RISA Technologies

Using RISAFloor for Commercial Building Design

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Today’s Agenda

• Design Criteria to optimize your beam selection
• Joist Design and Joist Girders
• Sloping Roofs
• Composite Design
• Vibration Analysis
• Using all of the RISAFloor features to build a Commercial Building
Design Criteria - Design Rules

Control your member design based on:
• Depth
• Width
• Maximum Code Check

Control the Deflection using DL, LL, or DL+LL Ratios or Maximums
Joists: Loading

• Uniform Dead Load, UDL

• Uniform Live Load, ULL includes:
  LL, LLS, RLL, SL, SLN, RL

• Uniform Total Load, UTL
  = UDL + ULL

Important Notes:
✓ None of the Uniform loads include the Other Load category

✓ Load combinations are not used to create UDL, ULL or UTL
Joists : Special Loading

Any Non-Uniform Loading = SPECIAL JOIST (SP)

The design is based on the capacity shear envelope of the joist under a standard uniform load. (Grey outline).

Calculations from
Designing with Vulcraft: Steel Joists, Girders and Steel Deck
Joists : Special Loading

Special Joist loading

Length = 30 feet

Point loads at 1/3 points

Max Shear is not the Critical Point of design
Joists Girders

Girders are called out based on the assumed depth

28G refers to the DEPTH of the Joist Girder (28”)

8N corresponds to the NUMBER of equally spaced concentrated loads

29.2K refers to the MAGNITUDE of the concentrated loads
  (23 kips + 6 kips = 29 kips)
Non-Uniform Point loads → Special Joist Girders

**Joist Girder Load Tolerance** sets the maximum load variation to be allowed when specifying that standard joist girder call-out.

When the load variation exceeds this, the call-out will switch to “Special”
Given: Depth only
Estimated Moment of Inertia:
\[ I_{zz} = 0.027 \times 2.4 \times \left( \frac{\text{beam length}}{12} \right) \times JG \text{ depth} \]

Given: Depth, number and magnitude of point loads
Estimated Moment of Inertia:
\[ I_{zz} = 0.027 \times \text{Joist spacing} \times \text{Point load} \times \left( \frac{\text{beam length}}{12} \right) \times JG \text{ depth} \]

Reported in Detail Report
Common Questions

How are my joists selected?

What is the criteria for Joist selection?

1) Span
2) Capacity
3) Joist Weight

How did a 2.5K2 get selected?

Spans below 8’ are not available on the K-Joist table.
4’ – 8’: 2.5” K-Series Joists Substitutes used.
Common Questions

How are my joists selected?

Actual UTL < Load Capacity (Black #)
Common Joist Questions

Can I analyze an existing joist?
Sloping Roofs

Slope the roof in any direction, in multiple pitches or a single pitch.
Sloping Roofs

- Rise/Run
- Angle
- Max Height

Or Just Elevate the Points
Composite Beam Design

Control the Composite parameters in the Global Parameters

- Effective Width End Offset: 10%
- Orthogonal Beam Angle: 45 Degrees
- Beam/Deck Parallel Angle: 10 Degrees

- Min. Percent Composite: 25%
- Max. Percent Composite: 100%
- Max. Stud Spacing: 30 in
- Min. Stud Spacing: 4.5 in
- Stud End Offset: 0 in
- Min. Width for 2 Rows: 5.5 in
- Min. Width for 3 Rows: 8.5 in
Composite Beam Design

- Uniform Studs (# Studs)

OR

- Segmented Studs
  (# Studs) shown at every Segment

OR

- Manually Change your Studs with the Redesign Tool
Vibration

- Based on the AISC Design Guide 11
- Total Vibration Loads applied = Self wt (members + deck) + Vibration Load (VL)
  
  \[ VL = \text{Superimposed Dead Load} + \text{Live Load} \]
- Applied as a uniform distributed load
  (Section 3.3 of the AISC Design Guide)
Vibration - Color Coded

Based on Acceleration

Based on Frequency
Let’s build a Commercial Building Model
Final Things to Consider About RISAFloor

• Import and Export Geometry
  ✓ Revit Structure
    RISA has the most comprehensive link with Revit
    ** New Webinar** May 27, 2010
    Complete Integration between RISA and Autodesk Revit Structure
  ✓ DXF

• One Model for both Gravity and Lateral Design
  ✓ You can also design your foundation with RISAFoundation
    ** New Webinar** August 11, 2010
    Comprehensive Design of Shallow Foundations with RISAFoundation
Questions?

Please let us know if you have questions.

We will answer as many questions as time permits during the webinar.

Once the webinar is closed, we will post all Q&A’s to our website: www.risatech.com

For further information, contact us at: info@risatech.com

THANK YOU!