Description

Illustration


Figure caption

Low carbon steel is cheap, ductile, tough and versatile. Its uses are wide -- from paperclips to steel-framed buildings, some 100 stories high.

The material

Think of steel and you think of railroads, oilrigs, tankers, and skyscrapers. And what you are thinking of is not just steel, it is carbon steel. That is the metal that made them possible - nothing else is the same time so strong, so tough, so easily formed - and so cheap. Carbon steels are alloys of iron with carbon and, often a little manganese, nickel, and silicon. Low carbon or "mild" steels have the least carbon - less than 0.3%. They are relatively soft, easily rolled to plate, I-sections or rod (for reinforcing concrete) and are the cheapest of all structural metals - it is these that are used on a huge scale for reinforcement, for steel-framed buildings, ship plate and the like.

Compositional summary

Fe/0.02 - 0.3%C

Data:
m_o=11.5 Kg/m, EA_o=4e8 N, EI_o=6e7 Nm2
m_f=10 Kg/m, EA_f=4e8 N, EI_f=6e7 Nm2

Using lowCsteel:
ρ=7800 Kg/m3 , E=206 GPa
- A_o=m/ ρ=11.5/7800= 1.5e-3 m2 → EA_o=3.1e8
- A_f= m/ ρ=10/7800= 1.3e-3 m2 → EA_f=2.7e8

They're approx. in the range of values used, since (I've notice that) changing the sections doesn't affect that much the results on the amplitude reduction, the modified structure with lowCsteel represents still a valid solution

- (EI depends on the shape of the beam, so the geom. type of bar/beam can be chosen in order to have the area computed, and the moment of inertia I similar to the one specified in the inp. file)

General properties

Density		7,8e3	-	7,82e3	kg/m^3
Price	*	0,594	-	0,626	EUR/kg

Material form that data applies to

Bulk	✓
Sheet	✓

Building system

Superstructure	✓
Enclosure	✓
Interiors	✓
Services	✓

Mechanical properties

Young's modulus		200	-	220	GPa
Shear modulus					