Structural Analysis Report

Engineering Team

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Project Overview

This document presents the structural analysis for the beam design.

Design Parameters

Parameter	Value	Unit
Span	8.0	m
Load	12.0	kN/m
Material	Steel	-

Calculations

Support Reactions

For a simply supported beam with uniform load:

$$R_A = R_B = \frac{wL}{2}$$

Substituting values:

$$R_A = R_B = \frac{12.0 \times 8.0}{2} = 48.0 \text{ kN}$$

Maximum Moment

$$M_{max} = \frac{wL^2}{8} = \frac{12.0 \times 8.0^2}{8} = 96.0 \text{ kN} \cdot \text{m}$$

Maximum Shear

$$V_{max} = \frac{wL}{2} = 48.0 \text{ kN}$$

Python Verification

```
# Beam parameters
L = 8.0 * ureg.meter
w = 12.0 * ureg.kN / ureg.meter

# Reactions
R_A = w * L / 2
print(f"Reaction: {R_A:.2f}")

# Maximum moment
M_max = w * L**2 / 8
print(f"Max moment: {M_max:.2f}")
```

Conclusions

1. Support reactions: 48.0 kN
2. Maximum moment: 96.0 kN · m
3. Maximum shear: 48.0 kN

All values are within acceptable limits.