



Why planetary gears for servo applications ?

? WHY use Gearheads ??

Servo Motors have high Power Density, along with high speeds

Watts / Volume (or W/kg) ■ Power density increasing proportionally with speed

...but Servo Motors have LOW Torque Density Nm/Volume (or nm /kg)

Gearbox :

Boosting the torque by - i

Reducing the reflected inertia by - J_{load} / i^2

Reducing the speed by - $1/i$

$$\text{Motor accel. Torque requirement } T_{\text{motor accel}} = J_{\text{load}} / i^2$$

Servo motor with Gearbox :

Reduced load inertia, boosted torque → lower motor acceleration torque required → smaller motor, lower current rating less costly driver

→ smaller, more compact, more economical overall drive package,

WHAT properties are desired for a Servo-Gearhead ?

- ***High Torque density (Compact)***
- ***High Stiffness =>Low Lost Motion***
- ***Suitable for high input speeds***
- ***Low Backlash***
- ***High efficiency***
- ***Low maintenance, Long reliable Life***
- ***Low noise***
- ***Low Inertia***
- ***Flexible Motor Mounting***

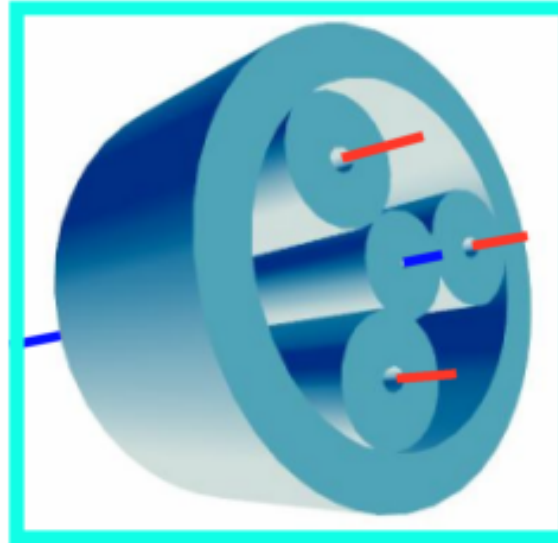
Desired properties of Servo Gearheads

Volume =1, Torque =1, Stiffness=1



Fixed Axis Gear System

Volume =1, Torque =3, Stiffness=3



Planetary Gear System

- *High Torque density (Compact)*
- *High Stiffness =>Low Lost Motion*
- *Suitable for high input speeds*
- *Low Backlash*
- *High efficiency*
- *Low maintenance, Long reliable Life*
- *Low noise*
- *Low Inertia*
- *Flexible Motor Mounting*

Approximately same ratio and same volume, the planetary has 3 x higher torque density and about 3 x higher stiffness, due to the increased number of gear contacts

— Moving Axis — — Fix Axis —

