Chapter 7: Acceleration analysis

Example 1
An electric motor drives the grinding wheel clockwise, as shown in the figure below. It will speed up to 1800 rpm in 2 s when the power is turned on. Assuming that this speed-up is at a constant rate, determine the angular acceleration of the grinding wheel. Also determine the number of revolutions that the wheel spins before it is at full speed.

Example 2
The mechanism shown in the figure below is used in a distribution center to push boxes along a platform and to a loading area. The input link is driven by an electric motor, which, at the instant shown, has a velocity of 25 rad/s and accelerates at a rate of 500 rad/s². Knowing that the input link has a length of 250 mm, determine the magnitude and direction measured with reference to the horizontal of the normal and tangential acceleration of the end of the input link in the position shown.
Example.3
The figure below shows a power hacksaw. At this instant, the electric motor rotates counterclockwise and drives the free end of the motor crank (point B) at a velocity of 12 in/s. Additionally, the crank is accelerating at a rate of 37 rad/s². Determine
1. The angular velocity of the crank
2. The angular velocity of the coupler
3. The velocity of point C
4. The angular acceleration of the coupler
5. The acceleration of point C.

Example.4
The mechanism shown in the figure below is designed to move parts along a conveyor tray and then rotate and lower those parts to another conveyor. The driving wheel rotates with a constant angular velocity of 12 rpm. Determine the angular acceleration of the rocker arm that rotates and lowers the parts.
Example 5

The figure below illustrates handheld grass shears, used for trimming areas that are hard to reach with mowers or weed whackers. The drive wheel rotates counterclockwise at 400 rpm. Determine the angular acceleration of the oscillating blades at the instant shown.