Risk Assessment

Presentation

by

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Risk Assessment

Every engineer whether civil, mechanical or electrical when designing a building, machine or process has to address the essential question of “What could go wrong?” An engineer would need to identify the following before a risk can be evaluated.

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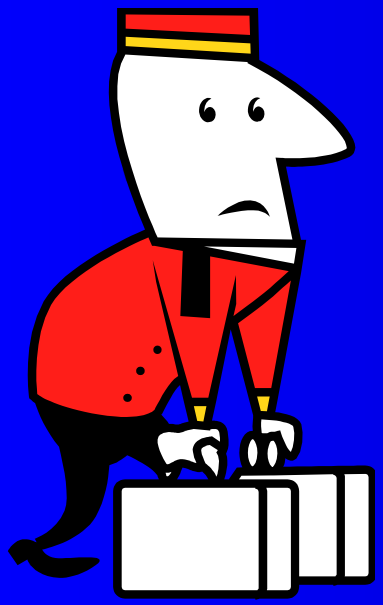
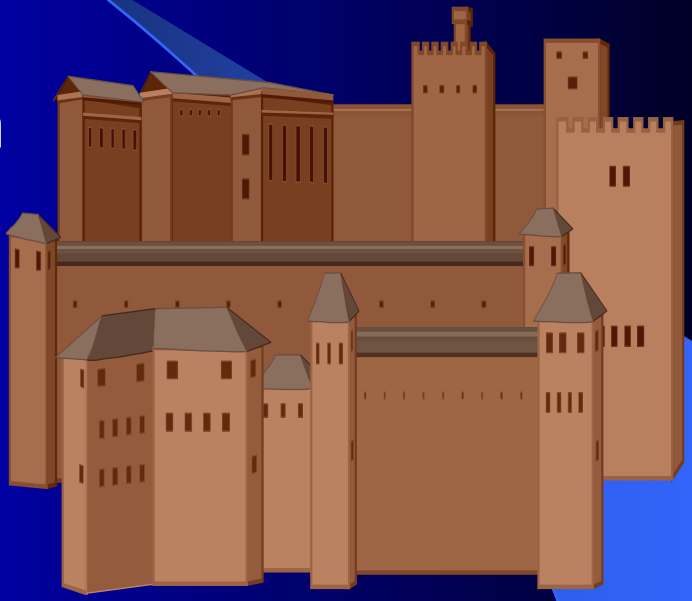


Harm to Whom

Hazard

Circumstances

Precautions



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When a civil engineer is designing a building he has to think what could go wrong which could cause fatal, major or minor injuries to the occupant of that building e.g. in case of fire how he could reduce the fatalities and provide the emergency services easy access plus sufficient fire exits and the elevators. The elevators must not be next to the stairs as in the case of a fire on the stairs you cannot use elevator therefore all the occupants living on higher floors will be trapped and fatalities would be very high. Also the fire exits must be clearly marked and identified. Similarly when a design engineer is designing a machine he has to see how can he minimise the risk of an accident.

Risk Assessment

A technique to evaluate the above factors is known as risk assessment and this involves the rating of two factors, which affect the risk:

- the severity of the hazard
- the likelihood of an occurrence of harm from the hazard.

Risk Assessment

A scale of three is used for each factor.

Hazard severity rating

3	Major (death/major harm)
2	Serious (off work for over three days)
1	Slight (off work for up to three days)

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Likelihood of occurrence rating

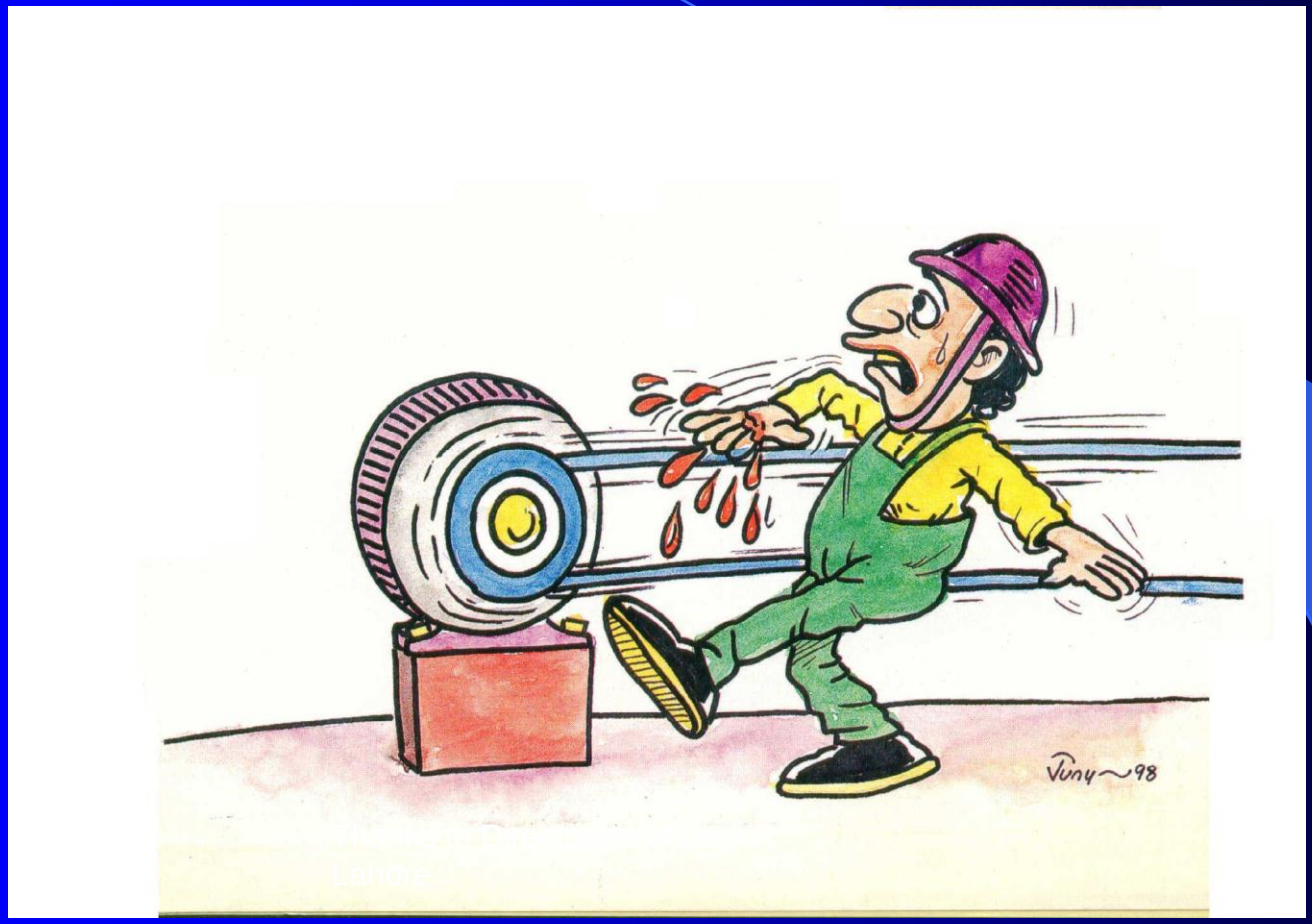
3	High (certain or near certain)
2	Medium (frequently)
1	Low (seldom)

Risk Assessment

For example in the next slide, Lathe Machine is operated without any guards on the drive pulleys and belts. Somebody can get his hand or fingers trapped between the pulleys and the belt, which could cause the person to lose the limbs, or a passer-by could have his loose clothing caught in the belt and result in some serious injury.

Risk Assessment

Risk Assessment



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The risk can be evaluated as follows:

Severity factor x likelihood factor e.g. if the severity

factor is 3 and likelihood factor is 3 then the risk factor:

$$3 \times 3 = 9$$

(This value may be termed as the risk rating).

Which means an urgent action is to be taken and the next slide illustrates this action.

Risk Assessment

Risk Assessment

Risk assessment is carried out again as follows:

= Severity factor x Likelihood factor =

1 x 1 = 1

Similarly next slides show man working on the grinding wheel.

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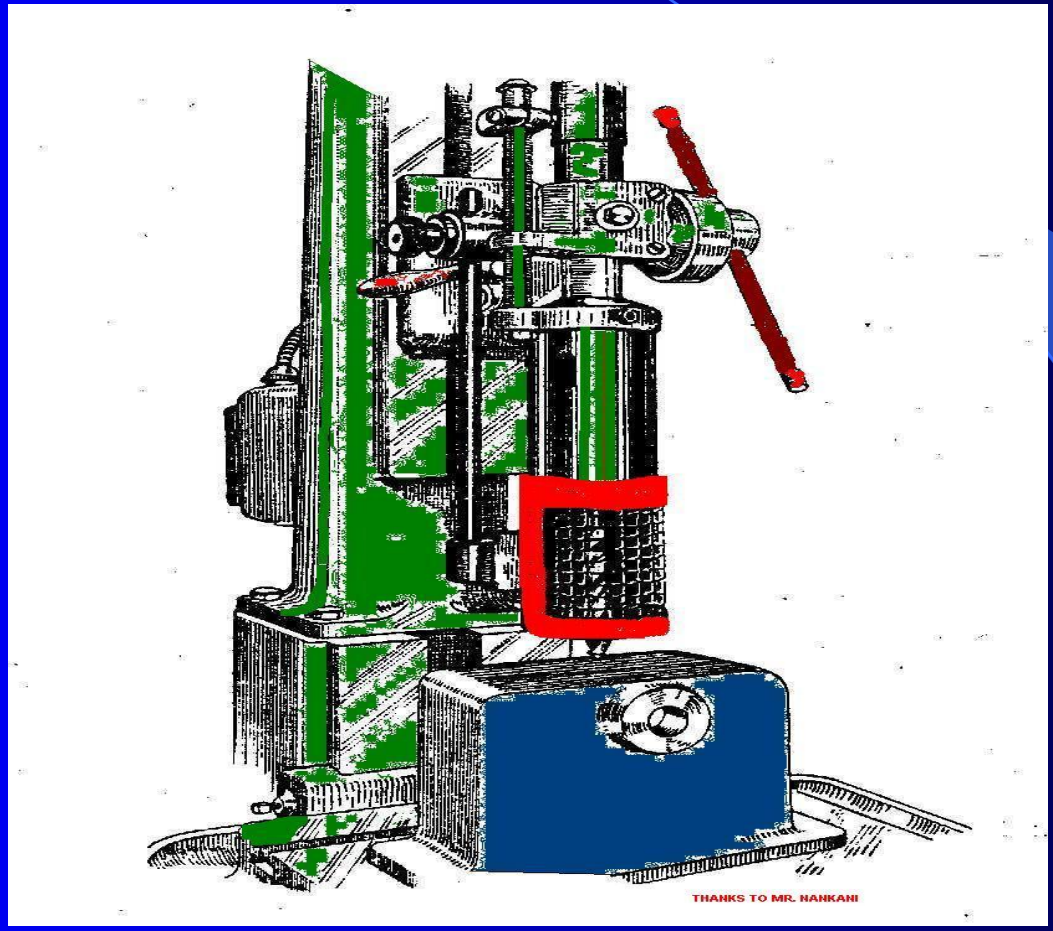
Grinding Wheel

Risk Assessment

Risk Assessment

Grinding Wheel Operator with Safety Glasses

Risk Assessment



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Calculating Risk Rating

The risk of accident is not totally eliminated but likelihood of it happening is very much reduced.

Another example, almost certain likelihood (3)
of serious injuries (2)
from a given hazard:

3 x 2 = 6

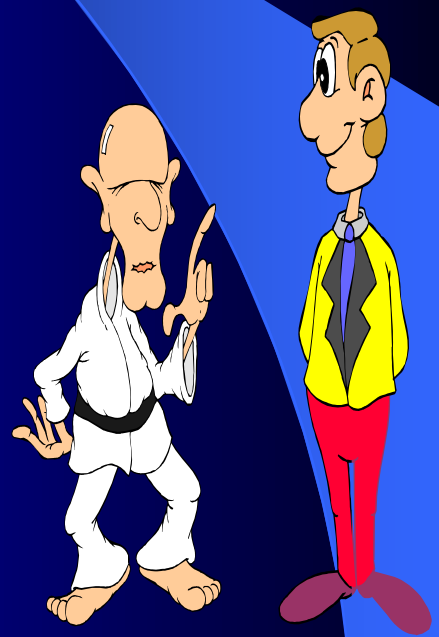
would be evaluated as a more significant risk than:

Risk Assessment

an unlikely (1) fatality (3) resulting from another hazard:

1 x 3 = 3.

For example somebody falling from a large window of a high-rise building is very low but would be fatal.



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Risk Rating

The risk can be illustrated as follows.

LIKELIHOOD OF OCCURRENCE		HAZARD SEVERITY		RISK RATING
3	High	3	Major	1,2,3,4,6 or 9
2	Medium	2	Serious	
1	Low	1	Slight	

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Risk Rating

The risk-rating column will, in this example, include a number 1, 2, 3, 4, 6 or 9. This number provides a working value of the residual risk, which helps to complete the answer to the question of what could go wrong. Thus, the eight elements, which enable a risk to be evaluated, are:

Risk Assessment

The 8 Elements:

- Harm
- To whom
- Hazard
- Circumstances
- Precautions
- Likelihood
- Severity
- Risk rating

Risk Assessment

This basic technique and the rating of risk factors to evaluate risk provides extremely useful guidance for the assessment of many of the risks which industrial employers need to manage (such as those from plant, equipment and processes, etc) and can also be adapted to help management address certain non-industrial risks (such as passive smoking, etc). There are, however, limits to how far the guidance can be adapted. For example, it is probably easier to model new guidance than to adapt the above when assessing health and safety risks in relation to stress, violence to staff, etc.

Risk Assessment

Expressing priorities for risk control

The assessment is not complete if it remains as a statement of hazards and risks. It must contain conclusions about action needed to eliminate or reduce the risk. The risk assessment therefore needs another stage beyond the evaluation of the risk, which identifies the action required, i.e. measures, in addition to existing precautions, which may be necessary to control the risk. Also, it is helpful to include a priority action standard, which specifies how immediately action is required.

Risk Assessment

RISK RATING	PRIORITY
1	no action or low priority
2	low priority action
3 or 4	medium priority action
6	high priority action
9	urgent action

Thus the 10 elements of the assessment process are as follows:

Risk Assessment

- Harm
- To whom
- Hazard
- Circumstances
- Precautions
- Likelihood
- Severity
- Risk rating
- Priority
- Action required.

Given below is the table, which outlines the above elements:

Risk Assessment

Harm	To Whom	Hazard	Circumstances	Precautions	Likelihod	Severy	Risk Rating	Priority	Action Required	Priority Rating
Loss of limbs	Operators Passer by	Operation lathe mc	Operator unknowingly touches the belts while mc is running. Loose clothing can get caught in the belts	Do not operate mc Temporarily stop the mc	3	3	9	Urgent	Fit guards to prevent access to the belts	Urgent
Loss of limbs	Operator and Passer by	Operation lathe mc	No possibility of operator touching the belt while machine is running	Check guards before starting mc No loose clothing as rotating shaft or article	1	1	1	Low	Nil	Nil

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During the assessment process, the action required column could be completed with the relevant additional measures if these are immediately obvious. Alternatively, inclusion of an intermediate priority column before action required allows the assessor to record the priority action standards (nil, low, medium, high or urgent) only.

Risk Assessment

The advantage of including the priority action standard is that the assessment process may continue and the identification of urgent or high priority items will not be delayed by deliberation over possible control options for lower priority items. The additional control measures required may then be specified once all the urgent and high priority items are compiled for detailed consideration and decision-making.

Risk Assessment

The risk assessment does not finish here as it could be enlarged to include various other aspects in refining the assessment i.e. The British Health and Safety Regulations require that the employer must ensure that all measures satisfy the general duties under Health and Safety regulations to manage risks "so far as is reasonably practicable".

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CE Marking

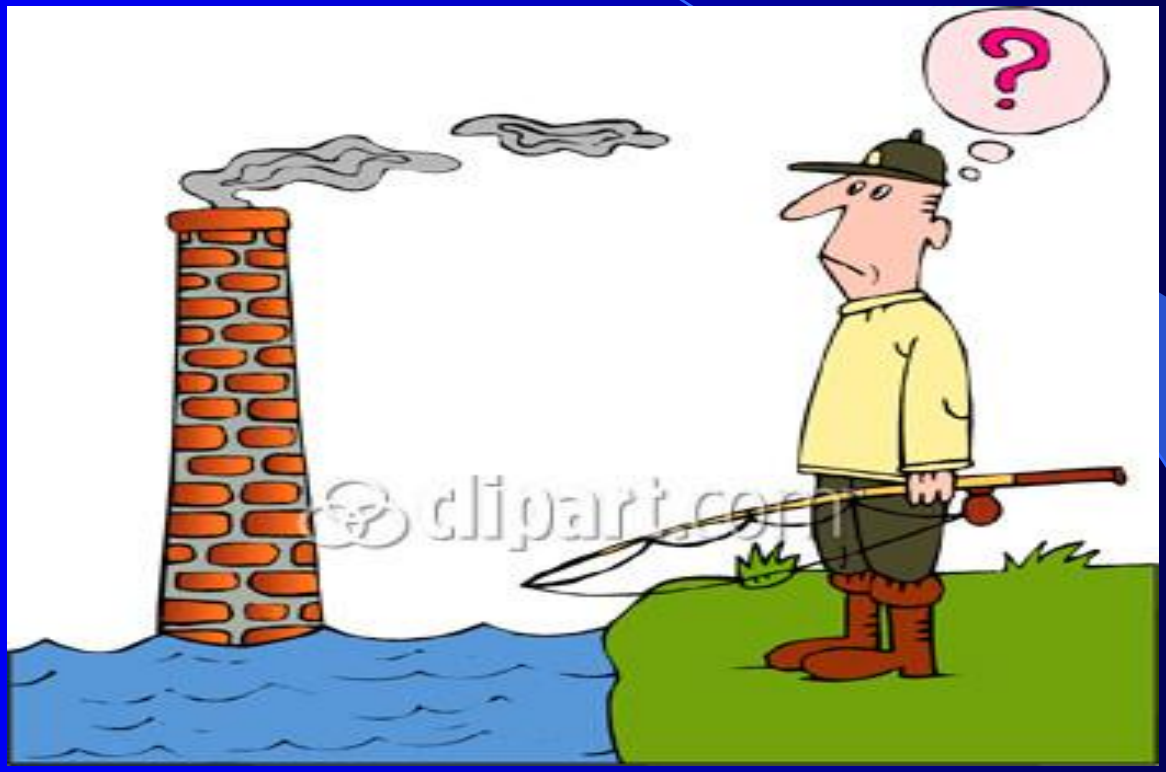
You probably have seen the products originating from the European Common Market have a CE marking. This CE marking means that the manufacturer has carried out the risk assessment and is in compliance with the legal requirements applicable to that particular machine, process or product and shall provide the details on demand.

Risk Assessment

Finally I must say that nothing can be made fool proof but our duty is to make it safe for a person with below average IQ.

Please spare some thoughts for the people in the next few slides. We may find ourselves in these slides too.

Risk Assessment



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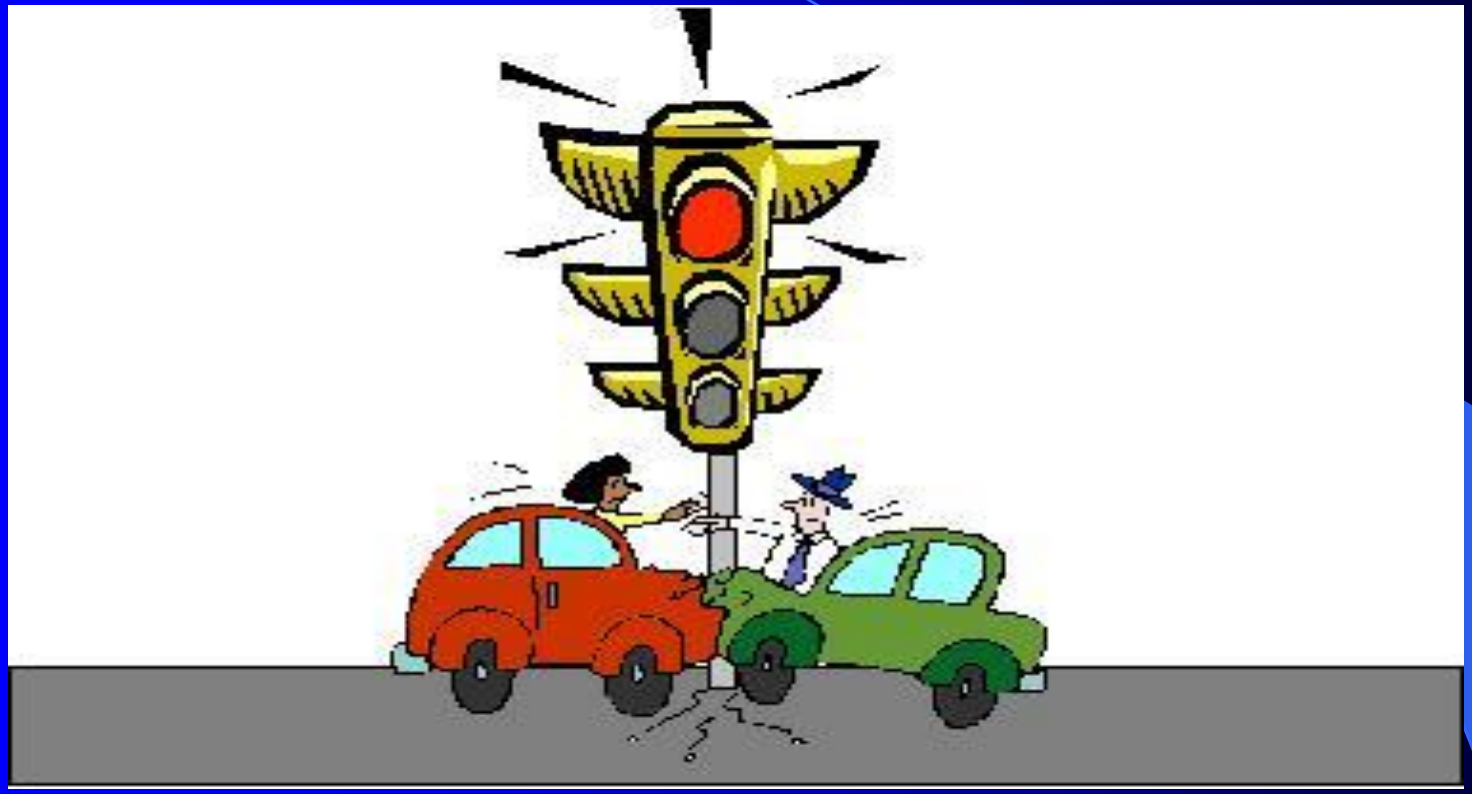

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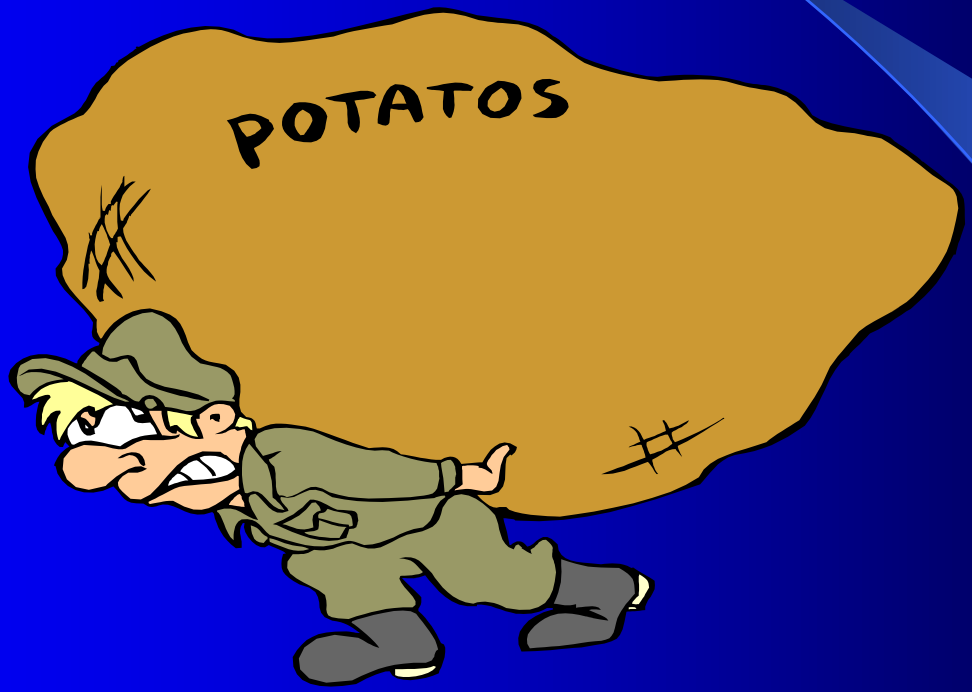

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