Report

Check AISC-2010 Example E.2

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

|  |  |
| --- | --- |
| Engineer: |  |
| Customer: |  |
| Project Number: |  |
| Version: | 1 |
| Date: | 10 Jul 2014 |

# Preface

This document is generated with SDC Verifier 3.6 and calculated with FEMAP v11.0.0

Model File: E:\ASIC\_Standart\Model\_for\_check\Example\_E.2.modfem

Project File: E:\ASIC\_Standart\Model\_for\_check\Example\_E.2.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 |
| Elements | 6 | 6 |
| Elements | 5 | 5 |
| Materials | 1 | 1 |
| Property | 1 | 1 |

# Dimension

Length – ft (foot)

Mass – pounds (lb)

Force – pound force (lb); 1 kip = 1000 lb

Pressure – lb/ft2

Density – lb/ft3

# EXAMPLE E.2 BUILT-UP COLUMN WITH A SLENDER WEB











# 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 A572 Grade 50 | 5 | 1008.07 | [22.50; 0.00; 0.00] |

### 1..Steel ASTM A572 Grade 50

|  |  |
| --- | --- |
| Property | Value |
| Elements | 5 |
| Mass | 1008.07 |
| Gravity Center | [22.50; 0.00; 0.00] |
| X [Min;Max] | [15.00; 30.00] |
| Y [Min;Max] | [0.00; 0.00] |
| Z [Min;Max] | [0.00; 0.00] |

|  |  |  |
| --- | --- | --- |
|  | Property | Value |
| FEM Relevant | Young Modulus | 4.18e+09 |
|  | Shear Modulus | 0.000 |
|  | Poisson Ratio | 0.300 |
|  | Shear | 0.000 |
|  | Mass Density | 490.000 |
| SDC Verifier Relevant | Tensile Strength | 9.36e+6 |
|  | Yield Stress | 7.20e+6 |
|  | | | |

## Properties

This paragraph contains properties information.

### Properties Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Element(s) | Material | Mass | Gravity Center |
| 1..Column\_PL1in.x8in.\_flanges\_and\_PL1/4in.x15in.\_web | 5 | 1..Steel ASTM A572 Grade 50 | 1008.07 | [22.50; 0.00; 0.00] |

### 1..Column\_PL1in.x8in.\_flanges\_and\_PL1/4in.x15in.\_web

|  |  |
| --- | --- |
| Property | Value |
| Elements | 5 |
| Type | Beam |
| Material | 1..Steel ASTM A572 Grade 50 |
| Mass | 1008.07 |
| Gravity Center | [22.50; 0.00; 0.00] |
| X [Min;Max] | [15.00; 30.00] |
| Y [Min;Max] | [0.00; 0.00] |
| Z [Min;Max] | [0.00; 0.00] |
| Moment I1 or Izz | 0.05 |
| Moment I2 or Iyy | 4.12e-03 |
| Moment I3 or Izy | 0.00 |
| Area A | 0.14 |
| Z Shear Area | 0.10 |
| Y Shear Area | 0.03 |
| Torsional Constant J | 2.45e-04 |
| Nonstructural Mass Length | 0.00 |
| Warping Constant | 0.00 |
| Perimeter | 5.46 |
| Y Neutral Axis Offset | 0.00 |
| Z Neutral Axis Offset | 0.00 |

|  |  |
| --- | --- |
|  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Geometry Property | Value | Points Of Interest | Value |
| Height | 1.42 | Point 1 | [-0.71 ; 0.33] |
| Width | 0.67 | Point 2 | [-0.71 ; -0.33] |
| h | 1.42 | Point 3 | [0.71 ; -0.33] |
| a | 0.67 | Point 4 | [0.71 ; 0.33] |
| b | 0.67 |  |  |
| c | 0.08 |  |  |
| d | 0.02 |  |  |
| t | 0.08 |  |  |
|  | | | | |

## FEM Loads

This paragraph contains information about applied loads to model.

### 1..Dead load (70 kips)

|  |  |  |  |
| --- | --- | --- | --- |
| Definition Title | Load Type | Applied on | Value(s) |
| 1..70kips | Force | Node: 22 | (-70000;0;0) |

|  |
| --- |
|  |

### 2..Live load (210 kips)

|  |  |  |  |
| --- | --- | --- | --- |
| Definition Title | Load Type | Applied on | Value(s) |
| 1..210kips | Force | Node: 22 | (-210000;0;0) |

|  |
| --- |
|  |

## Constraints

This paragraph contains information about constrained parts of the model.

### 1..Pinned

|  |  |  |
| --- | --- | --- |
| Definition | Count | Type (DOF) |
| 1..Top | 1 node(s) | Ty Tz Rx |
| 2..Bottom | 1 node(s) | Tx Ty Tz Rx |
|  | | | |

# 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 | 6 |
| Classifications | 0 |
| Standard Tables | 0 |

### Constant

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

### Checks

This paragraph contains checks descriptions with their results.

#### 1..Beam Characteristics

|  |  |
| --- | --- |
| Property | Value |
| Category | Elemental Custom Check |
| Selection | 18 PropertyShape(s) |
| Parameters | 6 |

##### Table Profiles

This paragraph represents result table profiles previously created in a job.

All (LS1, 1 element(s))

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Check | 1..Beam Characteristics | | | | Load Set | | 1..LRFD | | |
| Direction | All | | | | Selection | | 1 element(s) | | |
| ID / Point | | Radius of Gyration Y | Radius of Gyration Z | Slenderness Ratio Y | | Slenderness Ratio Z | | Elastic Buckling Stress Y | Elastic Buckling Stress Z | |
| 20 | | 0.62 | 0.17 | 24.17 | | 86.59 | | 70.57e+6 | 5.50e+6 | |

  

= 5.51e+6 lb/ft2

= 0.173 ft.

#### 7..Section I

|  |  |
| --- | --- |
| Property | Value |
| Category | Elemental Custom Check |
| Selection | 3 PropertyShape(s) |
| Parameters | 16 |

##### Table Profiles

This paragraph represents result table profiles previously created in a job.

All (LS1, 1 element(s))

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Check | 7..Section I | | | | | | | Load Set | | 1..LRFD | | |
| Direction | All | | | | | | | Selection | | 1 element(s) | | |
| ID / Point | | Flange Thickness | Flange Width | Web Thickness | Web Width | Width to Thickness Ratio Flanges | Width to Thickness Ratio Webs | Kc\_calc | Kc | |
| 20 | | 0.08 | 0.33 | 0.02 | 1.25 | 4.00 | 60.00 | 0.52 | 0.52 | |
| ID / Point | | 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 | | |
| 20 | | 1.000 | 6.90e+6 | 4.16e+6 | 4.16e+6 | 1.040 | 0.968 | 1.000 | 0.968 | | |

  

 

= 4.17e+6 lb/ft2



#### 8..Axial

|  |  |
| --- | --- |
| Property | Value |
| Category | Elemental Custom Check |
| Selection | 17 PropertyShape(s) |
| Parameters | 7 |

##### Table Profiles

This paragraph represents result table profiles previously created in a job.

All (LS1, 1 element(s))

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Check | 8..Axial | | | | Load Set | | | 1..LRFD | | |
| Direction | All | | | | Selection | | | 1 element(s) | | |
| ID / Point | | Net Reduction Factor | Critical Stress Y | Critical Stress Z | | Nominal Compressive Strength | Design Tensile Strength | | Axial Force | Utilization Factor | |
| 20 | |  |  |  | |  |  | |  |  | |
| Total | | 0.968 | 6687681.5 | 4099839.8 | | 506071.094 | 888744.938 | | -420000.000 | 0.83 | |



# Conclusion

Comparing results of calculation in SDC Verifier and in Example E.2 we can see that values completely match.

The available compressive strength is 506 kips.