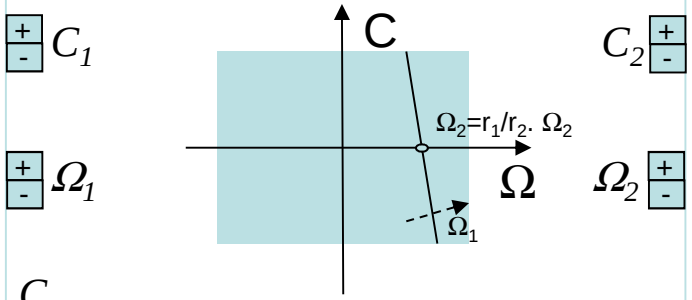
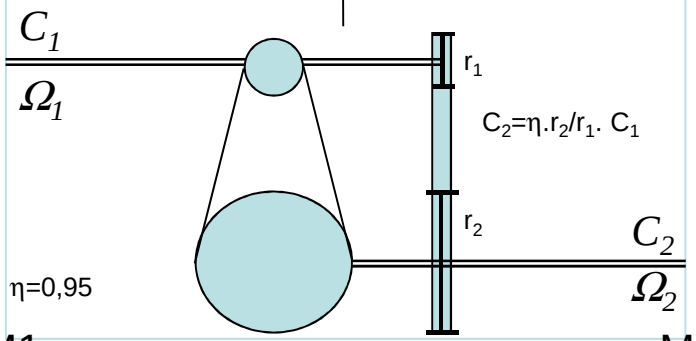
M1

Belt - pulley (smooth)



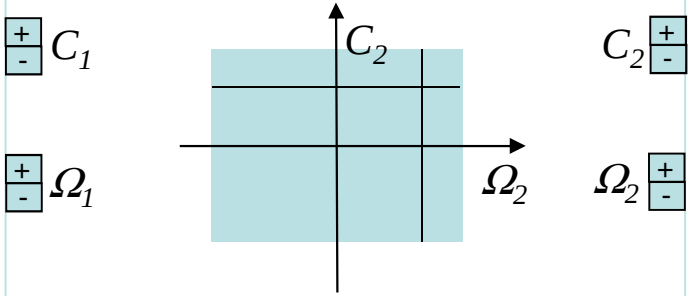


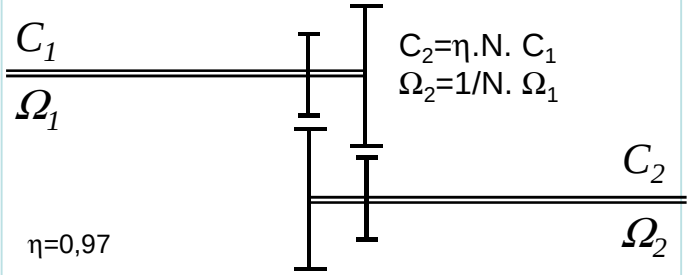
η=0,95

M1 M2

M1 M3

Spur Gear



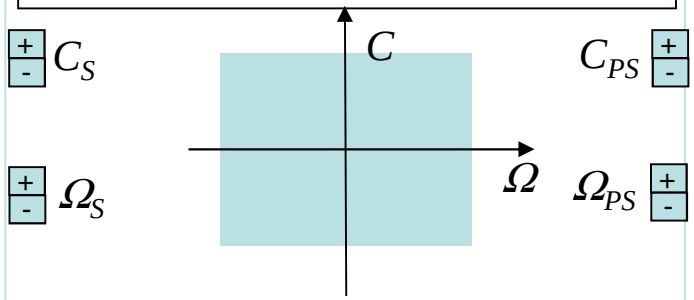


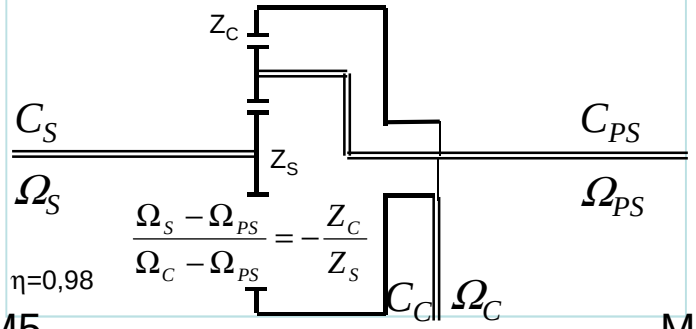
η=0,97

M3 M4

M5

Epicyclic gear



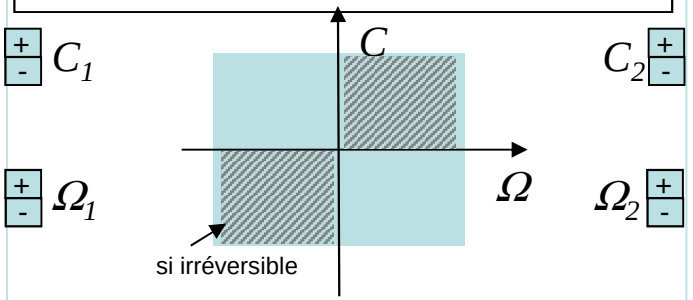


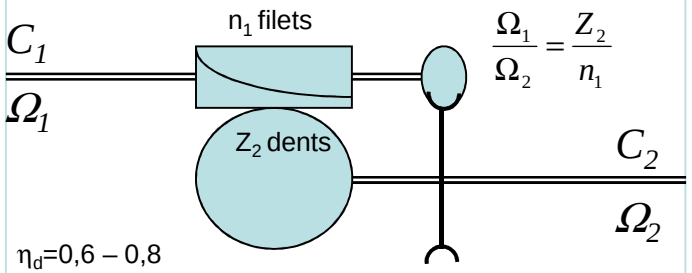
η=0,98

M5 M6

M2

Worm gear



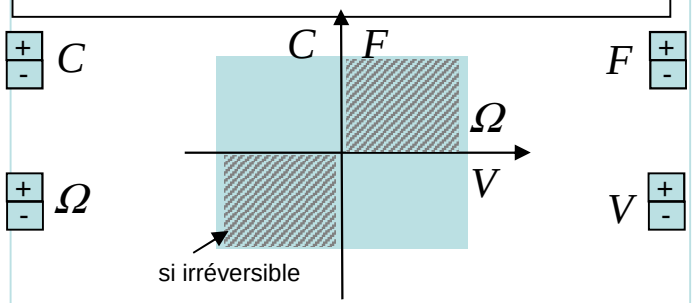


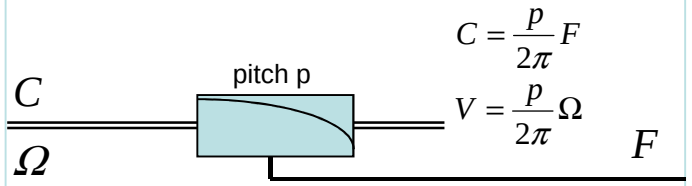
η_d=0,6 – 0,8
η_i= 0 – 0,7

M2 M4

M4

Nut - screw



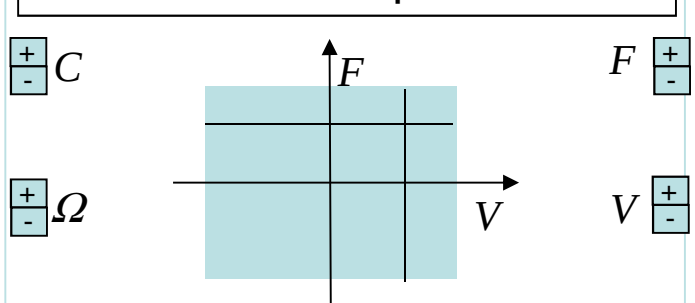


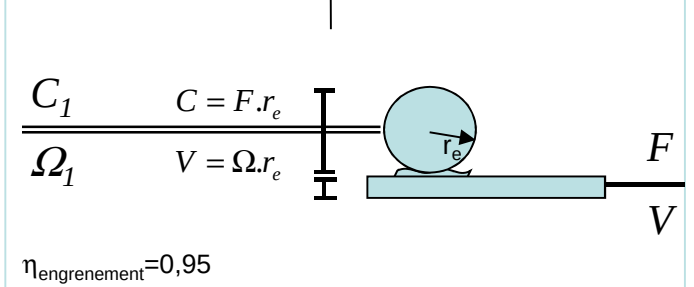
Sliding :
η_d=0,15 – 0,20
η_i= 0

Ball/Roller screw :
η_d= 0,80
η_i= 0,75

M6

Rack and pinion

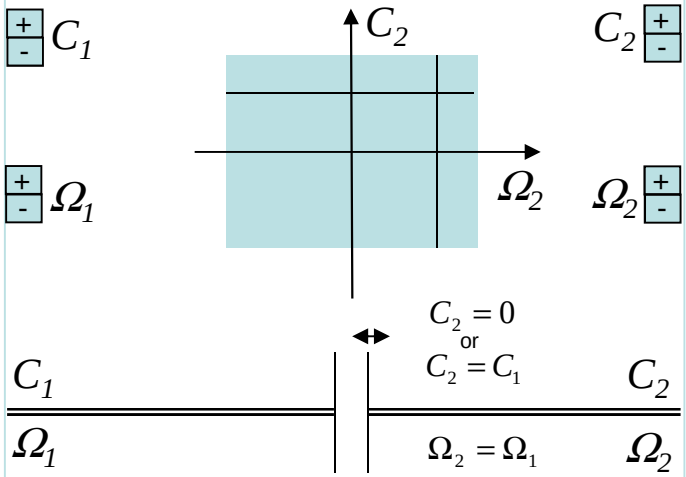




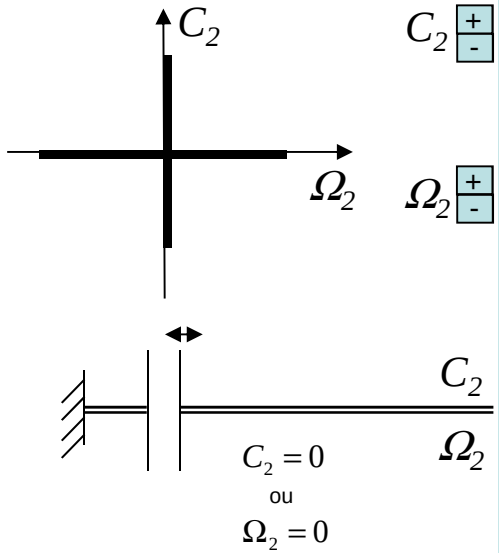
$\eta_{engrenement}$=0,95

M6

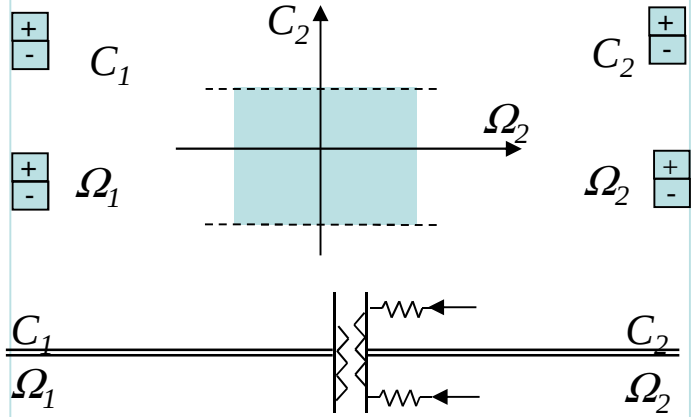
Clutch



Brake

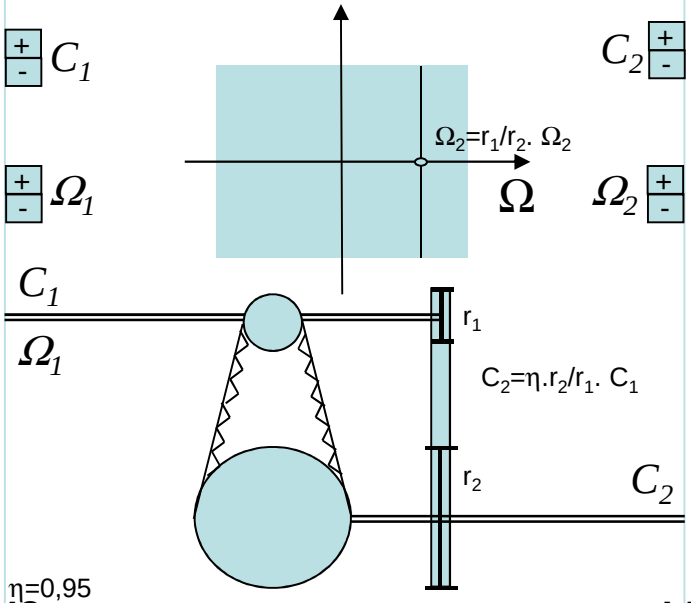


Torque Limiter

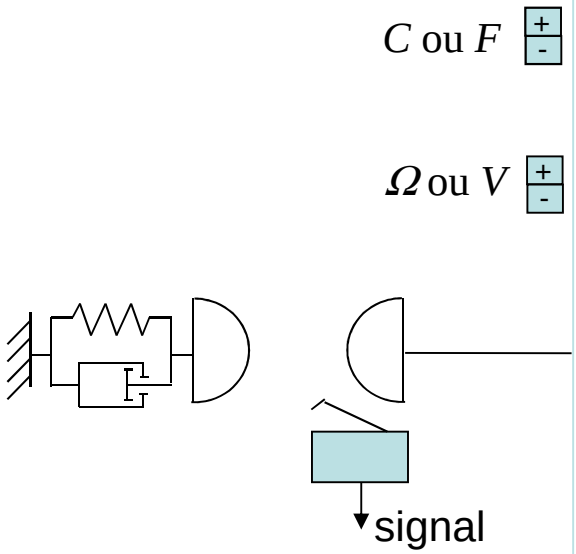


$\Omega_1 - \Omega_2 = 0$ if $abs(C_2) < C_{max}$
else $\Omega_1 - \Omega_2$ in order $abs(C_2) = C_{max}$

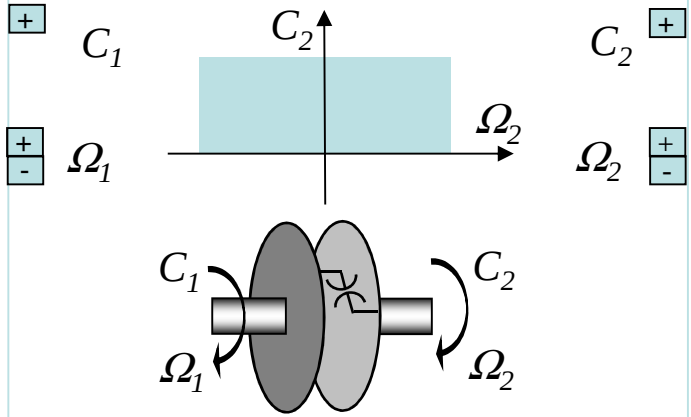
Belt - pulley (toothed)



Mechanical stop



Freewheel



Freewheel : $C_1 = C_2 = 0$
Transmission : $C_1 = C_2$ and $\Omega_1 = \Omega_2$

M5 M5 M3 M3 M1 M1

Epicyclic gear

Functions
• Adapt the torque and/or the speed with high ratio

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:
-

Spur Gear

Functions
• Adapt the torque and/or the speed

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

Belt - pulley (smooth)

Functions
• Adapt the torque and/or the speed
• Free from the positioning constraints (on center or corner)
• Absorb the sharp variations of torque (stiffness and slippage)

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

M5 M5 M3 M3 M1 M1
M6 M6 M4 M4 M2 M2

Rack and pinion

Functions
• Transform rotation into translation or the opposite
• Adapt efforts and / or speed

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

Nut - screw

Functions
• Transform rotation into translation or the opposite (if rolling elements)
• Adapt torques and/or speeds

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

Worm gear

Functions
•Adapt the torque and/or the speed with a high ratio
• Ensure a irreversible power transmission

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

M6 M6 M4 M4 M2 M2

M11 M11

Torque Limiter

Functions
• Limit torque to a maximal value

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

M11 M11

M12 M12

M9 M9

Brake

Functions
• Transform kinetic energy into heat
• Immobilize a mobile part

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

M9 M9

M10 M10

M7 M7

Clutch

Functions
• Enable a speed difference between two shaft
• Provide or not a mechanical connection between two shafts

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

M7 M7

M8 M8

Freewheel

Functions
• Allow the transmission of power in only one direction of rotation

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

M12 M12

Mechanical stop

Functions
• Sensor: Detect the stop position
• Mechanical stop safety: Stop and dissipate the kinetic energy of the mobile part.

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

Model
- Perfect (main function):
- Main imperfections:

M10 M10

Belt - pulley (toothed)

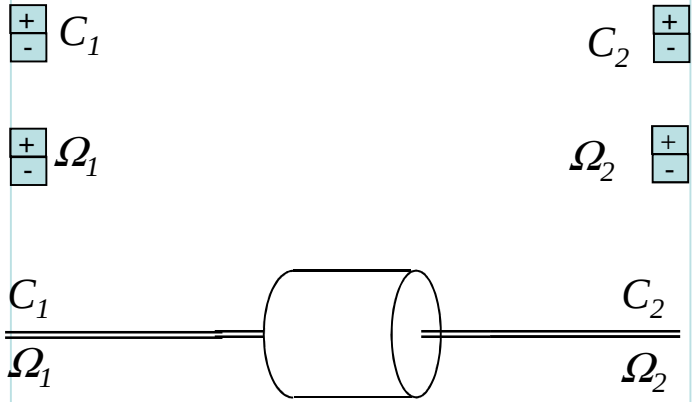
Functions
• Adapt the torque and/or the speed
• Free from the positioning constraints (on center or corner)
•Absorb the sharp variations of torque (stiffness and slippage)
• Ensure synchrony speeds without backlash

Operational limits
- Transient (rapid degradation):
- Continuous (gradual degradation):

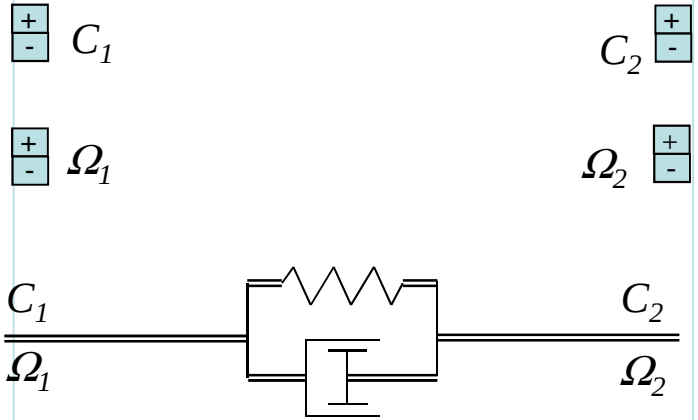
Model
- Perfect (main function):
- Main imperfections:

M8 M8

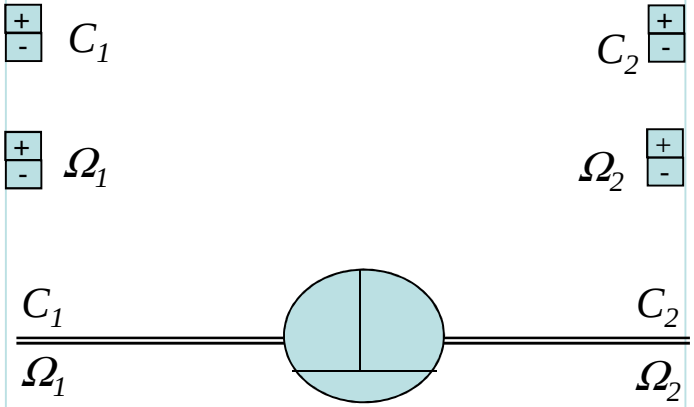
Flywheel



Flexible Coupling



Hydrodynamic coupling or torque converter



M15

M15

Flexible Coupling

Functions

• Filter torque pulses (in association with inertia of rotating parts)
• Enable misalignment between shafts

Operational limits

• Transient (rapid degradation):

• Continuous (gradual degradation):

Model

• Perfect (main function):

• Main imperfections:

M15

M15

M13

M13

Flywheel

Functions

• Store energy
• Limit speed variations
• Smooth motor torque

Operational limits

• Transient (rapid degradation):

• Continuous (gradual degradation):

Model

• Perfect (main function):

• Main imperfections:

M13

M13

M14

M14

Hydrodynamic coupling or torque converter

Functions

• Convert torque by transmitting power
• Couple two shafts

Operational limits

• Transient (rapid degradation):

• Continuous (gradual degradation):

Model

• Perfect (main function):

• Main imperfections:

M14

M14