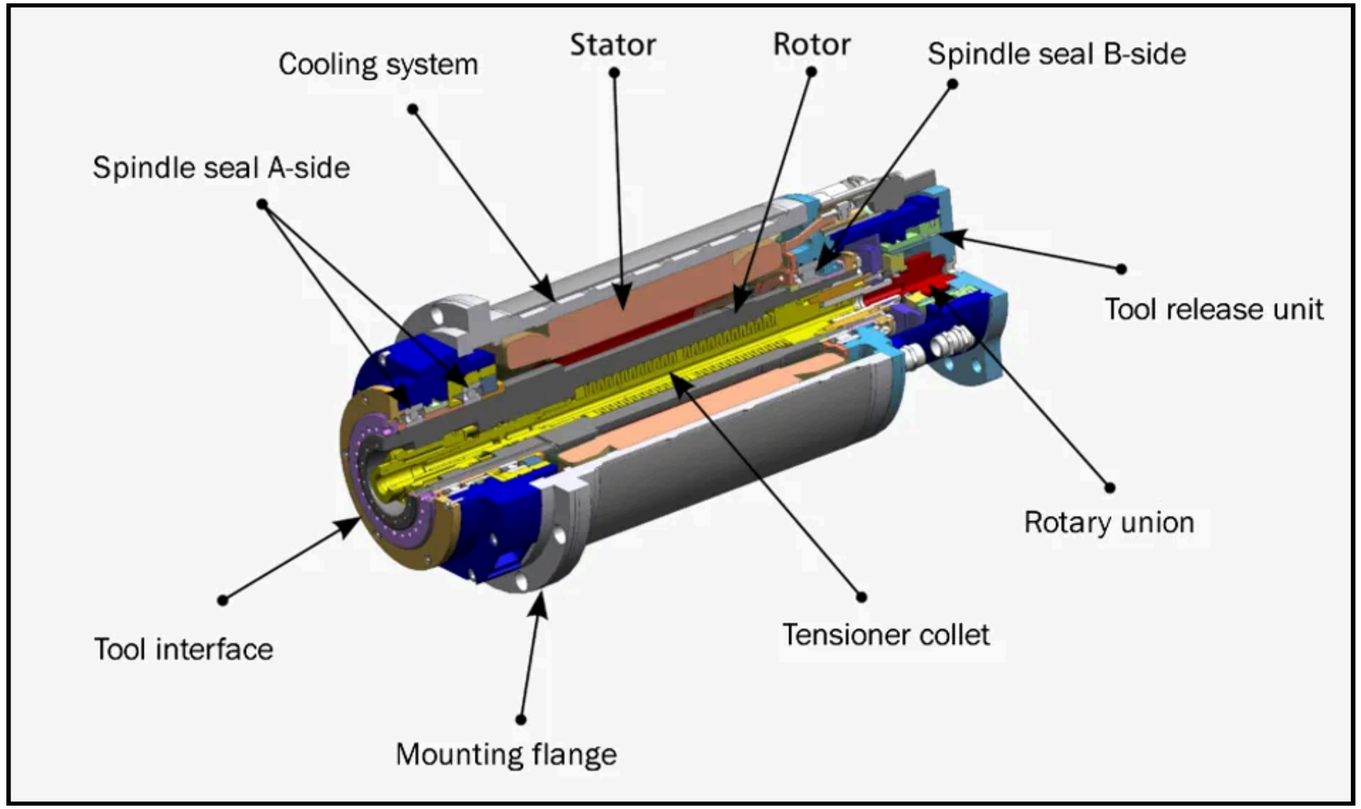
UNIT 3 –MOTION CONTROL AUTOMATION

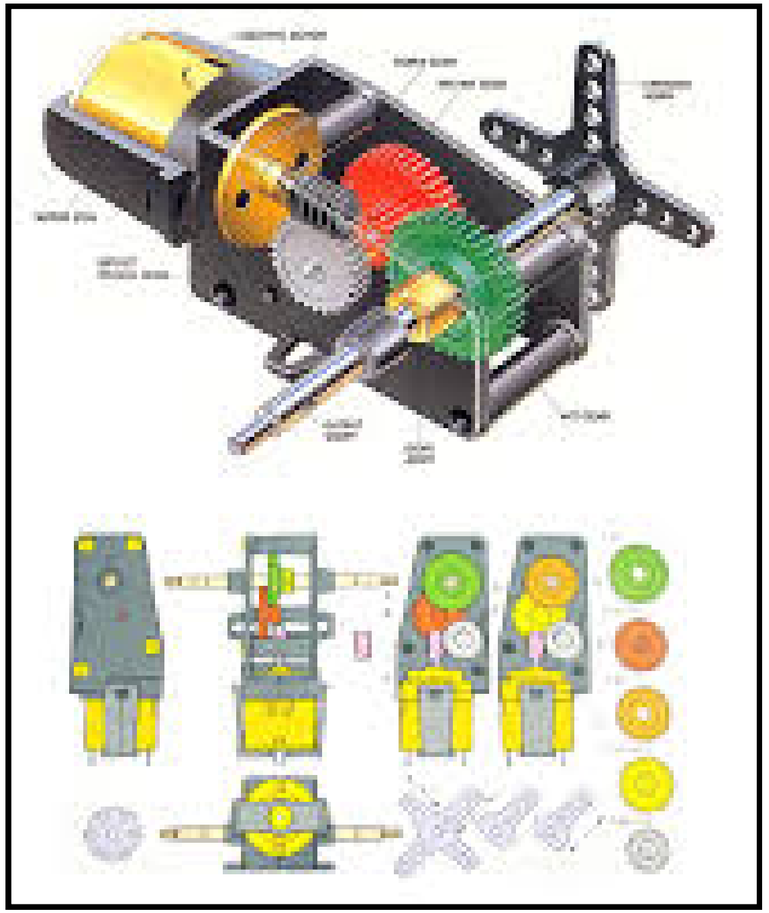
TOPIC - Selection of Motors for Automation

CLASSFICATION OF MOTORS

Motor Type	Use Case & Features	Applications
🌀 AC Induction Motor	Reliable, robust, low-cost	Fans, pumps, conveyors (constant speed)
⚡ DC Motor	Speed control, simple, high torque	AGVs, actuators, light-duty drives
🎯 Stepper Motor	Precise steps, open-loop control	3D printers, CNC, pick & place
🎛️ Servo Motor	High precision + feedback (closed-loop)	Robotics, CNC machines, automation arms
🧲 BLDC Motor	Efficient, quiet, high-speed control	Drones, electric vehicles, compact robots
🚄 Linear Motor	Direct linear motion without rotation	Actuators, transport lines, pick & place
🔧 Torque Motor	High torque at low speeds	Indexing tables, direct-drive systems

PROCESS


Cooling system
Stator
Rotor
Spindle seal B-side
Spindle seal A-side
Tool release unit
Rotary union
Tool interface
Tensioner collet
Mounting flange



APPLICATIONS

Step-by-Step Motor Selection Process

✅ Step 1: Define Application Requirements
- Load (static & dynamic)
- Required motion profile
- Speed and acceleration

✅ Step 2: Calculate Load Torque and Speed
- Use formulas for rotational or linear systems:
  - Torque (T) = Force × Radius
  - Speed (RPM) = Linear speed × 60 / (2π × Radius)

✅ Step 3: Choose Motor Type
- High precision? → Servo or stepper
- Simple motion? → AC or DC motor
- High efficiency and low noise? → BLDC
- Linear motion needed? → Linear motor

✅ Step 4: Determine Control Method
- Open-loop (simple, cheaper): Stepper, AC motor
- Closed-loop (accurate, safer): Servo, BLDC with encoder

✅ Step 5: Select Drive/Controller
- Compatible with motor type and system logic
- Supports required communication (EtherCAT, Modbus, etc.)

🔍 **Example: Selecting Motor for Conveyor Belt**
- Load: 20 kg
- Speed: 30 m/min
- Duty cycle: Continuous
- Control: Basic ON/OFF with variable speed

✅ Suggested motor:
- AC induction motor with VFD (variable frequency drive)


Thank You