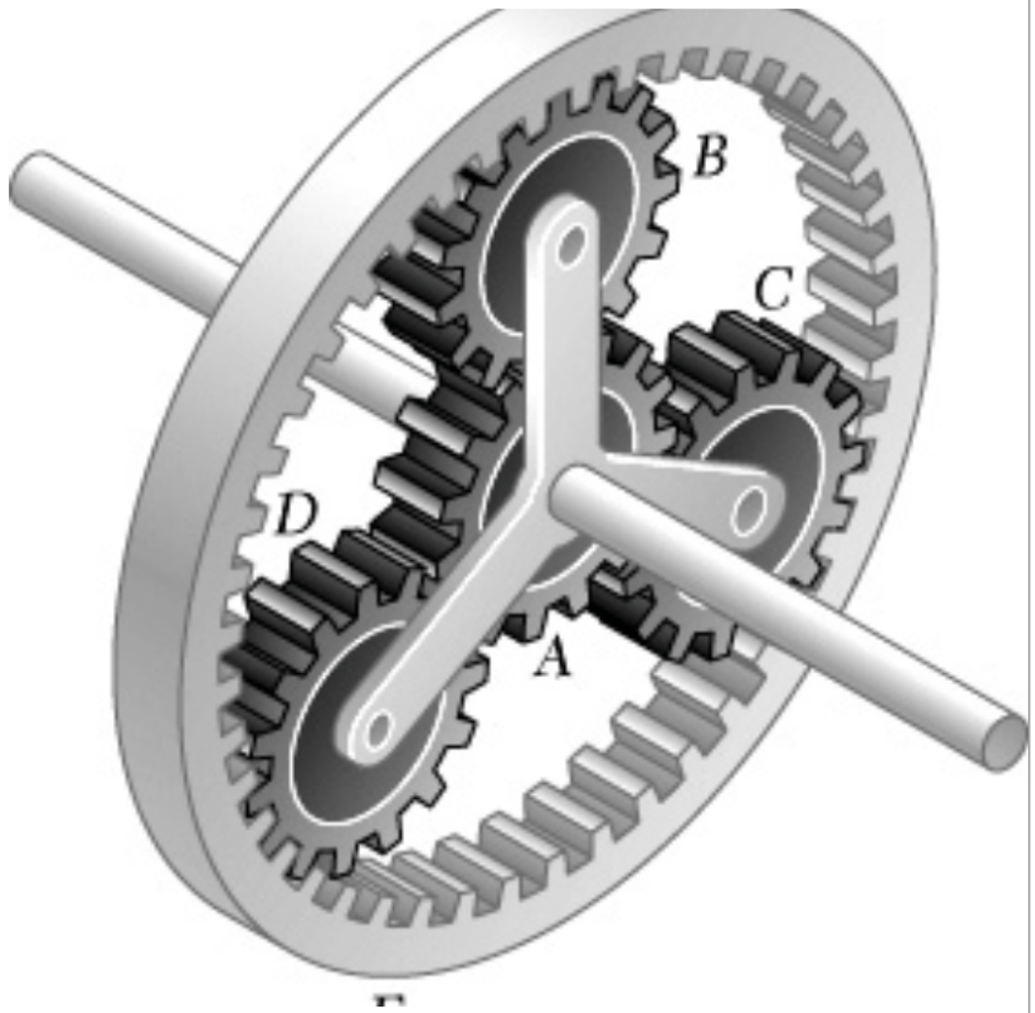
Extra Problems

3D equilibrium

Problem B

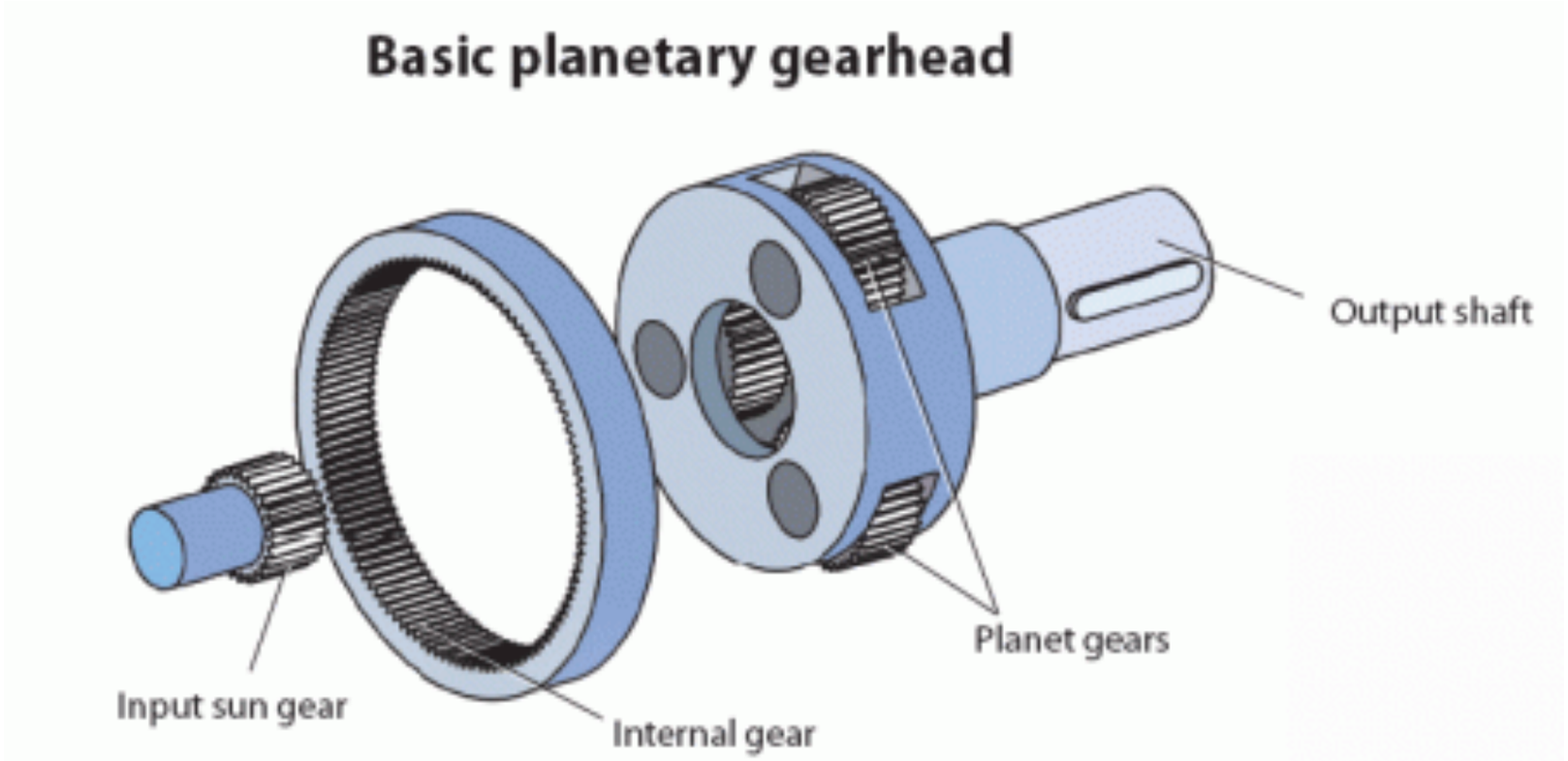
In the planetary gear system shown, the radius of the central gear A **is** $\boldsymbol{a = 24\ mm}$, the radius of the planetary gears is b, and the radius of the outer gear E is (a+2b). A clockwise couple of magnitude 15N.m is applied to the central gear A, and a counterclockwise couple of magnitude 75N.m is applied to the spider BCD. If the system is to be in equilibrium, determine (a) the required radius b of the planetary gears, (b) the couple M_E that must be applied to the outer gear E.



$r_B = 36.0$ mm

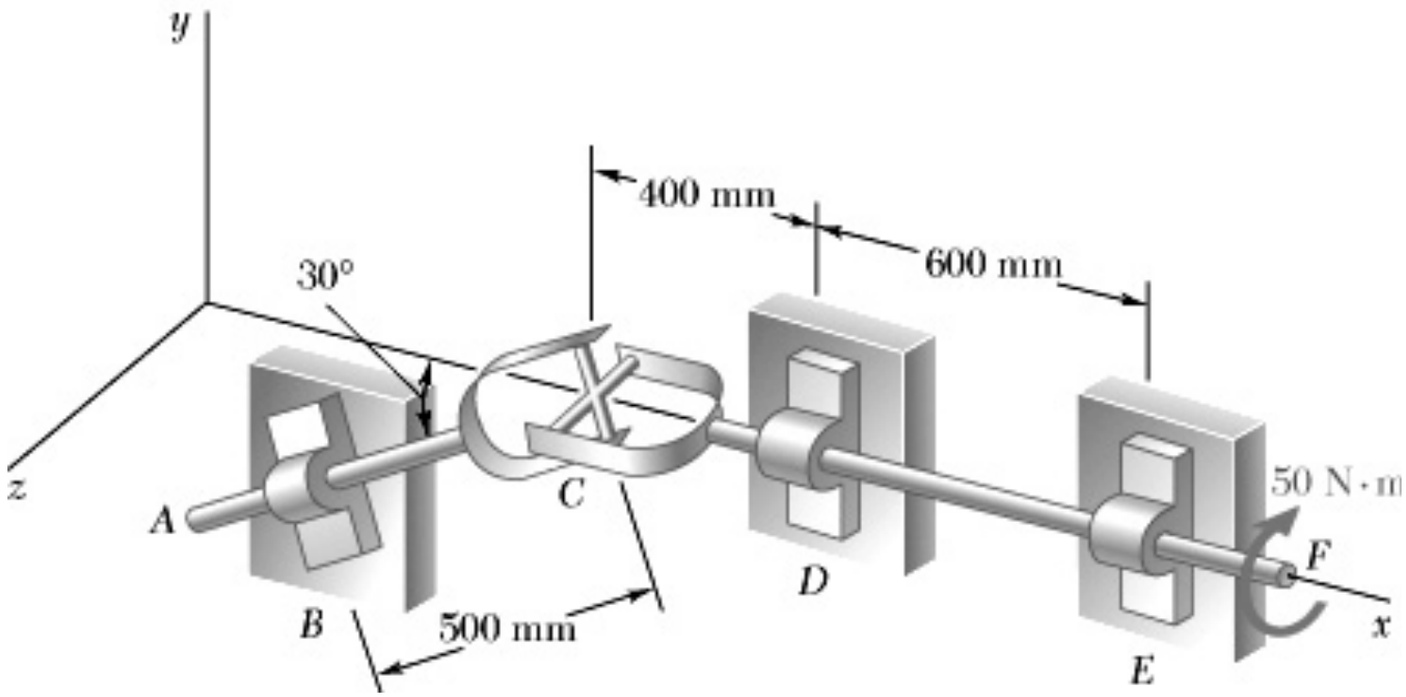
$\mathbf{M}_E = 60.0\ \mathrm{N \cdot m}$)

Planetary Gear



http://machinedesign.com/mechanical-drives/planetary-gears-review-basic-design-criteria-and-new-options-sizing

Problem C



- Two shafts AC and CF, which lie in the vertical xy plane, are connected by a universal joint at C. The bearings at B and D do not exert any axial force. A couple of magnitude (clockwise when viewed from the positive x axis) is applied to shaft CF at F. At a time when the arm of the crosspiece attached to shaft CF is horizontal, determine the magnitude of the couple which must be applied to shaft AC at A to maintain equilibrium.

Universal Joint

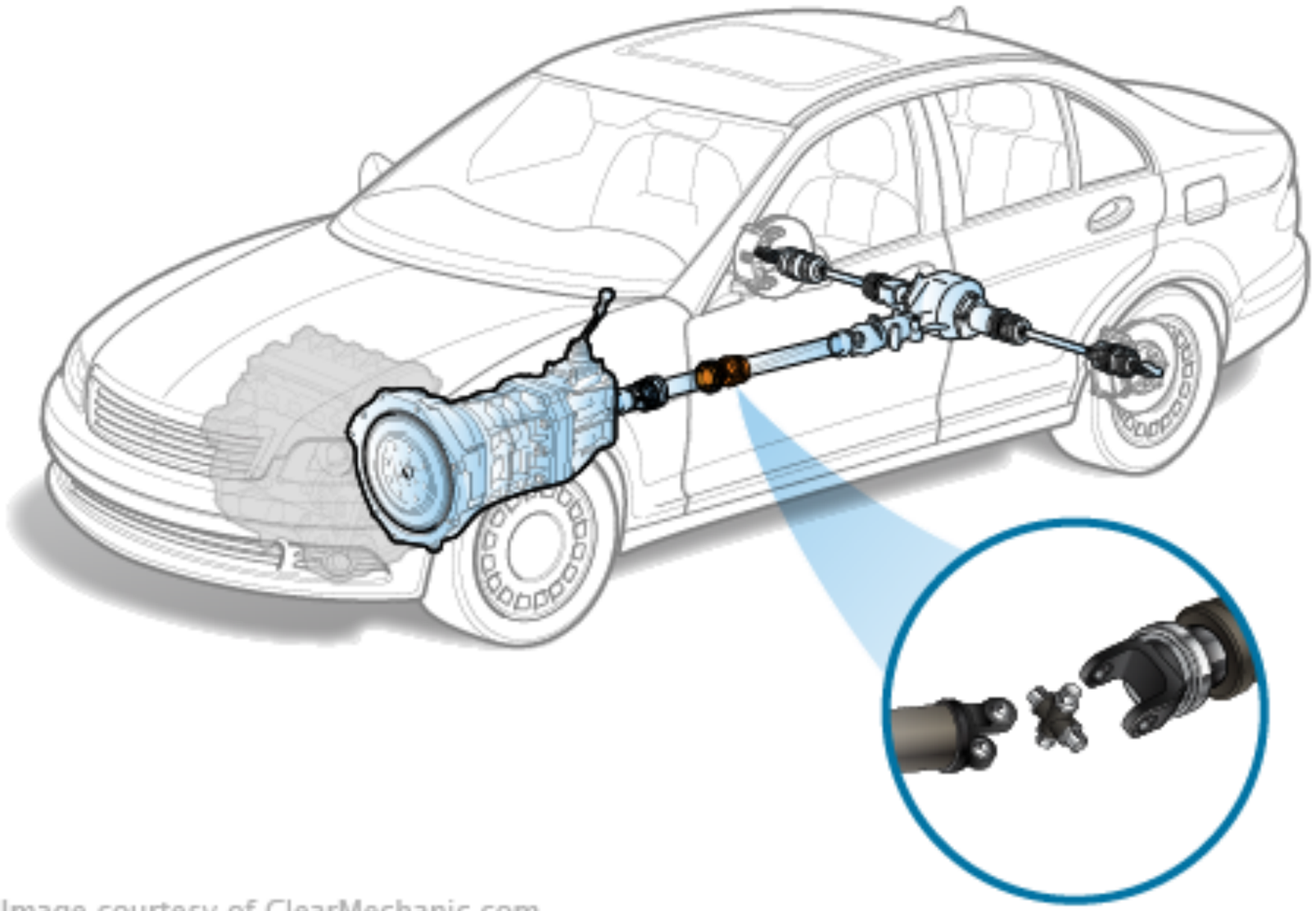


Image courtesy of ClearMechanic.com