Recurring hazard on machinery falling under category C safety standards

CE certification : or the risk of “unsafe” certifications for category C standard equipment.

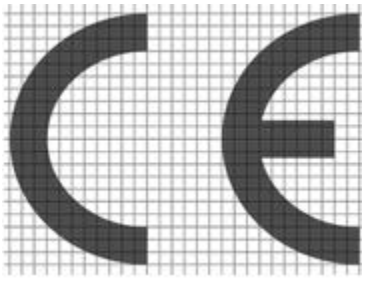
The complexity of regulations, the strength of habits, the cost of technical and security standards, both in the acquisition of documents, their reading and understanding, their business transposition, expose to a major risk of CE certification "insincere", in particular in the case of machinery falling within category C standards (a standard dealing with detailed safety requirements for a particular machine or group of machines)

In certain trades, such as continuous conveyor belt bulk handling, which falls under EN 620 (category C), I have observed that a very large number of conveyors, bearing the CE mark, do not respond strictly to the safety requirements of the Machinery Directive 2006/42 / EC and repeated by the category A standard, reference EN ISO 12100v2010.

Habitual practice:

The problem, resulting from the use, can be defined thus: the study of a project is done first of all according to a mechanical approach and when this one is finished, it is added a layer "security" to the project almost frozen mechanically. This common practice, however, is contrary to the principles of the "New Approach" described in EN ISO 12100.

In my observations, I was able to deduce that all of these statements, in my opinion "non-compliant", had a systematic usage-related origin and two reasons.



First reason : go fast !

As the markets are very competitive, manufacturers have to spend as little time as possible to development their technical offer and the best way to achieve this is to rely on copy-paste of previous business and / or files established for a long time. Unfortunately, this way of doing things, for which the economic reason is understandable, freezes the conceptions for the future, especially when the contract is signed.

This first reason, falling under the breach in terms of safety compliance, comes from a multitude of poorly understood technical standards that are supposed to represent the state of the art. As a result, these standards are poorly enforced. This fact is reinforced by the certainty of a well-established knowledge that prevents any questioning (see # usage).

To illustrate this severe statement and among many other poorly understood standards, ISO 5048 (technical standard) which defines the method of calculating a conveyor, includes in its article 5.3.3 a formula for calculating the chain profile (so of parabola, of loop) that forms the belt between 2 supports and which gives the admissible upper and lower limits of arrow (lowest point of the loop).

In its 1973 version, this article was completed by 2 examples and in its 1987 version, these were rightly deleted, since the example values were erroneous. Unfortunately, in 2018, it is still the "wrong" example values that are applied in the designs. Later in this article I present the relation with EN ISO 12100.

Second reason: a prescription applied too rarely !

It is necessary to get back into the context of the hierarchy of laws to understand where is the drift leading, in good faith or not, CE certification unfortunately "insincere".

The Machinery Directive 2006/42 / EC specifies, in its articles 173 and 174 (attention, use the "*Guide for the application of the Machinery directive 2006/42 / CE 2nd edition*), a hierarchy of "*the most adequate solutions and in the sequence indicated*". These articles of the Directive are taken over by EN ISO 12100v2010 in Articles 4e and 6.1, Step 1, Note 1. Indeed, if Article 4e is subject to interpretation because of a comma instead of a new paragraph (4 e: remove the dangerous phenomenon, or reduce the hazard ...), Article 6.1, Step 1, Note 1 is particularly clear, without discussion or possible interpretation, specifying that everything that exposes to at least one hazard should be removed if it is possible and if it is not possible, then and only then, it will be used a device to reduce the hazard (example: safety hood, grid, etc.).

So, why is this prescription not applied or too infrequently?

As stated in the preamble, the complexity of the standards is such that when you are told that the safety standard that covers your type of machine is No. xxx, rare are those who think to consider that the application of this standard It can only be launched after the solutions prescribed in the general standards, such as the category A standards, and specifically the EN ISO 12100v2010 standard, have been exhausted. CQFD!

This complexity can be seen, for example, in the EN 620 standard which send back to 29 standards as a reference and 17 other standards in the bibliography, ie a first set of 46 standards to know to master the application of EN 620; to this we must add the normative references and library standards mentioned in each of the 1st level standards, and so on. It's a lot !!

Proposal:

Pour mettre bon ordre et bon usage aux normes de catégorie C, je recommande que dans l'article « *1 Domaine d'application* », de ce type de norme, il soit fait mention de cet avertissement :

« *This EN xxx standard, like all category C standards, applies only after the exhaustion of the solutions prescribed in the general category A standards, notably EN ISO 12100v2010 # 4 e and 6.1, Step 1, Note 1* ».

Each reader of this article can express their support for my wording, above in italics, by writing to the editor or me, in order to obtain the introduction of this complement in the C standards.

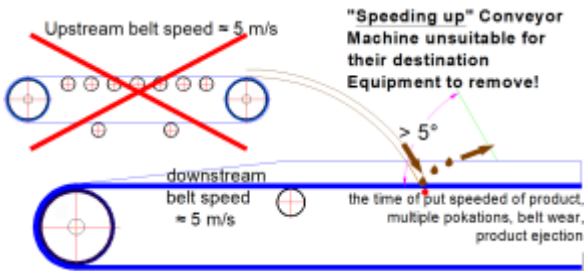
A demonstration by the example

Below are four examples of belt conveyor designs, because this is my area of expertise, whose certification is insincere; this affirmation is dismounted by calculation.

Extra radical case, n ° 1

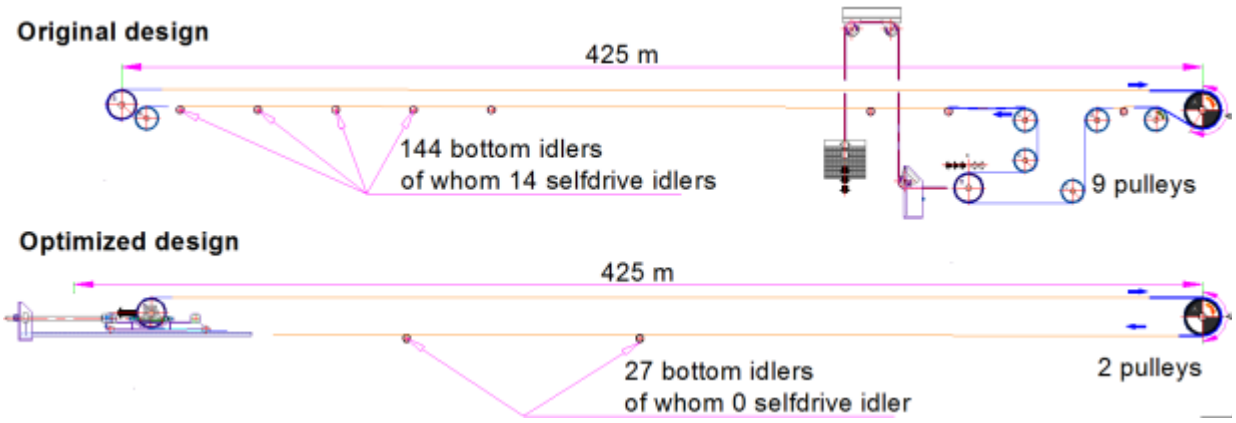
Here, the entire machine should be removed!

100% of conveyors called "speeding up" are to be removed because they are "unsuitable for their destination" (mechanical aspect) and they involve at least 1 risk (safety aspect). The proof lies in the calculation of the fall parabola of the product, projected on the unloading pulley, which must be considered as the angle of travel of the aggregates at the time of contact on the downstream belt.
Indeed, the put speeded of the product on the downstream belt is not done according to the foresee function and this machine is the source of several disorders.



General case 2

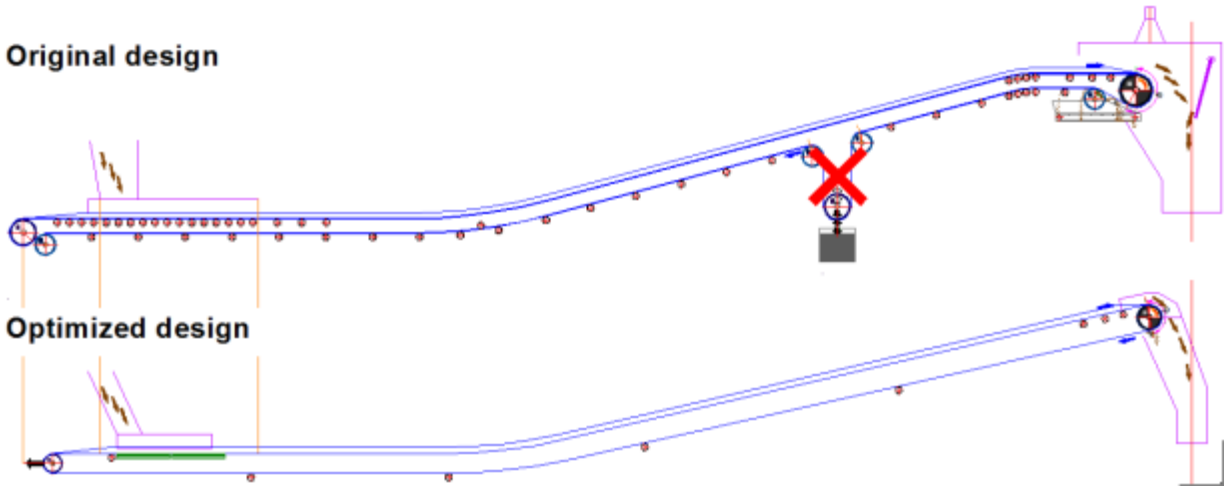
It is a conveyor of 425 m center to center distance equipped, in its original version, with 9 pulleys and 144 return idlers and, after calculation, the new design had only 2 pulleys and 27 return idlers; that is to say a reduction in the number of components at hazards of [100- (100/9 * 2)] = 78% for the pulleys and [100- (100/144 * 27)] = 81% for the return idlers. These changes were motivated by recurrent disturbances on the original version and that the optimized design solved for a very high level of reliability and security.



General case 3

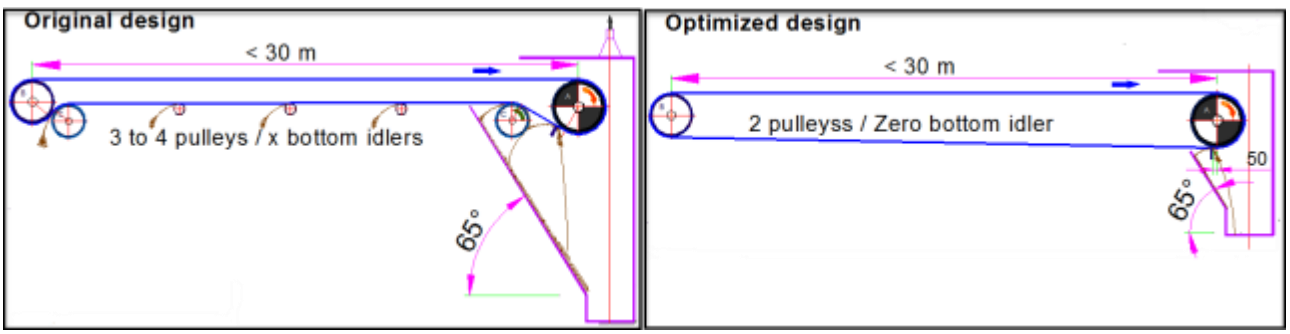
This is certainly the most common case, which concerns conveyors of 42 m center to center distance and above, for which the common practice is the design comprising 1 snub pulley in head, 3 pulleys for the pre-tensioning device (GTU) and , sometimes, 1 snub pulley associated with the tail pulley and with, for the pitch between return idlers, a standard pitch of 3 m.

Here, the ISO 5048 and ISO 3870 technical standards, well understood and well applied, make it possible to reduce the number of pulleys from 6 or 7 pieces to 2 pieces and to increase the pitch between 3 m and 12-15 m return idlers, for a very high level of reliability and security.



General case 4

These are conveyors up to 30 m center to center, for which in most cases, there should be zero return idlers, instead of a number of unnecessary idlers. For these conveyors, it goes without saying that the number of pulleys is limited to 2, except and subject to calculation, extractors (+1).



Reinforcing opinion
To ensure the relevance of these four examples, there is a conveyor in service since 2002, with a flow rate of 700 t / h of 1,100 m of center distance, 28 m of elevation, with 1 head pulley and 1 tail pulley, the return idlers have a step of 12 m.

This suggests that all smaller conveyors can have such a simple mechanical design for perfect safety compliance. Yes ! It's ok!

Reminder
As can be seen from the examples above, machine calculation notes are essential to a true statement of conformity for CE certification purposes; it is still necessary that these calculations are well carried out properly.

Unsafe certification: What is the risk ?

Given the estimated number of machines (conveyors) in service, whose certification is probably insincere, we can consider, according to the adage "not seen, not taken", that the subject is unimportant.

The risks, in case of control or audit following an accident or almost accident, are a withdrawal, a revocation, a termination of the conformity statement (EN ISO 17000). Such a situation leads to the immediate cessation of the operation of the machine and the obligation to do the safety modifications for compliance to be able to operate the machine again. For example, a CRAM* of France had to order to comply to do, under 3 months, the modifications of a conveyor, in a cast iron foundry, under penalty of shutdown.
(* CRAM : Regional sickness and work accident insurance fund).

In case of an accident on a machine, which is shown by experts to have an unsafe certification, the owner is then vulnerable to a court conviction (Case M … 1996) with serious consequences for the company.

Manage compliance as a good family man

For achieving a high safety level (rules of good governance), you have to start with the removal of machines, machine parts and components that are hazard and have no functional utility and in more of the better reliability, with a very high level of safety.

There are organizations that can assist the machine owner to obtain, at least, an opinion on the quality of the safety compliance of his machine. First and foremost, CRAM engineers and insurers in general can provide advice or direct the request to an expert.

The habitual practice today is to call on a control body. Nevertheless, the report issued can be a false guarantee of conformity if the competence and the mission of the organization are limited to note that this or that exposure to a hazard is protected or unprotected. In this context, it will be difficult for him to say that this or that component, exposing him to a hazard, has no use, an affirmation demonstrated by a calculation for which, in general, he is not authorized.

C3 Expert has created the labels "*C3 Label*" and "*C3^{M} Label*" in order to guarantee, after the audit, a sincere CE certification of the machines and with an easy and safe maintenance.

In a word !

This article should encourage the reader to consider the design of the machines under his responsibility and to ask the question for each component posing a risk, according to the list of hazards established from the standards EN ISO 14121, 14121-1, 14121 -2 '' *Machine Safety - Hazard Assessment* ''. If necessary, it owe to recalculate the machine according to an optimized design, that is to say a design whose components not justified by the calculation have been removed..

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Not bene
Your remarks and comments on this text are welcome to change practices to the benefit of all.

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