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HITACHI
Inspire the Next

Body Harness and Rescue Systems

EHS CULTURAL DAY 2011

The Matrix @ Biopolis
Exploration Theatrette, Level 4

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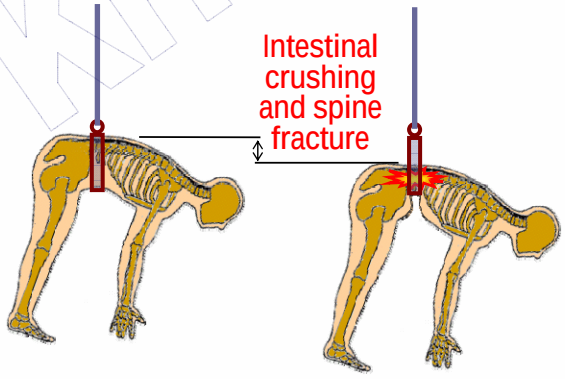
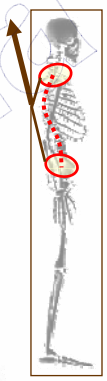
Working at Height, and body belts

- Working at height has been and continues to be most hazardous activity around the world, causing maximum number of accidents and deaths.
- Employers gave belts and ropes for "fall arrest", i.e. to prevent workers from hitting the ground (or other base), until they found out that belts broke the spine and damaged intestines.
  - 'Arrest' = Stop
  - In 1998, USA banned the belt for fall arrest.
  - Singapore banned it in 1999.

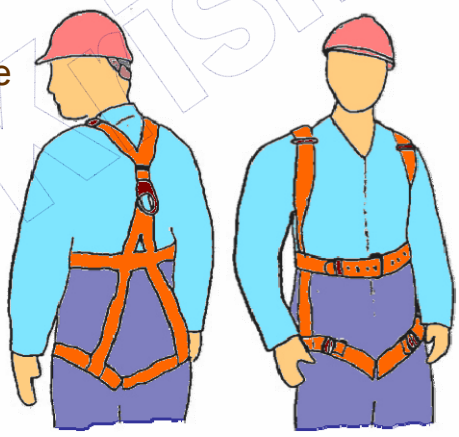


Fall arrest and body harness

- Body harness takes the body load at sturdy shoulders and hips, and does not damage the spine, hence is the proper solution for fall arrest.



- All workers do not need fall arrest
  - Only those who are liable to fall in their normal course of work need fall arrest.
  - All other workers need only to be prevented from falling.



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1. Safe Working Zone and Fall Prevention

- We should provide every worker a 'Safe Working Zone'
  - A strong and stable work platform, with proper guard-rail
- *"In the case of a fully boarded and guarded scaffold, workers would not be expected to wear personal fall-arrest equipment in addition."* – HSE, UK
  - Helmet too is only to protect him from stray debris.

Edge Protection

- Primary attention to be more on fall prevention than to protect from fall effects
  - This can be done by 'Edge Protection', i.e. is by guard-rails, like parapets on our balconies and staircases.
- Only when and where edge protection is not feasible, the worker should have fall prevention or protection.

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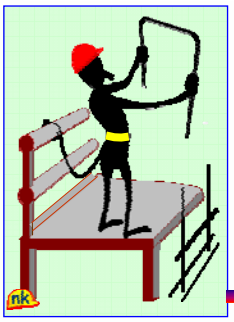
2. Work Restraint and Work Positioning



Work Restraint

- While legally a belt and cable cannot be used to stop a fall, a cable ('Lanyard') can be used to prevent a fall by restricting the movement of the worker beyond limits.
  - This is known as a 'Work Restraint', or 'Travel Restraint'.

Work Positioning

- Modification of this system, in which belt is not merely to restrict movement beyond specific limit, but to position worker safely to carry out task with both his hands free.
  - This is known as a 'Work Positioning'.
  - It requires worker generally to lean back, keeping restraint taut, so he will be stable while using both his hands.

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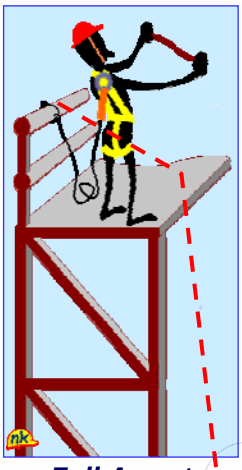
3. Fall Protection – Fall Arrest



Fall Arrest

A safety net is a very good alternative, and for all workers

- When worker cannot be restricted to work platform area but has to move around
  - Or when there is yet no work platform (as during erection),
  - Or there will not be one (as during dismantling),
  - Or the base is not stable (as in demolition)
  - Or the base is not flat (as on slopes),
  - Or in general, wherever there is no continuous, flat, stable, or dependable base to stand on or work from,
- Then worker needs a way to stop a fall before he hits ground or other base.
  - This is 'Fall Arrest'.

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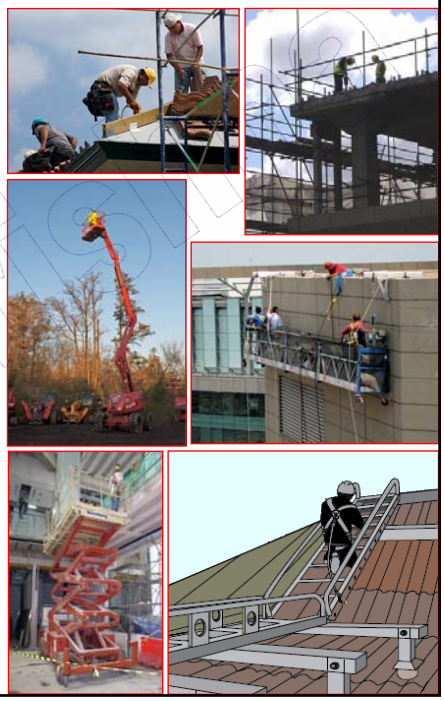
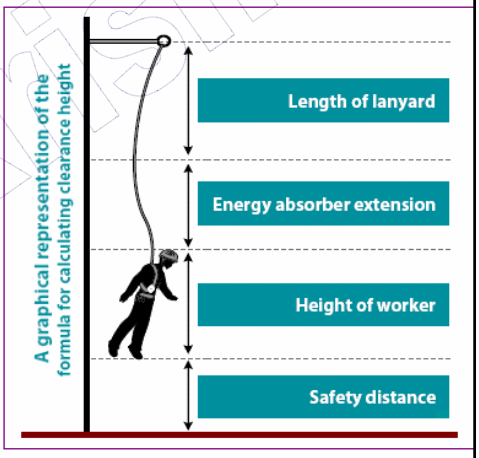
When and Why of Body Harness

- **Who needs body harness by law?**
  1. Erectors
  2. Dismantlers
  3. Demolition workers
  4. Boom-hoist and scissor-lift workers
  5. Suspended or slung scaffold workers
  6. Sloping roof workers
  7. Any situation with likeli-hood of fall but there is no edge protection
- Nobody else needs it
  - Then, why are we giving it to many other workers?



Why shouldn't we give everybody body harness? – a

1. Body harness is PPE – should be considered only after all other controls have been exhausted
2. It is much costlier than other PPE.
3. It needs more training, more understanding, more supervision, more adjust-ments, more maintenance than other PPE.
4. It must fit the user, must be adjusted snug fit, and must be used correctly.
5. It will not be effective within a minimum falling distance (≈ 3.5m).



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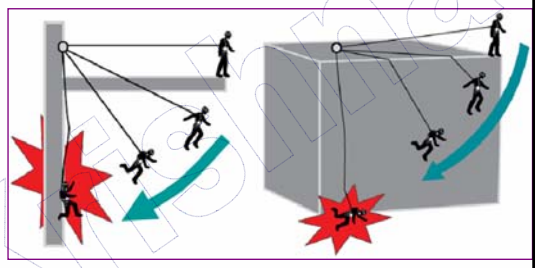
Why shouldn't we give everybody body harness? – b

6. It may face pendulum effect, and chances of hitting projections on the way down.



7. It needs very strong anchors, ≈ 22kN
8. It makes the regular wearer very uncomfortable, and reduces productivity.
9. It needs close and continuous supervision.
10. It may give rise to other hazards, such as "suspension trauma", which may be fatal after about 20-30 minutes.
    - In-house rescue system is essential to save fallen workers promptly.

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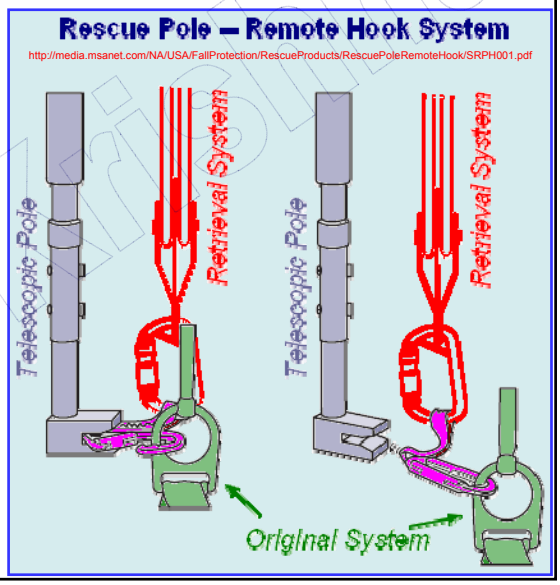
In-house Rescue by Gondola or Rescue Pole

- Rescue by gondola
- Rescue by retrieval system



Rescue by Rappellers

Self-rescue

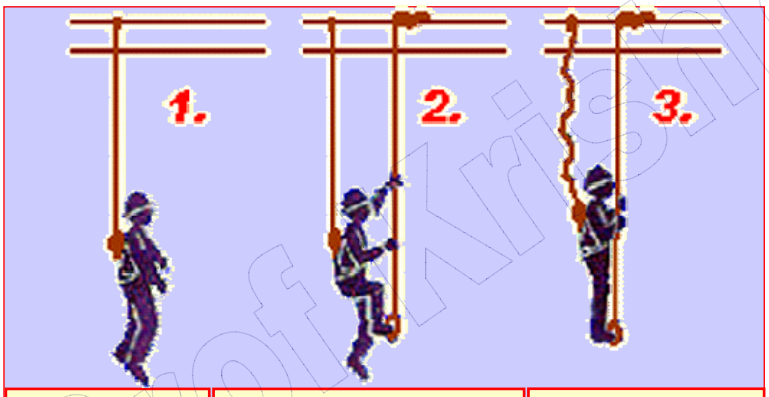
- By drop stirrup (commercially available)

http://www.caloly-safety.com/detail/fall-restraint/rescue-step-6224.cfm

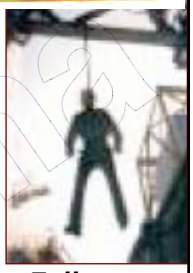
- By step-wise lanyard

Basic Rope Rescue for Body Harness

- Simpler, cheaper alternative in emergencies, when the worker is conscious
- Only care needed is with anchoring at top



Person has fallen and has no means of rescue within 20 minutes	Rescue rope with loop end is dropped to person to allow him/her to step up into loop and revive blood circulation	Person can safely wait for rescue without further risk of suspension trauma



Fall arrest

Self-rescue

The End