

Standards misunderstood

The issue that was covered (Jan./Feb. 2003 *Gazette* about G.F. Cowie, PEng.) concerned a monorail beam which was supposed to carry 10 tonnes over a span of 16'-0". The original beam selected was an S12 x 35 and was adequate. Another engineer designed a replacement beam, W460 x 89 (W18 x 60). I checked this new beam for a single span, simply supported beam and found it to be unsatisfactory due to the local (combined) stresses under the wheels. However, if the beam was continuous over two or more spans, the bending stresses were reduced sufficiently so that the combined stresses in the bottom flange were acceptable. However, that is not my reason for writing.

I am writing because the article referred to the hoist as a crane, which is not accurate. Most people I know differentiate between a crane and a monorail hoist. A crane can take many forms, but the usual form found

in buildings, and covered by the *Ontario Building Code* (OBC), is the overhead traveling crane of four or more wheels traveling on two or more runway beams. This crane supports a trolley with a hoist, which may be a version of the trolley and hoist on the monorail beam in the article. As the crane has a trolley that can traverse from side to side (transverse to the runway beams), the runway beams are subjected to a horizontal or lateral load caused by the starting or braking motion of the trolley or the trolley hitting the end stops on the crane bridge. There is also a possibility of a lateral force on the runway due to misalignment of the rails or runway beams so that the crane is pushing on them as it moves down the crane runway. The OBC prescribes that the runways be designed for a lateral load of 20 per cent. This load can be divided between two runways in proportion to their lateral stiffness (in the case of symmetrical runways, 10

per cent of lifted load and trolley weight to each runway).

However, a monorail does not have a trolley that moves transverse to the beam, and hence there can be no lateral load caused by a transverse action. Therefore, the 20 per cent lateral load prescribed by the OBC is inappropriate to a hoist and trolley that can only move along the monorail beam. Nor can there be any lateral load due to misalignment of the monorail beam, as there is enough allowance in the trolley for the wheels to adjust as they roll along the beam. That is why there are monorails with curves in them. American National Standards

Institute (ANSI) MH27.1 (my edition is 1981 so later versions may be different) *Specifications for Underhung Cranes and Monorail Systems* has no requirement for lateral load on the monorail beam and/or bridge beam. The ANSI standard also requires a minimum impact load on the monorail beam and/or bridge beam. The ANSI standard also requires a minimum impact factor of 15 per cent. Having said that, I recommend that all monorails be designed for lateral load of 10 per cent because there will always be someone who will try to pick up a load sideways because he or she cannot get the crane or monorail hoist directly over top of the load. This is bad practice but people do it. There is always a danger because the load will swing. The cranes and monorails are not intended or designed for this type of sideways pull. The lateral load will be reduced almost immediately when the load swings into position but the danger and wear and tear are not worth it. To avoid this, the crane or monorail system should be extended to avoid sideways pick-ups, or gantries or jib cranes should be installed in remote locations to move these loads.

The OBC requirements are a minimum and are not applicable to all cases. Canada, having a small population, cannot produce all the standards that the U.S. (or Britain or Germany) does. The Canadian Standards Association (CSA) only produces standards that it feels it can sell in sufficient quantities to cover the cost. Instead of leaving these voids in our laws, we should be adopting other countries' standards. I believe, as it stands now, anyone can build a crane as they wish. The only restriction on this is the provincial Ministry of Labour, which can demand that the crane be approved by an engineer, who is bound to endure that it is designed to an acceptable standard. Consequently, cranes today are being built and sold in Canada to U.S., British, Finnish and German standards. Some are built without Canadian material, labour or welding requirements. The purpose of this paragraph is to illustrate that the OBC and its CSA references cannot and do not apply in all cases.

Planning for the future



Professional Engineers
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PEO is embarking on a new Strategic Plan to guide its directions and priorities for the next five years. As such, PEO is consulting with members and other stakeholders regarding PEO's strategic issues. We want to collect your ideas regarding the strategic focus PEO should take now that we are focused on our regulatory function. We are using a collaborative approach, building on each other's ideas, using our website. Over the next months, we will be collecting input, organizing it and forwarding the issues to Council. Many of the issues that Council wishes to pursue will then go through a rigorous, transparent policy debate, where you will have the opportunity to join in the on-line consultation process as these issues emerge.

An on-line form for your ideas has been created on the PEO website, as well as a Strategic Outcomes Worksheet, which contains ideas contributed at the April Chapter Leaders Conference, as well as other ideas carried over from the 2001 Strategic Plan. Your suggestions to expand, consolidate or better explain those ideas are encouraged. You may also wish to add other ideas not already captured, using the on-line form.



Everyone is encouraged to participate on-line by visiting the PEO website at www.peo.on.ca.

The OBC requirements are copied from the NBCC. With the exception of the latest NBCC when they added the 10 per cent impact, these crane loadings have not changed in years and I believe there is no one on the committees at NBCC who is directly involved in following the latest developments or research in this area. However, the new edition of the CSA Standard S16-01 *Limit States Design of Steel Structures* contains a mandatory appendix for design of crane-supporting structures. The appendix references a publication by the CISC, *Crane Supporting Steel Structures*, that elaborates on many loading, design and construction issues and is compatible with Canadian Codes and Standards.

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Outsourcing is suicide

I am dumbfounded by the sentiments expressed in the May/June issue letters.

Remember that religious cult that set up camp in South America and then 900 people drank Kool-Aid flavoured with cyanide? More and more people are signing on to an equally suicidal cult, namely that it is good for European and North American companies to transfer production to China. Mr. Leidel, P.Eng., states that the head of Siemens wonders why he should hire a German engineer when he can hire six engineers in China for the same money. Then Mr. Leidel proceeds to talk loftily about competition.

When Mr. Leidel is out of a job because his functions have been transferred to six engineers in China, he will not be talking in this way.

It is competition if Chinese entrepreneurs located in mainland China develop

their own manufacturing methods and products and put them on the world market.

It is national economic suicide, not “competition,” when companies transfer production technology and employment to China.

We can invoke the principle of “*reductio ad absurdum*.” When all European and North American companies have signed on to this suicide cult and have transferred all engineering and manufacturing employment to China, who will buy their products?

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Letters to the editor are welcomed, but should be kept brief and are subject to editing. Publication is at the editor's discretion; unsigned letters will not be published. The ideas expressed do not necessarily reflect the opinions and policies of the association, nor does the association assume responsibility for the opinions expressed. All letters pertaining to a current PEO issue are also forwarded to the appropriate committee for information. Address letters to naxworthy@peo.on.ca.