**9. SPUR GEAR DESIGN**

**GEAR:** It’s a toothed wheel used for transmission of power from one shaft to another.

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| **TOOTH DIRECTION** | In the direction of axis of wheel | **SPUR GEAR** |
| Tooth is inclined with the axis of wheel | **HELICAL GEAR** |

Gear Pair is made of **GEAR** and **PINION**.

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| --- | --- | --- |
|  | = Module of Gear,  = Centre to centre Distance between two gears, | = No. of tooth on Pinion,  = No. of tooth on Gear,  = Pinion Diameter (PCD),  = Gear Diameter (PCD), |

**ASSUMPTIONS IN WILFRED LEWIS EQUATION:**

1. At any point of time there will be only one pair of teeth in contact.
2. The tangential load () is distributed uniformly throughout the width.
3. The effect of radial load is neglected.
4. Consider Tooth as Beam of uniform strength.
5. Stress concentration effects are neglected.

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| --- | --- | --- |
|  | Lewis Factor depends on No. of tooth and profile of teeth.  **Y IS CLOSER OR GREATER THAN 0.3**  = Uniform Tangential load,  = Maximum bending Stress, | = Maximum bending moment,  = Depth of teeth base,  = Thickness of teeth base,  = Width of teeth base,  **= Modified Lewis Form factor,**  **= Lewis Form factor,** |

**EQUIVALENT LOAD ON TEETH:**

|  |  |  |
| --- | --- | --- |
| If ,  If , | is used to incorporate Fluctuation of power transmission.  is used to incorporate Impact Load Due to power transmission | = Mean Torque =  = Mean Speed,  = Mean Tangential Load,  = Maximum Torque,  = Service Factor,  = Velocity Factor,  = The Max. Tangential Load, |

**DESIGN CONDITION:**

|  |  |
| --- | --- |
|  | = Maximum bending Stress,  = Yield Strength of material, |

**WEAR STRENGTH (HERTZ THEORY):**

**Pitting:** Surface Fatigue Failure due to repetitive loads.

|  |  |
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| **Failure Condition:** | = Load Stress Factor,  = Young’s Modulus of Pinion,  = Young’s Modulus of Gear,  = Ratio Factor,  = Contact Stress,  = Surface Endurance Strength of tooth material,  = Wear Strength = Maximum tangential load that can be applied to avoid pitting failure,  = Pressure Angle, |