Report

Example 4A

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| Prepared by: | Prepared for: |
| SDC Verifier |  |
|  |  |

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| --- | --- |
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| Customer: |  |
| Project Number: |  |
| Version: | 1 |
| Date: | 24 Sep 2014 |

# Preface

This document is generated with SDC Verifier 3.6.1 and calculated with FEMAP v11.1.0

Model File: D:\SDC\AISC Examples\Chapter E\Example E4\Example\_E.4A\_v11.modfem

Project File: D:\SDC\AISC Examples\Chapter E\Example E4\Example\_E.4A\_v11.sdcv

Report Profile: 1..Standards

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Femap and SDC Verifier models coincide. Checked information is presented below:

|  |  |  |
| --- | --- | --- |
| Entity | Femap Model Entities Count | SDC Verifier Model Entities Count |
| Nodes | 61 | 61 |
| Elements | 60 | 60 |
| Materials | 1 | 1 |
| Property | 3 | 3 |

# Model Entities

This paragraph shows detailed or brief model overview.

## Materials

This paragraph contains materials information.

### Materials Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Title | Element(s) | Mass | Gravity Center |
| 1..Steel ASTM A992 | 60 | 16669800.00 | [0.00; 228.98; 0.00] |

### 1..Steel ASTM A992

|  |  |
| --- | --- |
| Property | Value |
| Elements | 60 |
| Mass | 16669800.00 |
| Gravity Center | [0.00; 228.98; 0.00] |
| X [Min;Max] | [-420.00; 420.00] |
| Y [Min;Max] | [0.00; 336.00] |
| Z [Min;Max] | [0.00; 0.00] |

|  |  |  |
| --- | --- | --- |
|  | Property | Value |
| FEM Relevant | Young Modulus | 2.90e+07 |
|  | Shear Modulus | 0.000 |
|  | Poisson Ratio | 0.300 |
|  | Shear | 0.000 |
|  | Mass Density | 490.000 |
| SDC Verifier Relevant | Tensile Strength | 65000.00 |
|  | Yield Stress | 50000.00 |
|  | | | |

## Properties

This paragraph contains properties information.

### Properties Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Element(s) | Material | Mass | Gravity Center |
| 1..W14x82 | 20 | 1..Steel ASTM A992 | 3951360.00 | [0.00; 168.00; 0.00] |

### 1..W14x82

|  |  |
| --- | --- |
| Property | Value |
| Elements | 20 |
| Type | Beam |
| Material | 1..Steel ASTM A992 |
| Mass | 3951360.00 |
| Gravity Center | [0.00; 168.00; 0.00] |
| X [Min;Max] | [0.00; 0.00] |
| Y [Min;Max] | [0.00; 336.00] |
| Z [Min;Max] | [0.00; 0.00] |
| Moment I1 or Izz | 881.00 |
| Moment I2 or Iyy | 148.00 |
| Moment I3 or Izy | 0.00 |
| Area A | 24.00 |
| Z Shear Area | 15.43 |
| Y Shear Area | 6.73 |
| Torsional Constant J | 5.07 |
| Nonstructural Mass Length | 0.00 |
| Warping Constant | 6626.00 |
| Perimeter | 67.98 |
| Y Neutral Axis Offset | 0.00 |
| Z Neutral Axis Offset | 0.00 |

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| --- | --- | --- | --- |
|  |  |  |  |
| Geometry Property | Value | Points Of Interest | Value |
| Height | 14.30 | Point 1 | [-7.15 ; 5.05] |
| Width | 10.10 | Point 2 | [-7.15 ; -5.05] |
| h | 14.30 | Point 3 | [7.15 ; -5.05] |
| a | 10.10 | Point 4 | [7.15 ; 5.05] |
| b | 10.10 |  |  |
| c | 0.86 |  |  |
| d | 0.51 |  |  |
| t | 0.86 |  |  |
|  | | | | |

### 2..W24x55

|  |  |
| --- | --- |
| Property | Value |
| Elements | 20 |
| Type | Beam |
| Material | 1..Steel ASTM A992 |
| Mass | 6667920.00 |
| Gravity Center | [0.00; 168.00; 0.00] |
| X [Min;Max] | [-420.00; 420.00] |
| Y [Min;Max] | [168.00; 168.00] |
| Z [Min;Max] | [0.00; 0.00] |
| Moment I1 or Izz | 1350.00 |
| Moment I2 or Iyy | 29.10 |
| Moment I3 or Izy | 0.00 |
| Area A | 16.20 |
| Z Shear Area | 14.87 |
| Y Shear Area | 9.00 |
| Torsional Constant J | 1.18 |
| Nonstructural Mass Length | 0.00 |
| Warping Constant | 3865.10 |
| Perimeter | 74.45 |
| Y Neutral Axis Offset | 0.00 |
| Z Neutral Axis Offset | 0.00 |

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| --- | --- | --- | --- |
|  |  |  |  |
| Geometry Property | Value | Points Of Interest | Value |
| Height | 23.60 | Point 1 | [-11.80 ; 3.51] |
| Width | 7.01 | Point 2 | [-11.80 ; -3.51] |
| h | 23.60 | Point 3 | [11.80 ; -3.51] |
| a | 7.01 | Point 4 | [11.80 ; 3.51] |
| b | 7.01 |  |  |
| c | 0.51 |  |  |
| d | 0.40 |  |  |
| t | 0.51 |  |  |
|  | | | | |

### 3..W18x50

|  |  |
| --- | --- |
| Property | Value |
| Elements | 20 |
| Type | Beam |
| Material | 1..Steel ASTM A992 |
| Mass | 6050520.00 |
| Gravity Center | [0.00; 336.00; 0.00] |
| X [Min;Max] | [-420.00; 420.00] |
| Y [Min;Max] | [336.00; 336.00] |
| Z [Min;Max] | [0.00; 0.00] |
| Moment I1 or Izz | 800.00 |
| Moment I2 or Iyy | 40.10 |
| Moment I3 or Izy | 0.00 |
| Area A | 14.70 |
| Z Shear Area | 9.28 |
| Y Shear Area | 6.13 |
| Torsional Constant J | 1.24 |
| Nonstructural Mass Length | 0.00 |
| Warping Constant | 3041.86 |
| Perimeter | 65.29 |
| Y Neutral Axis Offset | 0.00 |
| Z Neutral Axis Offset | 0.00 |

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| --- | --- | --- | --- |
|  |  |  |  |
| Geometry Property | Value | Points Of Interest | Value |
| Height | 18.00 | Point 1 | [-9.00 ; 3.75] |
| Width | 7.50 | Point 2 | [-9.00 ; -3.75] |
| h | 18.00 | Point 3 | [9.00 ; -3.75] |
| a | 7.50 | Point 4 | [9.00 ; 3.75] |
| b | 7.50 |  |  |
| c | 0.57 |  |  |
| d | 0.36 |  |  |
| t | 0.57 |  |  |
|  | | | | |

## FEM Loads

This paragraph contains information about applied loads to model.

### 1..Dead\_Load

|  |  |  |  |
| --- | --- | --- | --- |
| Definition Title | Load Type | Applied on | Value(s) |
| 1..BC\_41.5kips | Force | Node: 123 | (0;-41500;0) |
| 2..AB\_100kips | Force | Node: 113 | (0;-100000;0) |
| 3..AB -41.5kips | Force | Node: 113 | (0;41500;0) |

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### 2..Live\_Load

|  |  |  |  |
| --- | --- | --- | --- |
| Definition Title | Load Type | Applied on | Value(s) |
| 1..BC\_125kips | Force | Node: 123 | (0;-125000;0) |
| 2..AB\_300kips | Force | Node: 113 | (0;-300000;0) |
| 3..AB -125kips | Force | Node: 113 | (0;125000;0) |

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## Constraints

This paragraph contains information about constrained parts of the model.

### 1..Supports

|  |  |  |
| --- | --- | --- |
| Definition | Count | Type (DOF) |
| 1..Fixed | 4 node(s) | Tx Ty Tz Rx Ry Rz |
| 2..Tz | 20 node(s) | Tz |
| 3..Foundation | 1 node(s) | Tx Ty Tz Rx Ry Rz |
|  | | | |

# Standards

This paragraph shows detailed information about applied standards.

## 1..ANSI / AISC LRFD 360-10

#### General Information

|  |  |
| --- | --- |
| Property | Value |
| Title | ANSI / AISC LRFD 360-10 |
| Type | 11 |
| Constants | 8 |
| Classifications | 0 |
| Standard Tables | 0 |

### Constant

|  |  |
| --- | --- |
| Title | Value |
| F\_t | 0.9 |
| F\_c | 0.9 |
| F\_v | 0.9 |
| rolled | 1 |
| built\_up | 2 |
| nonslender | 3 |
| slender | 4 |
| NotSupported | -12345678 |

### Characteristics

This paragraph contains information about extra elemental characteristics

#### 1..Section Build Type

|  |  |
| --- | --- |
| Property | Value |
| Type |  |
| AliasName | Section\_Build\_Type |
| Groups count | 3 |

#### Description

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Property | Value | No. | Property | Value |
| 1 | 1..W14x82 | 1 | 3 | 3..W18x50 | 1 |
| 2 | 2..W24x55 | 1 |  |  |  |

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#### 1..Section Build Type

|  |  |
| --- | --- |
| Property | Value |
| Type |  |
| AliasName | Section\_Build\_Type |
| Groups count | 3 |

#### Description

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Property | Value | No. | Property | Value |
| 1 | 1..W14x82 | 1 | 3 | 3..W18x50 | 1 |
| 2 | 2..W24x55 | 1 |  |  |  |

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#### 2..Effective Length Factor Y

|  |  |
| --- | --- |
| Property | Value |
| Type |  |
| AliasName | Ky |
| Groups count | 6 |

#### Description

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Property | Value | No. | Property | Value |
| 1 | Sub Member 2.1 | 1 | 4 | Sub Member 3.2 | 1 |
| 2 | Sub Member 2.2 | 1 | 5 | Component '1..AB' | 1.5 |
| 3 | Sub Member 3.1 | 1 | 6 | Component '2..BC' | 1.5 |

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### Checks

This paragraph contains checks descriptions with their results.

#### 7..Section I

|  |  |
| --- | --- |
| Property | Value |
| Category | Elemental Custom Check |
| Selection | 3 PropertyShape(s) |
| Parameters | 17 |

All (LS1, 3..AB+BC)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Check | | 7..Section I | | | | Load Set: | | 1..LRFD | | | |
| Selection | | 3..AB+BC | | | | Direction | | All | | | |
| Load | Flange Thickness | | Flange Width | Web Thickness | Web Width | | Width to Thickness Ratio Flanges | | Width to Thickness Ratio Webs | Kc\_calc | Kc | |
| Load Set '1..LRFD' | 0.86 | | 5.05 | 0.51 | 12.59 | | 5.91 | | 24.69 | 0.81 | 0.76 | |
| Load | Qs\_built\_up for Flanges | | Critical Stress Y (Q=1) | Critical Stress Z (Q=1) | Critical Stress (Q=1) | | Effective Web WidthHe | | Net Reduction Factor for Webs | Qs\_rolled for Flanges | Net Reduction Factor | |
| Load Set '1..LRFD' | 1.000 | | 44059.14 | 49999.41 | 44059.14 | | 12.590 | | 0.987 | 1.000 | 0.987 | |
| Load | | | | | | Slender Type | | | | | | | |
| Load Set '1..LRFD' | | | | | | 4.000 | | | | | | | |

#### 8..Help

|  |  |
| --- | --- |
| Property | Value |
| Category | Elemental Custom Check |
| Selection | 17 PropertyShape(s) |
| Parameters | 17 |

All (LS1, 3..AB+BC)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Check | | 8..Help | | | | Load Set: | | 1..LRFD | | | |
| Selection | | 3..AB+BC | | | | Direction | | All | | | |
| Load | Polar Radius of gyration Square | | H\_parameter | Fcr z Torsional | Net Reduction Factor | | Slender Type | | Fez Torsional | Fe Single Symmetric | Fe Double Symmetric | |
| Load Set '1..LRFD' | 42.875 | | 1.000 | 0.000 | 0.987 | | 4.000 | | 29022.4 | 29022.4 | 7313637.0 | |
| Load | Fe Torsional | | Fey Torsional Controls | Fez Torsional Controls | Fey | | Fez | | Critical Stress Y | Critical Stress Z | Critical Stress T Shape | |
| Load Set '1..LRFD' | 7313637.0 | | 0.0 | 1.0 | 165447.9 | | 7313637.0 | | 43564.2 | 49218.9 | 0.000 | |
| Load | | | | | | Critical Stress | | | | | | | |
| Load Set '1..LRFD' | | | | | | 43564.223 | | | | | | | |

#### 9..Axial

|  |  |
| --- | --- |
| Property | Value |
| Category | Elemental Custom Check |
| Selection | 17 PropertyShape(s) |
| Parameters | 4 |

All (LS1, 1..AB)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Check | 9..Axial | | | Load Set: | | 1..LRFD | |
| Selection | 1..AB | | | Direction | | All | |
| Load | | Nominal Compressive Strength | Design Tensile Strength | | Axial Force | | Utilization Factor | |
| Load Set '1..LRFD' | | 940987.2 | 1080000.0 | | -596722.2 | | 0.63 | |

All (LS1, 2..BC)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Check | 9..Axial | | | Load Set: | | 1..LRFD | |
| Selection | 2..BC | | | Direction | | All | |
| Load | | Nominal Compressive Strength | Design Tensile Strength | | Axial Force | | Utilization Factor | |
| Load Set '1..LRFD' | | 940987.2 | 1080000.0 | | -248301.7 | | 0.26 | |