When an object is rotating at a constant angular velocity, the whole object has a constant angular velocity. Therefore, every mint on the turntable has the same, constant angular velocity.

Looking at a single mint on the turntable:

- $\omega = \text{constant}$
- Because the angular velocity is constant, there is no angular acceleration.
  - $\alpha = \frac{\Delta \omega}{\Delta t} = 0$
- Because the angular acceleration is zero, the tangential acceleration of the mint is zero.
  - $a_t = r \alpha = r \left(0\right) = 0$
- The angular velocity of the mint is constant, however, the tangential velocity of the mint is not constant. Remember tangential velocity is a vector.
  - The magnitude of the tangential velocity of the mint is constant.
  - The direction of the tangential velocity of the mint is not constant.
- Because the tangential velocity of the mint is changing, the mint must have a linear acceleration.
  - $\ddot{a} = \frac{\Delta \vec{v}}{\Delta t}$ (If velocity is changing, there must be a linear acceleration.)
  - As shown above, this line acceleration is not a tangential acceleration.
  - It also is not an angular acceleration.
    - Angular acceleration is angular, not linear.
    - Also, it’s zero anyway.
- The acceleration which causes the tangential velocity to change direction is called Centripetal Acceleration.

Centripetal Acceleration:

- The acceleration that causes circular motion.
- “Centripetal” means “Center Seeking”.
  - Centripetal acceleration is always in toward the center of the circle.
  - Coined by Sir Isaac Newton. Combination of the Latin words “centrum” which means center and “petere” which means “to seek”.
- Is a linear acceleration.
  - $a_c = \frac{v^2}{r} = \left(\frac{r \omega}{r}\right)^2 = \frac{r^2 \omega^2}{r} = r \omega^2 \Rightarrow a_c = \frac{v^2}{r} = r \omega^2$
  - Base S.I. units for centripetal acceleration are $\frac{m}{s^2}$
    - $a_c = r \omega^2 \Rightarrow \left(m \frac{\text{rad}}{s}\right)^2 = \frac{m \cdot \text{rad}^2}{s^2} = \frac{m}{s^2}$