

CA - Bolt pretension

Contents

- 1 Introduction** **3**
- 1.1 Calculation of pretension force 3
- 1.2 Calculation of temperature change 3

- 2 Results** **3**
- 2.1 Without contact 3
- 2.2 With contact 7

1 Introduction

1.1 Calculation of pretension force

INPUT:

$$\Delta T = 100K$$

$$d = 16mm$$

$$\alpha = 12 \cdot 10^{-6}K^{-1}$$

$$E = 210000MPa$$

$$\frac{\Delta L}{L} = \alpha \cdot \Delta T \quad (1)$$

$$\sigma_x = \frac{\Delta L}{L} E = \alpha \cdot \Delta T \cdot E \quad (2)$$

$$S = \frac{\pi d^2}{4} \quad (3)$$

$$F = \sigma_x \cdot S \quad (4)$$

$$F = \alpha \cdot \Delta T \cdot E \cdot \frac{\pi d^2}{4} \quad (5)$$

1.2 Calculation of temperature change

INPUT:

$$F = 50000N$$

$$d = 16mm$$

$$\alpha = 12 \cdot 10^{-6}K^{-1}$$

$$E = 20000MPa$$

$$\Delta T = \frac{4 \cdot F}{\alpha \cdot \pi d^2 \cdot E} \quad (6)$$

$$\Delta T = \frac{4 \cdot 50000}{12 \cdot 10^{-6} \cdot \pi 16^2 \cdot 2 \cdot 10^5} = 103.616K \quad (7)$$

2 Results

2.1 Without contact

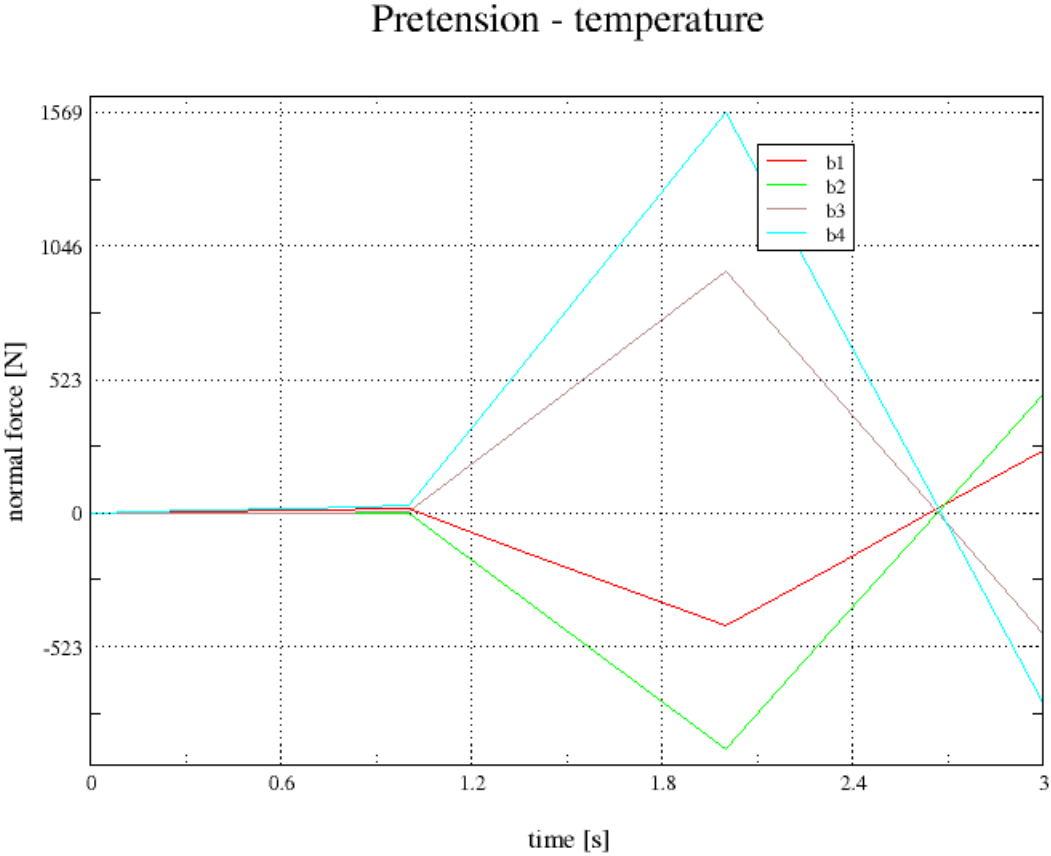


Figure 1: Temperature

Pretension - pretension

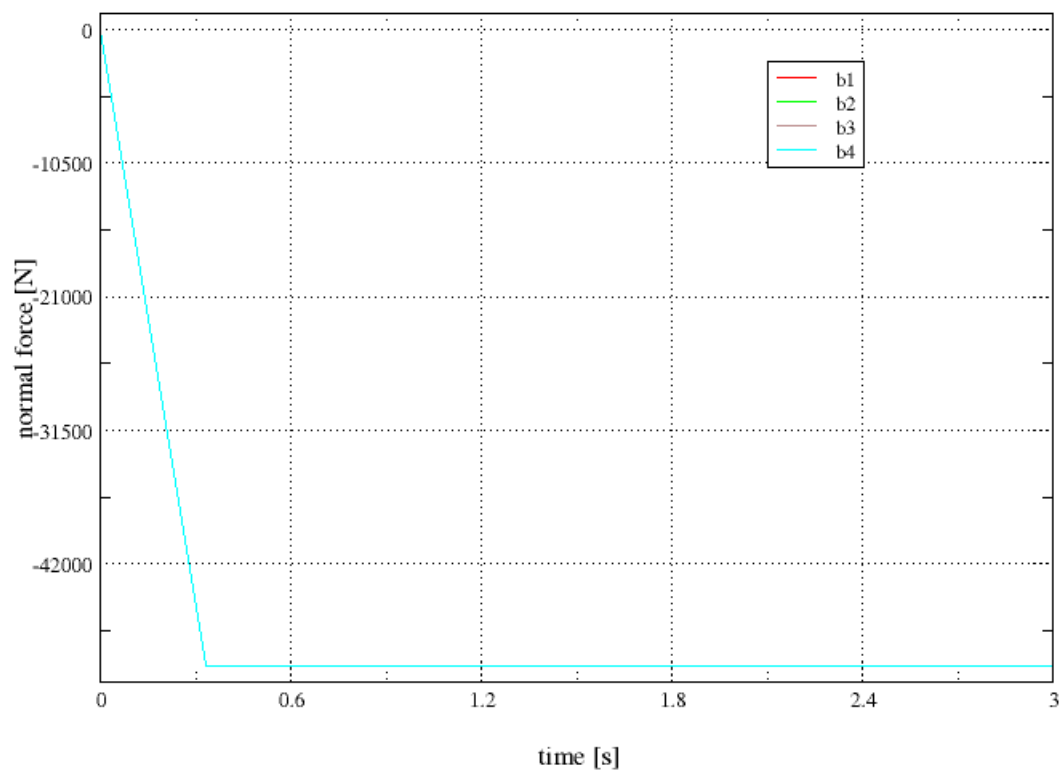


Figure 2: Beam force

Pretension - etat_init

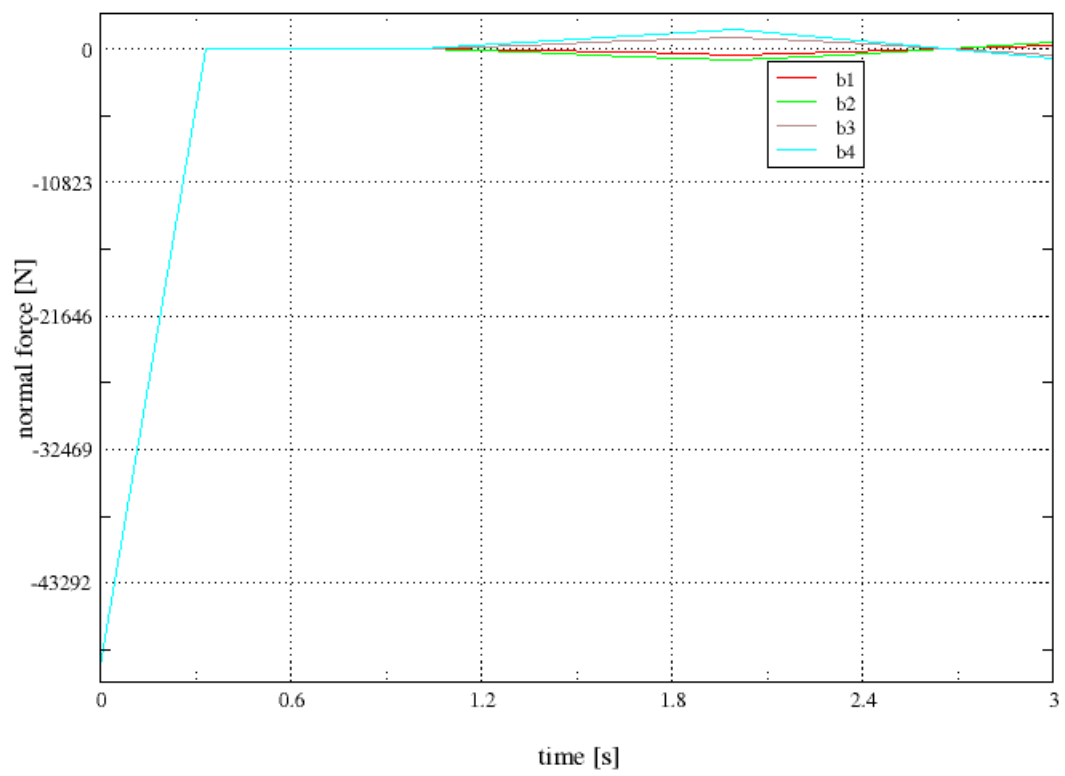


Figure 3: ETAT INIT

2.2 With contact

Pretension - temperature

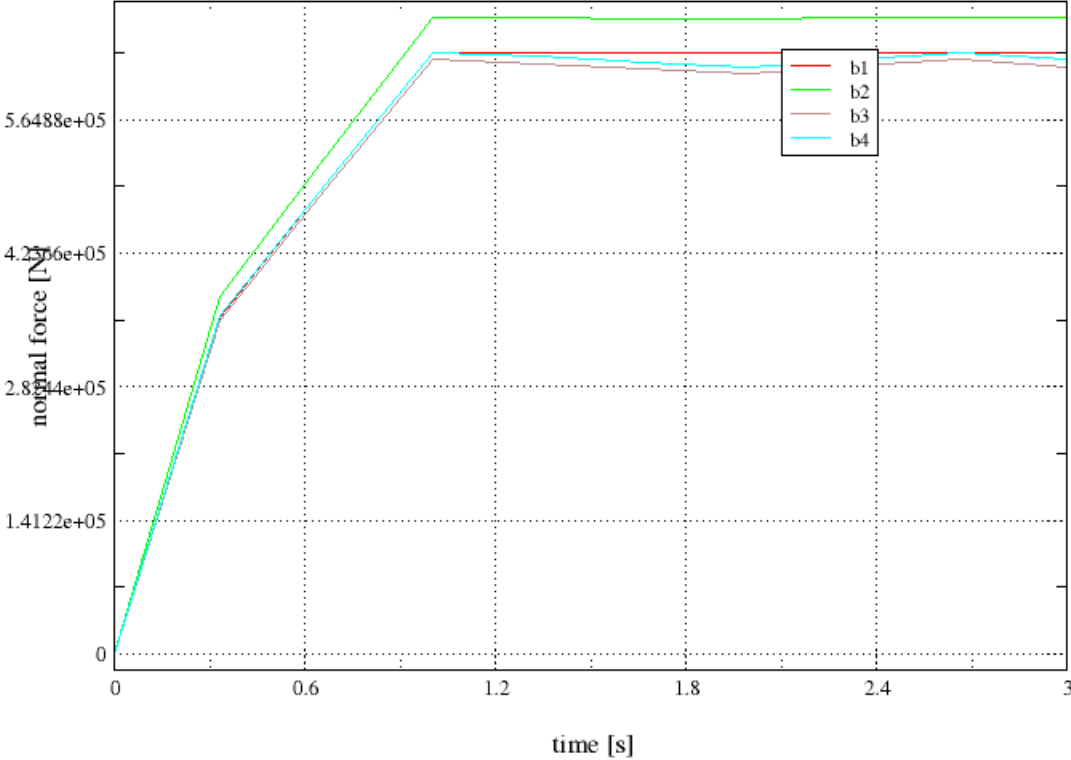


Figure 4: Temperature

Pretension - pretension

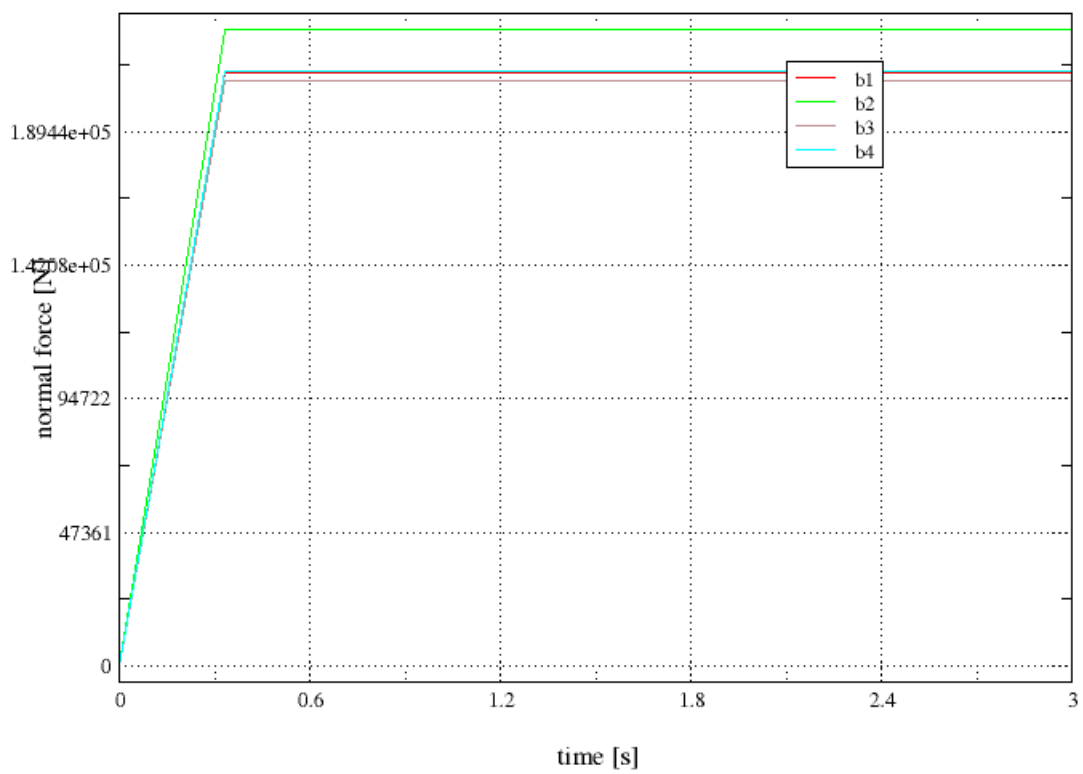


Figure 5: Beam force

Pretension - etat_init

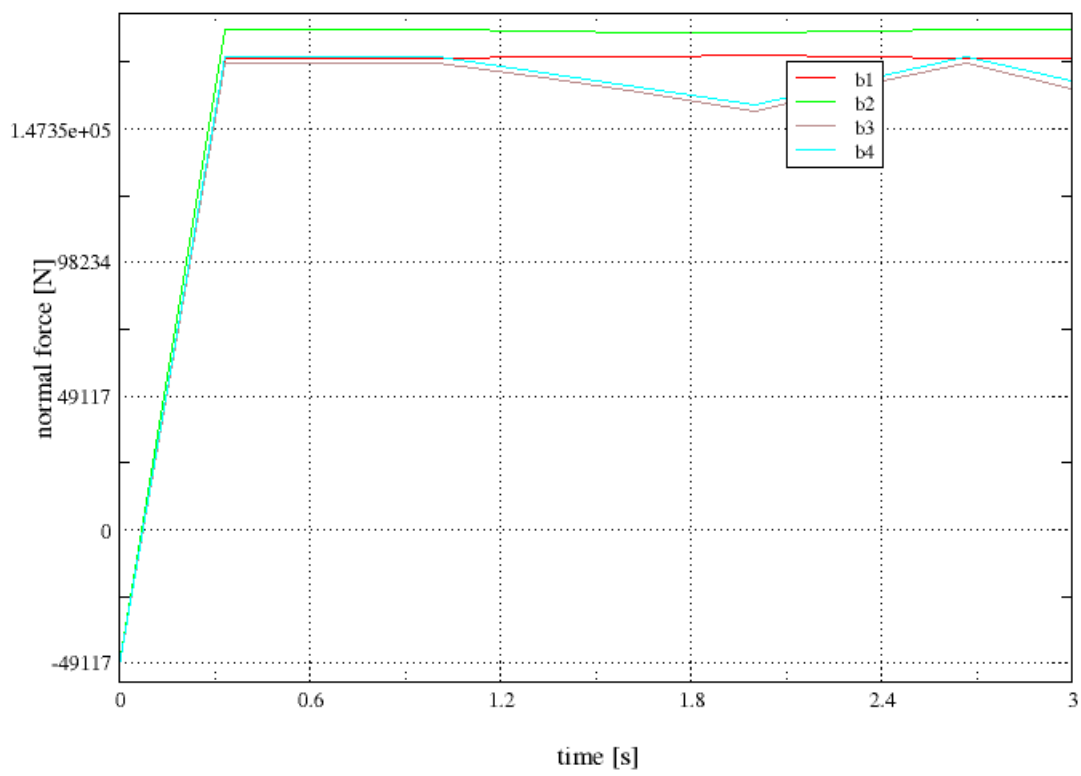


Figure 6: ETAT INIT