

Planetary Gear Design

Sample document - numeric values are only included in the purchased Pro export.

Project: _____ Part/Position: _____ Prepared by: _____

Overall assessment: PASS

Inputs

Tooth counts z_S / z_H ???
Number of planets p ???
Operating mode ???
Input speed n_{in} ??? min⁻¹
Input torque M_{in} ???
Efficiency η ???

Stationary ratio and tooth counts

Stationary ratio $i_0 = -z_H/z_S$???
Planet tooth count z_P ???
Ratio i (operating mode) ???

Ratio and output

Output speed n_{out} ??? min⁻¹
Output torque M_{out} ??? Nm
Output rotation direction ???

Shaft speeds

Sun speed n_{sun} ??? min⁻¹
Carrier speed $n_{carrier}$??? min⁻¹
Ring gear speed n_{ring} ??? min⁻¹

Evaluation criteria

Criterion	Value	Limit	Status
Assembly condition $(z_S+z_H)/p$	???	???	● PASS
Neighbour condition $(z_S+z_P)*\sin(\pi/p)$	???	???	● PASS

Notes and calculation basis

Simple minus-planetary gear set: sun gear (external teeth), p planets (external teeth, meshing with sun and ring gear), ring gear (internal teeth) and carrier (holds the planet axles). Calculation path: stationary ratio $i_0 = -z_H/z_S$, ratio of the chosen operating mode from the Willis equation $(n_{sun} - n_{carrier})/(n_{ring} - n_{carrier}) = i_0$, giving all three shaft speeds and, optionally, the output torque via the per-stage efficiency η . The assembly condition $(z_S+z_H)/p$ whole number and the neighbour condition (planet tip-circle clearance, simplified with tip clearance) check the even distribution and space requirement of the p planets.

Simplification: tooth root load capacity, pitting load capacity and profile shift of the gearing must be verified with the spur gear calculator per ISO 6336, and the bearings of carrier and planet pins separately. For multi-stage planetary trains, the ratios of the individual stages multiply to the overall ratio ($i_{total} = i_1*i_2*...*i_n$).

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