Geneva Mechanism: Index Angle, Dwell and Peak Wheel Speed

Index and dwell fractions, crank and wheel radii and the peak wheel speed of an external Geneva mechanism from its slots and centre distance.

Method: External Geneva mechanism geometry and kinematics

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of slots	6.0000	
Centre distance	100.00	mm
Crank speed	60.000	rpm

Calculated results

Parameter	Value	Unit
Wheel step angle 360°/n	60.000	°
Crank angle during indexing 180° − 360°/n	120.00	°
Dwell fraction of each crank turn	66.667	%
Crank (pin) radius C sin(π/n)	50.000	mm
Wheel slot radius C cos(π/n)	86.603	mm
Peak wheel-to-crank speed ratio a/(C − a)	1.00000	
Index time	0.33333	s

Notes for this case

- External Geneva with the pin entering the slot radially: crank radius C sin(π/n). The peak wheel speed occurs mid-index when the pin is on the line of centres.

Formula and method

$$a = C\sin\frac{\pi}{n}, \quad b = C\cos\frac{\pi}{n}, \quad \theta_{drive} = \pi - \frac{2\pi}{n}, \quad \frac{\omega_{w,max}}{\omega_c} = \frac{a}{C-a}$$

Variables

n	Number of slots	-
C	Centre distance	m
ω_c	Crank speed	1/s
θ_w	Wheel step angle 360°/n	rad
θ_{drive}	Crank angle during indexing 180° − 360°/n	rad
dwell	Dwell fraction of each crank turn	-
a	Crank (pin) radius C sin(π/n)	m
b	Wheel slot radius C cos(π/n)	m
$\omega_{w,max}/\omega_c$	Peak wheel-to-crank speed ratio a/(C − a)	-
t_{index}	Index time	s

Method and standards

Intermittent motion kinematics.

Assumptions and limits

- Rigid parts, constant crank speed, external Geneva.

References

External Geneva mechanism geometry and kinematics

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/machine-design/geneva-mechanism

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Reopens the calculator with the inputs of this report.