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Mezzanines: sustainability and steel

Cold-formed and hybrid mezzanines have various advantages and disadvantages, including different impacts in terms of the environment.

A RECENT survey by The Retail Hive & DHL Supply Chain showed that 72% of retail logistics leaders consider supply chain sustainability a priority for their business, although 70% admitted they are unaware how much their organisation is actually investing in low- or zero-carbon products.

Decarbonising steel

Steel is a key material when it comes to building and equipping a distribution centre. It is strong, durable, versatile and recyclable, making it ideal for a circular economy. The steel industry is trying hard to decarbonise. It is switching from traditional blast furnaces (that produce an average of two tonnes of CO₂ for every tonne of steel produced) to electric arc furnaces that utilise clean energy (producing an average of 0.6 tonnes of CO₂ for every tonne of steel). It is also investing in clean materials and technologies such as hydrogen, biocarbon, carbon capture utilisation and storage (CCUS) and direct reduced iron (DRI) furnaces.

Hot rolling and cold forming

The industry may be decarbonising but steel is not a single product – the World Steel Association lists over 3,500 different grades of steel, each with unique properties. A key distinction is made between hot-rolled and cold-formed steel. Hot rolling involves molten steel being pressed into the desired shape at extremely high temperatures – typically 1,700 degrees Fahrenheit or above – and then allowed to cool. This cooling may cause the steel to shrink, so there is less control over its final size and shape. Hence hot-rolled steel is commonly used when precise tolerances are not essential. Cold forming refers to further processing done to hot-rolled steel at

room temperature to achieve more exact dimensions and better surface qualities.

Hybrid and cold-formed mezzanines

While the UK generally favours hybrid mezzanines (built using hot-rolled primary beams and cold-formed joists) for large warehouse and distribution projects, the purely cold-formed design tends to be more popular for mezzanine floors in Europe. Having traditionally supplied hybrid mezzanines, MiTek recently added a cold-formed product to its range. “Our new cold-formed mezzanine has a lower environmental impact,” explains Rob Card, technical director for MiTek’s mezzanine operation in the UK. “Compared to a hybrid floor, it requires less material and offers faster lead times, although hybrid mezzanines remain the right choice for many applications.”

Although hot-rolled steel tends to be cheaper than cold-formed steel because it requires less processing, less steel by weight is typically needed to produce a column from cold-formed steel than hot-rolled steel. This improves the carbon footprint of the project, as

well as bringing the overall cost of the mezzanine structure down. The lighter weight also means lower transportation costs. Plus, the installation of cold-formed steel is quicker and easier, reducing labour costs on site and resulting in faster lead times. In addition to these benefits, cold-formed steel has a strength advantage. It is some 20% stronger than hot-rolled steel, and also more ductile – in other words, it can bend under greater stress without breaking. Given these positive facts about cold-formed mezzanines, why specify a hybrid solution? “A hybrid mezzanine offers higher load capacity, which is often crucial for larger intralogistics projects,” says Rob Card. “A hybrid floor also offers a longer maximum beam span – giving more space for vehicles and equipment beneath the mezzanine – and means less deflection. Although it forms a heavier structure, it is possible that bracing is not required and, in addition, fire protection can be ensured through the use of intumescent paint.” ■

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