Solution:

1) Using the Drag Force Equation:

$$F_d = \frac{1}{2}\rho * v^2 * \bar{A} * C_d$$

substituting given values and replacing v^2 with Vmax:

$$F_d = \frac{(0.07)(1.06)}{2(32)}[C_{Tf}(14 - (.49\omega))^2 - C_{d(2)}(14 + (.26\omega))^2 - C_{d(3)}(.26\omega)^2]$$

$$F_d = \frac{(0.07)(1.06)}{2(32)}[5.2(14 - (.26\omega))^2 - 0.63(14 + (.26\omega))^2 - 0.63(.26\omega)^2]$$

Expanding terms into a polynomial:

$$F_d = [(0.0011) * (0.26\omega^2 - 42\omega + 895)]$$

2) The Torque:

$$\tau = F_d * \bar{R}$$

$$\tau = [(0.0011) * (0.26\omega^2 - 42\omega + 895)] * (0.26)$$

3) The Work being Done:

$$W = \tau * \omega$$

$$W = [(0.0011) * (0.26\omega^2 - 42\omega + 895) * (0.26)] * (\omega)$$

Combining Terms:

$$W = (0.00076\omega^3 - 0.012\omega^2 + 0.25\omega)$$

Setting the derivative equal to zero:

$$\frac{dW}{d\omega} = 0$$

$$\omega = 11.8\,\frac{rad}{sec} = 113\,rpm$$

Solving W for $\omega = 11.3\,\frac{rad}{sec}$:

$$W = 1.6\,\frac{lb - ft}{sec} = 0.0029\,HP = 2.2\,watts$$