MACHINE SAFETY IN AGRICULTURE IN QUEBEC

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Presentation Overview

1. CSST's action plan for machine safety
2. How to identify the sources of hazards on machines
3. How to ensure the proper guarding of identified dangerous parts of machines
4. Safe use of machines: the obligations of the employer

1 - CSST's Action Plan for Machine Safety

- Why have an action plan?
- What is this plan?
- What are the expected results and the achieved results to date?

Why have an action plan?

In Quebec, between 1999 and 2003, 101 deaths related to machines

52 workers died after being pinned, crushed, struck, or caught up by the moving parts of a machine

20 fatalities per year (on average)

295 amputations per year (on average)

1,125 fractures per year (on average)

CSST's Action Plan for Machine Safety

Agricultural injuries

Tractors and agricultural machinery (cause):

Leading cause of deaths: from 1994 to 2007, 140 deaths, about 70% of all deaths in the industry

Leading cause of hospitalizations: from 1994 to 2008, 1006 hospitalizations, about 40% of all hospitalizations in the industry

Source: Burigusa et al., 2011

Agricultural injuries

Injuries recognized by CSST from 1998 to 2007:

Total number of injuries: 8,003
Leading cause: Contact with objects or equipment (machines, tractors and moving parts)
4,165 injuries for this cause

This cause accounts for 52% of injuries in the industry

Source: Burigusa et al., 2011

What is this plan?

The application of a zero tolerance policy regarding the exposure of workers to moving parts that can cause serious injuries:

When inspectors note that there is access to moving parts on a machine:

- they affix a seal on them;
- they do not authorize the restarting of the machine until corrections have been made that prevent access to moving parts or the implementation of temporary measures.

CSST prosecutes the guilty parties and publishes in the newspapers the convictions which the employers are subject to.

Expected results and achieved results

Expected result:
Reduce the number of machine-related accidents
Achieved results:
Injuries caused by an accident in connection with machines

Lésions causées par un accident en lien avec des machines

Résultats	2008	2009	2010	2011
Lésions - machines	4 335	3 904	3 880	3 552
Variation par rapport à l'année précédente	-	-9,9 %	-0,6 %	-8,5 %
Lésions - pièces en mouvement	1 063	859	819	767
Variation par rapport à l'année précédente	-	-19,2 %	-4,7 %	-6,3 %
Proportion des lésions liées à l'accès à des pièces en mouvement sur le total des lésions liées à l'usage de machines	24,5 %	22,0 %	21,1 %	21,6 %

(Source : Rapport annuel de gestion 2011 - DC 400-2032-5)

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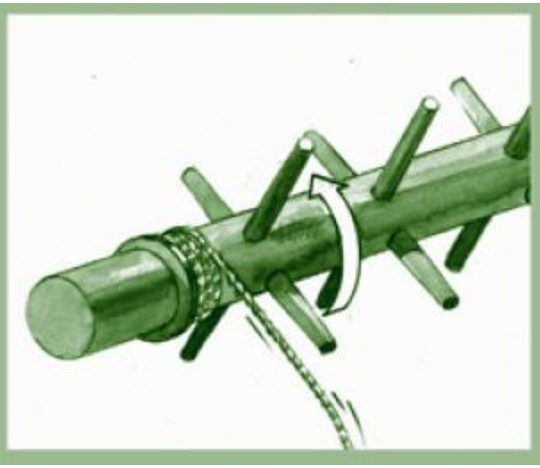
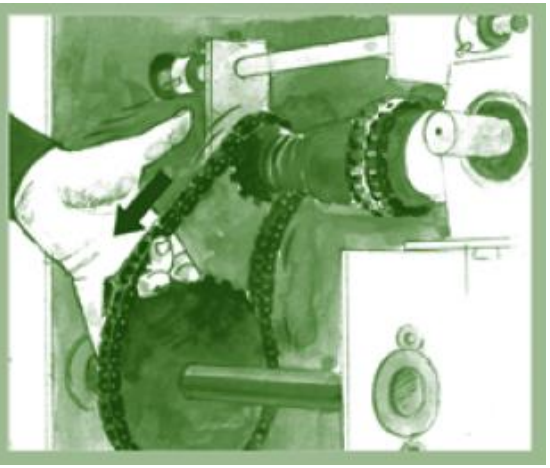
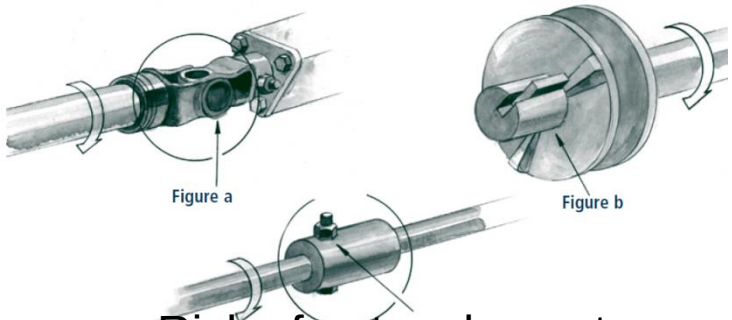
2. How to identify sources of hazards on machines



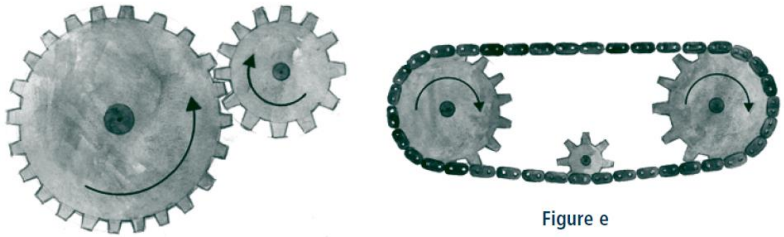


Identifying sources of hazards on machines

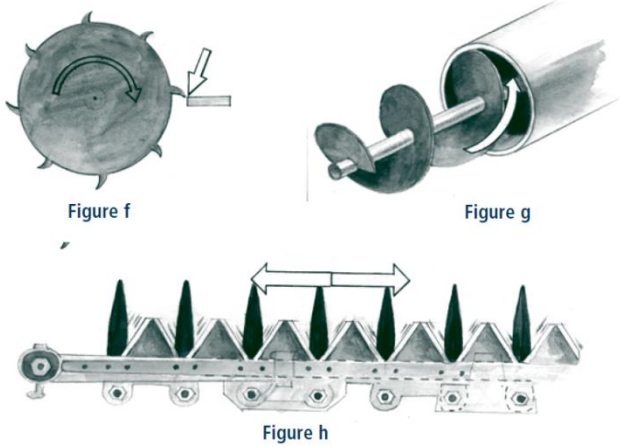
Find all moving parts and associate the nature of the hazards involved



Risk of entanglement



Risk of cutting



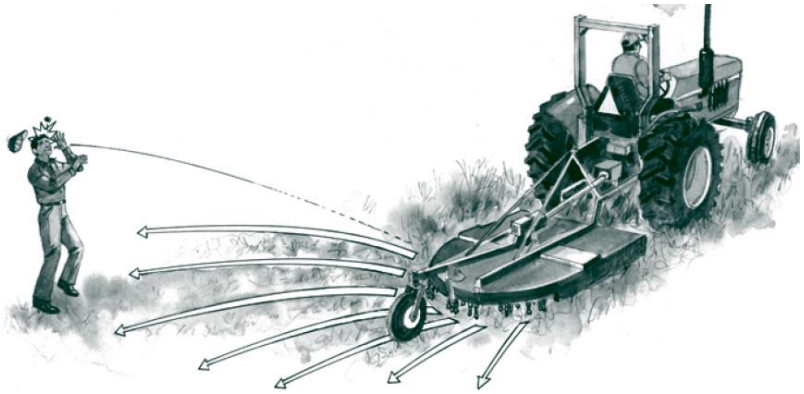
Risk of entrapment

Risk of crushing

Identifying sources of hazards on machines

Find all moving parts

Risk of being dragged in



Risk of projection

Situations taken from the CSST guidebook: La prévention des accidents liés aux pièces en mouvement DC300-436 (06-11)

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3 - **How to ensure the proper guarding of identified dangerous parts of machines**

Guarding of dangerous parts

What is the legal position in Quebec?

Article 182 of the Occupational Health and Safety Regulations requires the guarding of dangerous parts of machines and suggests different ways to do it:

- Fixed guards
- Movable guards equipped with interlocking devices
- Locking movable guards equipped with interlocking devices
- Sensitive devices
- Guards with automatic closure
- Adjustable guards
- Two-hand control

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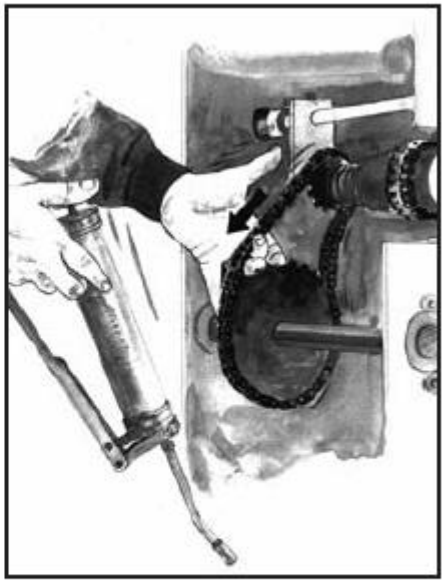
Guarding dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

- 1 -

Intrinsic guarding (in the design): **It is therefore important to plan for the acquisition of machines in order to purchase safe machines that comply with standards.**

Point de graissage



Exécuter des travaux de ce genre présente des dangers.

Guarding dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

- 2 -

A fixed guard if access is not necessary for the operation of the machine.

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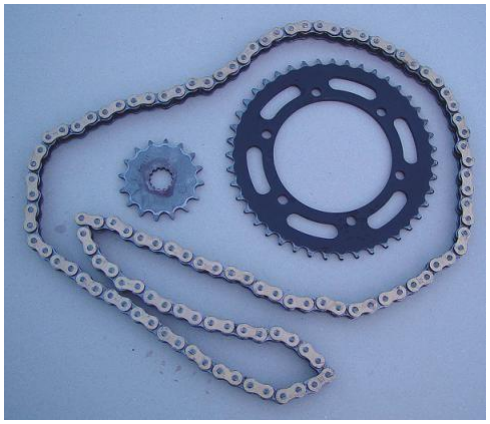
Guarding dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

- 2 -

The power transmission devices should always be protected by fixed guards.



Chain and sprocket assembly

Rack and pinion assembly

Pulley and belt assembly

Power Take Off assembly

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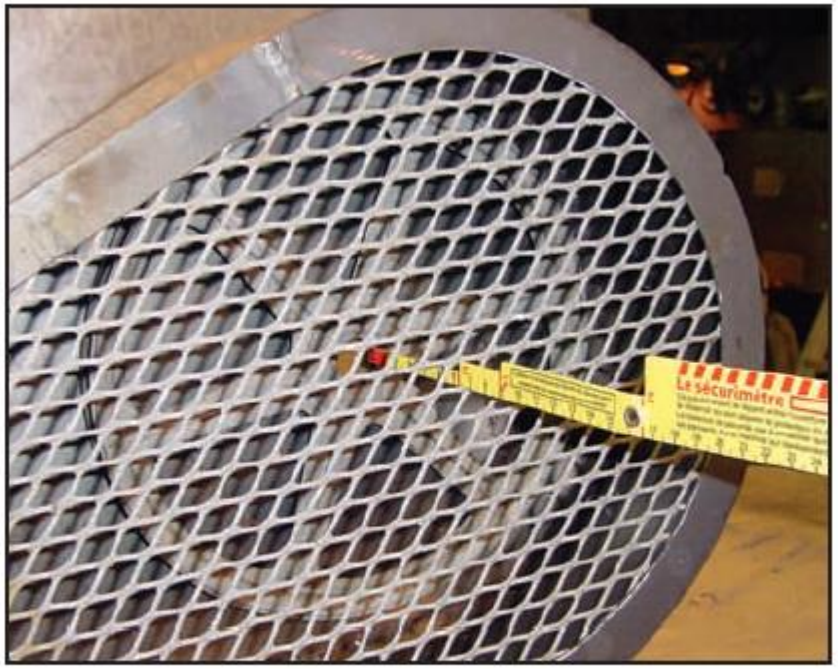
Guarding dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

- 2 -

For the purpose of ventilation, safe openings are allowed in guards. The safe opening depends on its shape, its size and the distance from the guard to the hazardous element (dangerous phenomenon).



Les dimensions des ouvertures d'un protecteur peuvent être vérifiées à l'aide d'un outil appelé sécurimètre.

Tables on safe openings are provided in the CSST guide entitled Machine Safety - Prevention of Mechanical Hazards – Fixed Guards and Safety Distances (DC 200-16002-1) and accessible on line.

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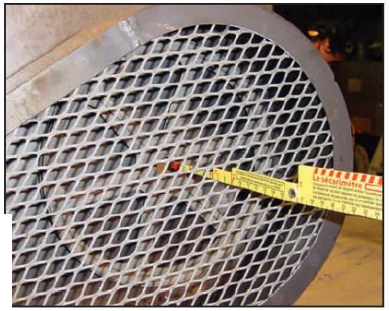
Guarding of dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

According to the rules conformity to standards in this area is required.



Les dimensions des ouvertures d'un protecteur peuvent être vérifiées à l'aide d'un outil appelé sécurimètre.

TABLEAU 5-3 : OUVERTURE MAXIMALE EN FONCTION DE LA DISTANCE DE SÉCURITÉ « ds »

Ouverture en forme de fente ou de rainure (tiré de la norme CSA Z432-04 [20])

Distance de sécurité « ds » (mm)	Ouverture maximale possible (mm)	Ouverture (mm)	Distance de sécurité « ds » minimale (mm)
Moins de 13	S. O.*	De 0 à 6	≥ 13
De 13 à 63,9	6	De 6,1 à 11	≥ 64
De 64 à 88,9	11	De 11,1 à 16	≥ 89
De 89 à 165,9	16	De 16,1 à 32	≥ 166
De 166 à 444,9	32	De 32,1 à 49	≥ 445
De 445 à 914,9	49	De 49,1 à 132**	≥ 915
≥ 915	132**		

The safety meter is an easy-to-use tool. Its dimensions are designed according to the table for slit-shaped openings.

Tables on safe openings are provided in the CSST guide entitled Machine Safety - Prevention of Mechanical Hazards – Fixed Guards and Safety Distances (DC 200-16002-1) and accessible on line.

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Guarding dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

- 3 -

For more or less frequent access, movable guards equipped with interlocking devices should be used.

Source: HSE in England

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Guarding dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

- 3 -

If the access to moving parts can easily cause death or if the parts take a while to stop, the movable guards equipped with interlocking devices should be locking: They only open when the parts are stopped.

Guarding dangerous parts

The guarding of dangerous parts of machines should follow a hierarchy (ISO 12100):

- 4 -

Safety devices (rare in agriculture) like presence sensors, light units, laser devices etc. are also used to make machines safe.

Guarding dangerous parts

Should all moving parts of a machine be guarded?

Article 183 of the Occupational Health and Safety Regulations tolerates the presence of unguarded parts if the presence of guards or protective devices would make the operation of the machine quite impracticable.
Example The front-mounted attachments of combines (reel with claws and cutter bar)

However, the article requires that measures be taken to ensure equivalent safety:

- organization of the work;
- training;
- personal protective devices and equipment

Guarding dangerous parts

Access to moving parts during maintenance:

Article 185 of the Occupational Health and Safety Regulations requires the lockout of machines before the removal of protective devices for the purpose of unblocking or maintenance.

Moving parts not easily accessible are not always guarded (parts more than 2.7 m high). Lockout should be done before maintenance work.

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Thank you for your attention!
Any questions?

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