

RISA-3D - [C:\RISA\Limit Axial Load.r3d]

File Edit Global Units View Insert Modify Spreadsheets Solve Results Tools Window Help

Director

Tiling

BLC 1:

Model View

Y
X

BY CODE AISC LRFD 2nd 1999

LIMIT LOAD WHEN THE COLUMN IS REPRESENTED BY JUST 1 SEGMENT

CLOSE TO AISC 360-05 WHEN INITIAL IMPERFECTION IS TAKEN L/500

-14.559mt

N5

1.00

N1

Code Check

- No Calc
- > 1.0
- .90-1.0
- .75-.90
- .50-.75
- 0-.50

Data Entry

- Project Grid
- Materials
- Section Sets
- Member Design Rules
- Wall Design Rules
- Seismic Design Rules
- Joint Coordinates
- Boundary Conditions
- Diaphragms
- Members
- Plates
- Wall Panels
- Basic Load Cases
- Moving Loads
- Load Combinations

Results

- Joint Reactions
- Joint Deflections
- Story Drift
- Member Forces
- Member Stresses
- Member Torsion
- Member Deflections
- Suggested Shapes
- Design Results
- Seismic Detailing
- Concrete Reinforcing
- Plate Stresses
- Plate Forces
- Plate Corner Forces
- Solid Stresses
- Solid Principals
- Wall Panel Design
- Material TakeOff
- Frequencies
- Mode Shapes

Member Code Checks Displayed

Loads: BLC 1,

Results for LC 1,

Pick the steel design code to be used

ES 23:29 20/05/2011

Mathcad Professional - [Pu_Boxe.mcd]

File Edit View Insert Format Math Symbolics Window Help

Normal Arial 10 B I U

Pu of Box from FLB from effective width and Bend Buckling

$b := 10\text{-cm}$
 $t := .6\text{-cm}$
 $F_y := 275\text{-MPa}$
 $\phi_c := 0.85$
 $L := 6\text{-m}$
 $K := 1$
 $E := 2100000 \frac{\text{kgf}}{\text{cm}^2}$

$P_n = 16.84\text{ton}$
 $\phi_c \cdot P_n = 14.32\text{ton}$

$A \cdot F_y \cdot \frac{1}{\lambda_c^2} = 19.21\text{ton}$
 $\frac{\pi^2 \cdot E \cdot I_x}{L^2} = 19.21\text{ton}$

BY CODE AISC LRFD 2nd 1999

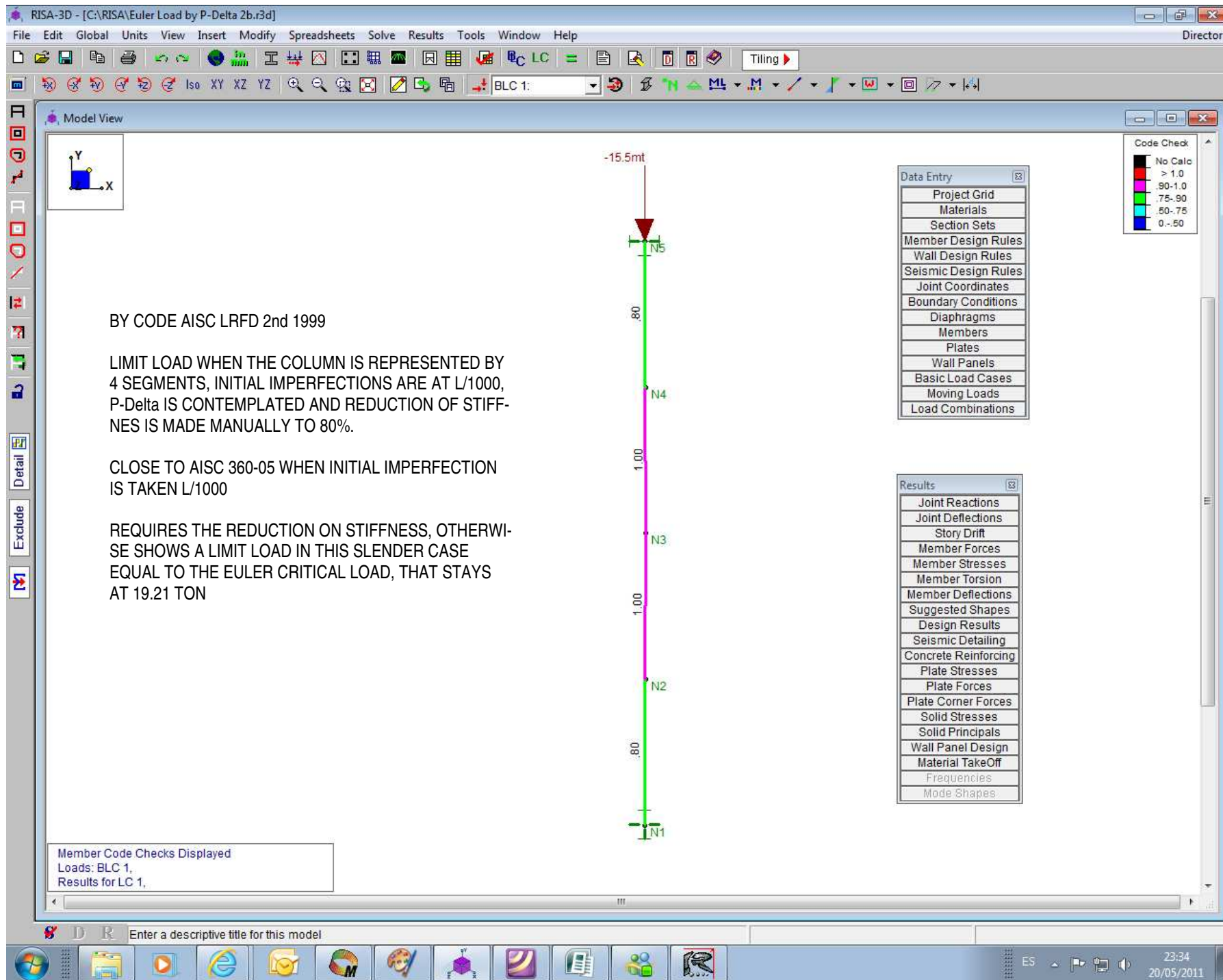
LIMIT LOAD WHEN THE COLUMN IS REPRESENTED BY JUST 1 SEGMENT

CLOSE TO THE ESTIMATE WITHIN RISA-3D IN PREVIOUS PAGE

Press F1 for help.

AUTO CAP Page 1

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RISA-3D - [C:\RISA\Euler Load by P-Delta 2c.r3d]

File Edit Global Units View Insert Modify Spreadsheets Solve Results Tools Window Help

Model View

BY CODE AISC LRFD 2nd 1999

LIMIT LOAD WHEN THE COLUMN IS REPRESENTED BY 4 SEGMENTS, INITIAL IMPERFECTIONS ARE AT L/500, P-DELTA IS CONTEMPLATED AND REDUCTION OF STIFFNESS IS MADE MANUALLY TO 80%.

CLOSE TO AISC LRFD 2nd 1999 WHEN THE COLUMN IS REPRESENTED BY JUST ONE SEGMENT, AND TO AISC 360-05 WHEN INITIAL IMPERFECTION IS TAKEN L/500

Member Code Checks Displayed
Loads: BLC 1,
Results for LC 1,

-14.64mt

N5

.80

N4

1.00

N3

1.00

N2

.80

N1

Data Entry

- Project Grid
- Materials
- Section Sets
- Member Design Rules
- Wall Design Rules
- Seismic Design Rules
- Joint Coordinates
- Boundary Conditions
- Diaphragms
- Members
- Plates
- Wall Panels
- Basic Load Cases
- Moving Loads
- Load Combinations

Code Check

- No Calc
- > 1.0
- .90-1.0
- .75-.90
- .50-.75
- 0-.50

Results

- Joint Reactions
- Joint Deflections
- Story Drift
- Member Forces
- Member Stresses
- Member Torsion
- Member Deflections
- Suggested Shapes
- Design Results
- Seismic Detailing
- Concrete Reinforcing
- Plate Stresses
- Plate Forces
- Plate Corner Forces
- Solid Stresses
- Solid Principals
- Wall Panel Design
- Material TakeOff
- Frequencies
- Mode Shapes

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CONCLUSIONS

- SINCE AISC 360-05 DOES NOT IMPOSE $L/500$ FOR IN-MEMBER INITIAL IMPERFECTIONS, YET IS CONTENT WITH $L/1000$, AISC LRFD 2nd 1999 IS A BIT MORE CONSERVATIVE
- BOTH AISC LRFD 2nd 1999 AND AISC 360-05 COME TO CLOSE SOLUTIONS WHEN BOTH ARE INCLUDING P-Delta, STIFFNESS REDUCTION AND THE SAME LEVEL OF INITIAL IMPERFECTIONS. TO CALIBRATE AISC 360-05 TO THE SAME LIMIT AXIAL VALUE -FOR THIS EXAMPLE- WOULD MEAN ADDITIONALLY THAT THE INITIAL IMPERFECTIONS NEED TO BE SET AT $L/500$ LEVEL

FURTHER WORK REQUIRED:

HOW TO REPRODUCE IN A LRFD 2ND 1999 SCHEME THE LIMIT LOAD AS PER THE CHECKS WITH ONE SEGMENT WITHOUT STIFFNESS REDUCTION (WHAT OTHER MODIFICATIONS WOULD BE REQUIRED)