

16MnCr5

$R_m := 650 \text{ MPa}$ tensile strength

$R_p := 450 \text{ MPa}$ yield strength

$\sigma_{zd_WN} := 290 \text{ MPa}$ fatigue strength

$\sigma_o := 395 \text{ MPa}$ principal stress (FEA)

$\sigma_u := 0 \text{ MPa}$ swelling load

$\sigma_o = 395 \text{ MPa}$

$\sigma_u = 0 \text{ MPa}$

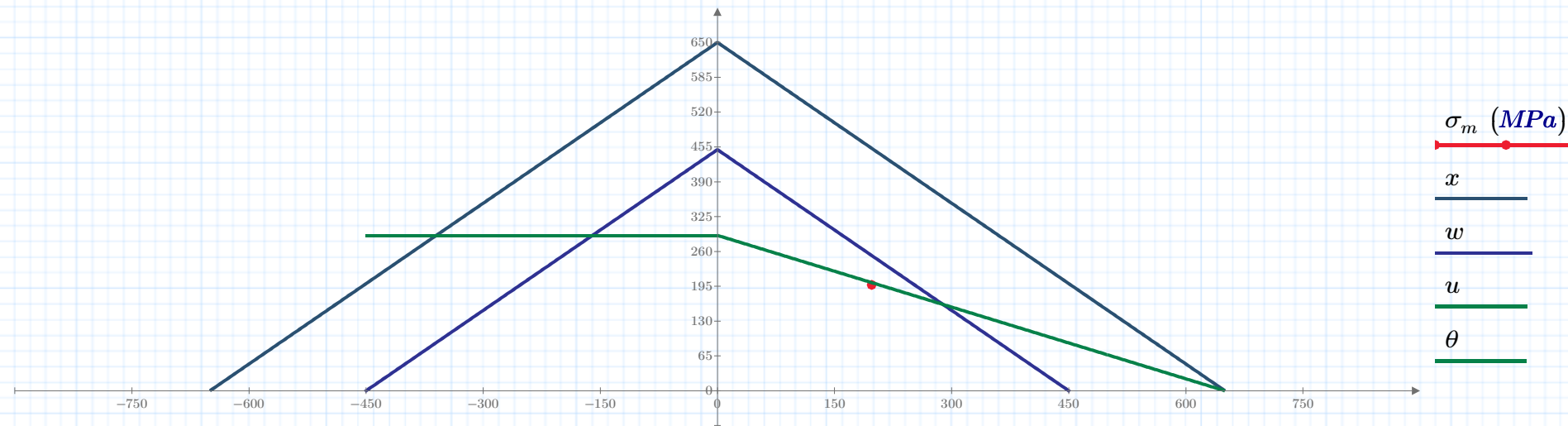
$$\sigma_a := \frac{\sigma_o - \sigma_u}{2} = 197.5 \text{ MPa}$$

$$\sigma_m := \frac{\sigma_o + \sigma_u}{2} = 197.5 \text{ MPa}$$

$$y(x) := R_m - |x| \cdot \text{MPa} \quad z(w) := R_p - |w| \cdot \text{MPa} \quad u := 0 \dots \frac{R_m}{\text{MPa}} \quad v(u) := \frac{-\sigma_{zd_WN}}{R_m} u \cdot \text{MPa} + \sigma_{zd_WN}$$

$$\theta := \frac{-R_p}{\text{MPa}} \dots 0 \quad \xi(\theta) := \sigma_{zd_WN}$$

$\sigma_a \text{ (MPa)}$
 $y(x) \text{ (MPa)}$
 $z(w) \text{ (MPa)}$
 $v(u) \text{ (MPa)}$
 $\xi(\theta) \text{ (MPa)}$



The fatigue strength proof has been provided.