Conjugate Action

When tooth profiles are designed to produce a constant angular velocity ratio during meshing.

In theory, given one tooth profile, one can find the profile for meshing tooth for conjugate action.

One solution is " involute profile" → universal use for gears.

If $P$ is not changing,

$P_0$ & $O$ do not feel the change

(No matter what the shapes are)

⇒ constant angular velocity

C is the contact point where two surfaces are tangent to each other.

force is on common normal $ab$, called

line of action

normal to surface (infinite plane)

normal to base circle

$P$ is the intersection point of $\overline{ab}$ & $0_0'$

⇒ pitch point

$R_a$ = pitch radius

Involute will satisfy this

$\overline{ab}$ is a tangent cord, generating line

point of contact is the tracing point

generating line does not change position,

⇒ always tangent to base circles

--- normal to the involute at point of contact

⇒ satisfy the requirement
- **Contact length & contact ratio**

Initial contact point

\[ \varphi \]

Driver

Pressure line

\[ R \]

Driven

\[ \theta \]

Final contact

\[ \psi \]

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\[ \zeta \]

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