

# Ce 405 Design Of Steel Structures

## Prof Dr A Varma

Teaching | M. Z. Naser, PhD, PE

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CHAPTER 3. COMPRESSION MEMBER DESIGN 3.1 INTRODUCTORY CONCEPTS

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Chapter 2. Design of Beams – Flexure and Shear

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DESIGN PROVISIONS FOR

BOLTED SHEAR

CONNECTIONS • In a

simple connection, all

bolts share the load

equally. T T T/n T/n T/n

T/n T/n T/n • In a bolted

shear connection, the

bolts are subjected to

shear and the connecting

/ connected plates are

subjected to bearing

stresses. Bolt in shearCE

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Steel Structures – Prof. Dr.

A. Varma Tension Member

Design Example 3.1 A 5 x

½ bar of A572 Gr. 50 steel

is used as a tension

member. It is connected

to a gusset plate with six

7/8 in. diameter bolts as

shown in below. Assume

that the effective net

areaCE 405: Design of

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STRUCTURAL

CONNECTIONS Members

of a structural frame are

connected together using

connections. Prominent

connection types include:

(1) truss / bracing

member connections; (2)

simple shear connections;

(3) fully-restrained

moment connections; and

(4) partially-restrained

flexible moment1.0

INTRODUCTION TO

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ENGINEERING 1.1

GENERAL ...Ce 405 Design

Of Steel CE 405: Design of

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A. Varma Tension Member

Design - Therefore, design

strength = 73.125 kips (net section fracture controls). Example 3.2 A single angle tension member, L 4 x 4 x 3/8 in. made from A36 steel is connected to a gusset plate with 5/8 in. diameter bolts, as shown in Figure ...Ce 405 Design Of Steel Structures Prof Dr A Varma CE 405: Design of Steel Structures - Prof. Dr. A. Varma Example 3b.2 Design a double angle tension member and connection system to carry a factored load of 250 kips. Solution Step I. Assume material properties □ Assume 36 ksi steel for designing the member and the gusset plates. □ Assume E70XX electrode for the fillet welds. 8 CE 405 Design of Steel Structures Prof Dr A Varma ...CE 405 Design Of Steel Structures Design Of Steel Structures Documents All (19) CE 405 : Design Of Steel Structures - MSU CE 405: Design of Steel Structures - Prof. Dr. A. Varma The governing slenderness ratio is the larger of  $(K_x L_x / r_x, K_y L_y / r_y)$   $K_y L_y / r_y$  is larger and the governing slenderness ratio;  $\lambda_c = \frac{F_y}{\pi^2 E} \left( \frac{K L}{r} \right)^2$   $\lambda_c < 1.5$ ; Therefore,  $F_{cr} = 0.658 \lambda_c F_y$  Therefore,  $F_{cr} = 21.99$  ksi Design column strength =  $\phi_c P_n =$

0.85 (Ag Fcr) = 0.85 (21.8 in CHAPTER 3. COMPRESSION MEMBER DESIGN 3.1 INTRODUCTORY CONCEPTS CE 405: Design of Steel Structures - Prof. Dr. A. Varma 2.2 Flexural Deflection of Beams - Serviceability Steel beams are designed for the factored design loads. The moment capacity, i.e., the factored moment strength ( $\phi_b M_n$ ) should be greater than the moment ( $M_u$ ) caused by the factored loads. Chapter 2. Design of Beams - Flexure and Shear CE 405 - Design of Steel Structures. Design of steel beams, columns, tension members and connections. Stability and plastic strength. Overview; Venkatesh K Kodur CE 405 - Design of Steel Structures - CE 405 - MSU Grades CE 405: Design of Steel Structures - Prof. Dr. A. Varma Homework No. 1: Structural Engineering and Design Loads A two-dimensional (2D) building frame is shown in the following figures. The dead loads, live loads, roof loads, snow loads, and wind loads acting on the frame have been determined using the ASCE 7-98 Standards, and are shown in the Figures. (Get Answer) - CE 405: Design of Steel

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 $\lambda_c < 1.5$ ; Therefore,  $F_{cr} = ( ) 2 0.658 \lambda_c F_y$   
 Therefore,  $F_{cr} = 21.99$  ksi  
 Design column strength =  $\phi_c P_n = 0.85 (A_g F_{cr}) = 0.85 (21.8$  in  
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*8 CE 405 Design of Steel Structures Prof Dr A Varma ...*  
 CE 405: Design of Steel Structures  $A_e$  equals the actual net area  $A_n$  and compute the tensile design strength of the member.  $b_b a a 5 x ?$  in. bar Gusset plate 7/8 in. diameter bolt Example 3.2 A single angle tension member, L 4 x 4 x 3/8 in. made from A36 steel is connected  
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T/n T/n T/n • In a bolted shear connection, the bolts are subjected to shear and the connecting / connected plates are subjected to bearing stresses. Bolt in shear CE 405: Design of Steel Structures – Prof. Dr. A. Varma properly certified, and for critical work, special inspection techniques such as radiography or ultrasonic testing must be used. • The two most common types of welds are the fillet weld and the groove weld.  
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