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 GIVEN

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 Actuator Weight:                   0.3000 lbf  
 Food Weight:                       0.1250 lbf  
 Spring Constant:                   0.6000 lbf / in  
  
 Distance to end of actuator:       17.6000 in  
 Distance to center of actuator:    9.2050 in  
  
 Velocity at end of actuator:       1.0000 in/s  
  
 Rest Angle:                         -40.0000 deg  
 Angle to end of curve:             -21.0000 deg  
 Angle to top of wall:               -5.0000 deg  
 End Angle:                          0.0000 deg  
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EQUATIONS

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 Motor Torque

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 $T_{12} = (F_a * L_a - F_f * M_a) * \cos(\theta)$   
 $T_{23} = (F_a * L_a - F_f * M_a) * \cos(\theta) - k * (L_a^2) * (\cos(\theta) - \cos(\alpha_2)) * \sin(\theta)$   
 $T_{34} = (F_a * L_a - F_f * M_a) * \cos(\theta)$

Actuator Loading

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 AXIAL

$Ax_{12} = (F_a - F_f) * \sin(\theta)$   
 $Ax_{23} = (F_a - F_f) * \sin(\theta) - k * L_a * (\cos(\theta) - \cos(\alpha_2)) * \cos(\theta)$   
 $Ax_{34} = (F_a - F_f) * \sin(\theta)$

TRANSVERSE

$Trans_{12} = (F_a - F_f) * \cos(\theta)$   
 $Trans_{23} = (F_a - F_f) * \cos(\theta) - k * L_a * (\cos(\theta) - \cos(\alpha_2)) * \sin(\theta)$   
 $Trans_{34} = (F_a - F_f) * \cos(\theta)$

Spring Catch Loading

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 $F_s = k * L_a * (\cos(\theta) - \cos(\alpha_2)) * \sin(\theta)$   
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RESULTS

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 Motor Torque

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 $T_{max} = 6.579 \text{ in-lbf}$   
 $T_{min} = 3.801 \text{ in-lbf}$

## Motor Power

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P\_max = 6.082 W

P\_min = 3.513 W

## Motor Current

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I\_max = 1216.361 mA

I\_min = 702.686 mA

## Actuator Loading

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## AXIAL

Fax\_max = 0.622 lbf

Fax\_min = -0.273 lbf

## TRANSVERSE

Ftrans\_max = -0.326 lbf

Ftrans\_min = -0.514 lbf

## Spring Catch Loading

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Fs\_max = 0.661 lbf

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