Explosion of Primary Explosive during Weighing Process

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May 27, 2011

XVII SAFEX Congress

Introduction

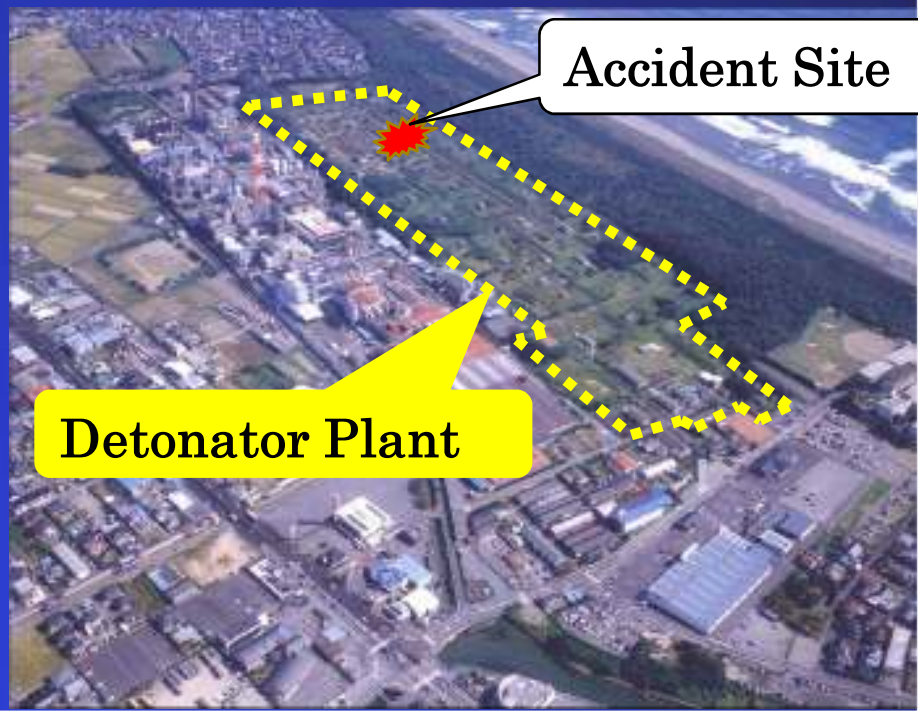
Main Products
1.Electric Detonator
2.Electronic Delay Detonator
3.Electric Safety Fuse

Fukushima No.1
Nuclear Power Plant

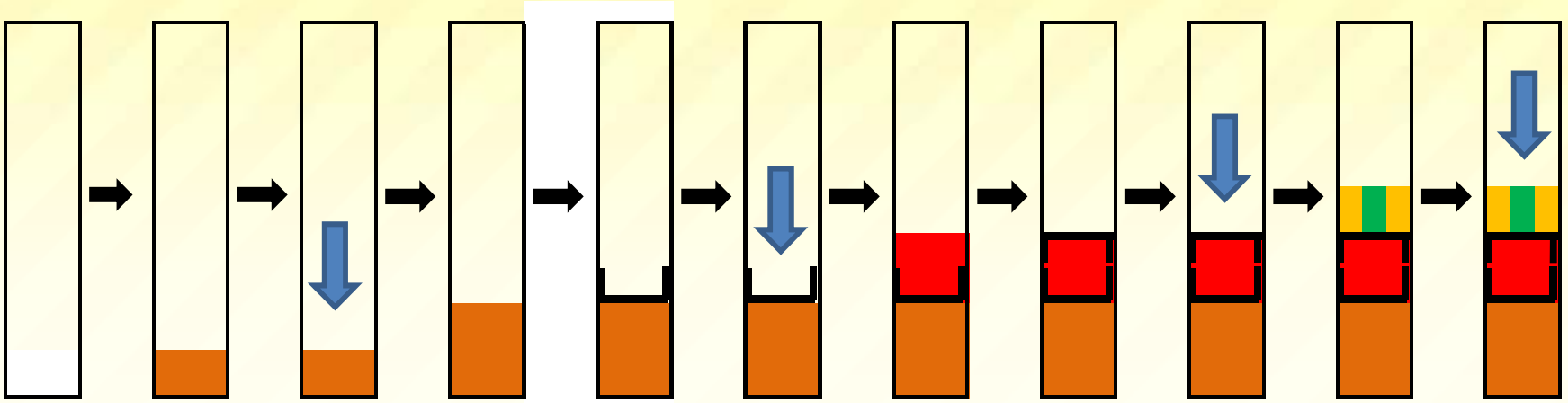
≒1,000km

Detonator Plant

3/11 Epicenter

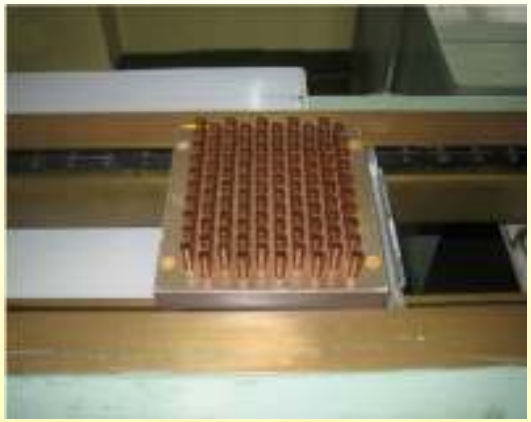


Process Outline

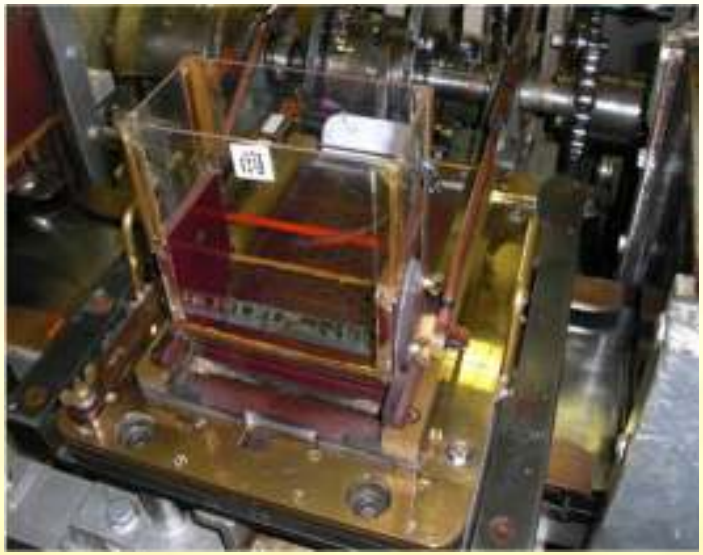


: Base Charge

: Primary Explosive



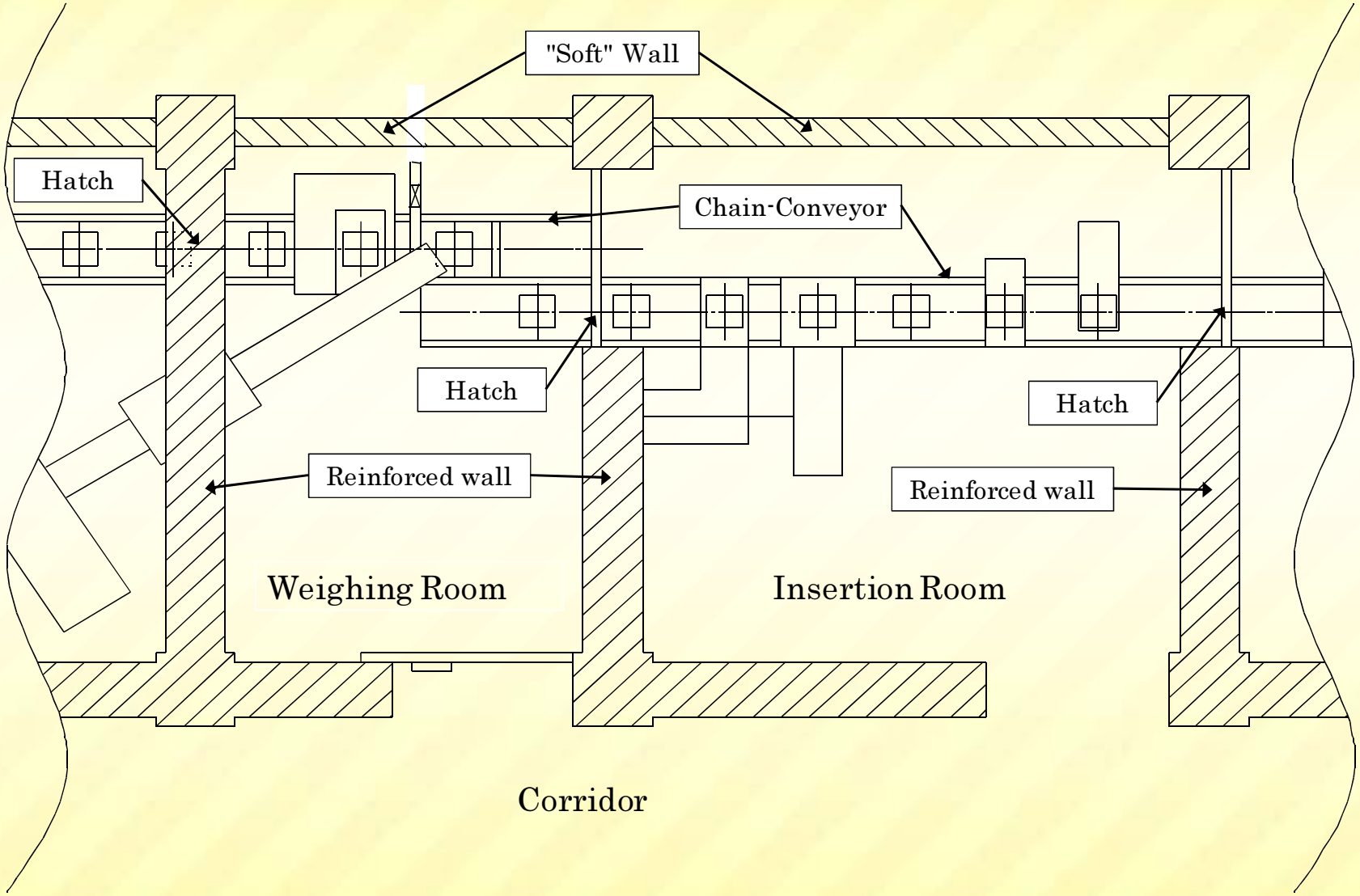
Copper Shells onto a Plate



Weighing and Dispensing Device

Pressing Machine

Process Outline



Brief Description of the Accident

Date and Time : Wednesday, 20 August 2008 at 14:24
Accident Location : Loading process in Detonator Plant
Short Description :

The explosion occurred in the primary explosive weighing room and the adjacent room where the 2nd inner tube is placed in position. About 400g of the primary explosive in the hopper of the weighing device, 300 electric detonators in the weighing room exploded. The 200 electric detonators in the adjacent room waiting for the insertion of the 2nd inner tube also exploded. Exploded amount was approximately 0.7Kg.

Injuries : No injuries
Damage : (1)Neighboring District : None
(2)Weighing Room and Insertion Room : Partially destroyed

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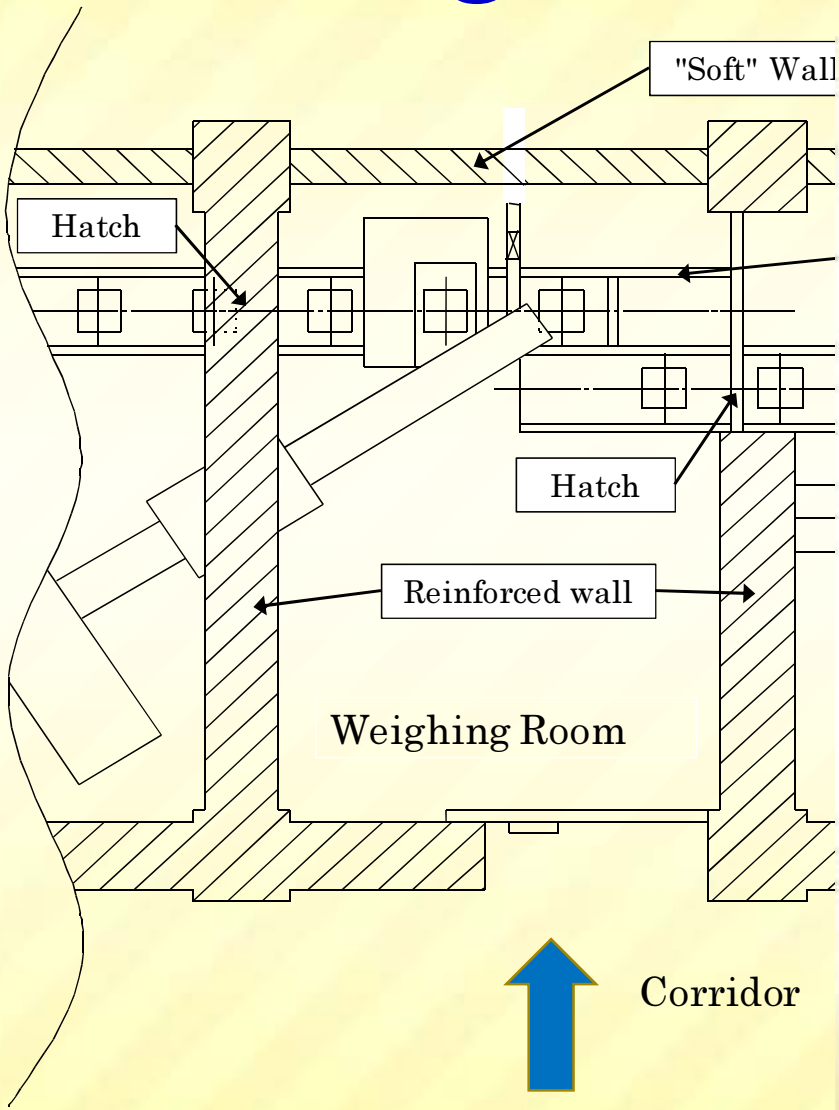
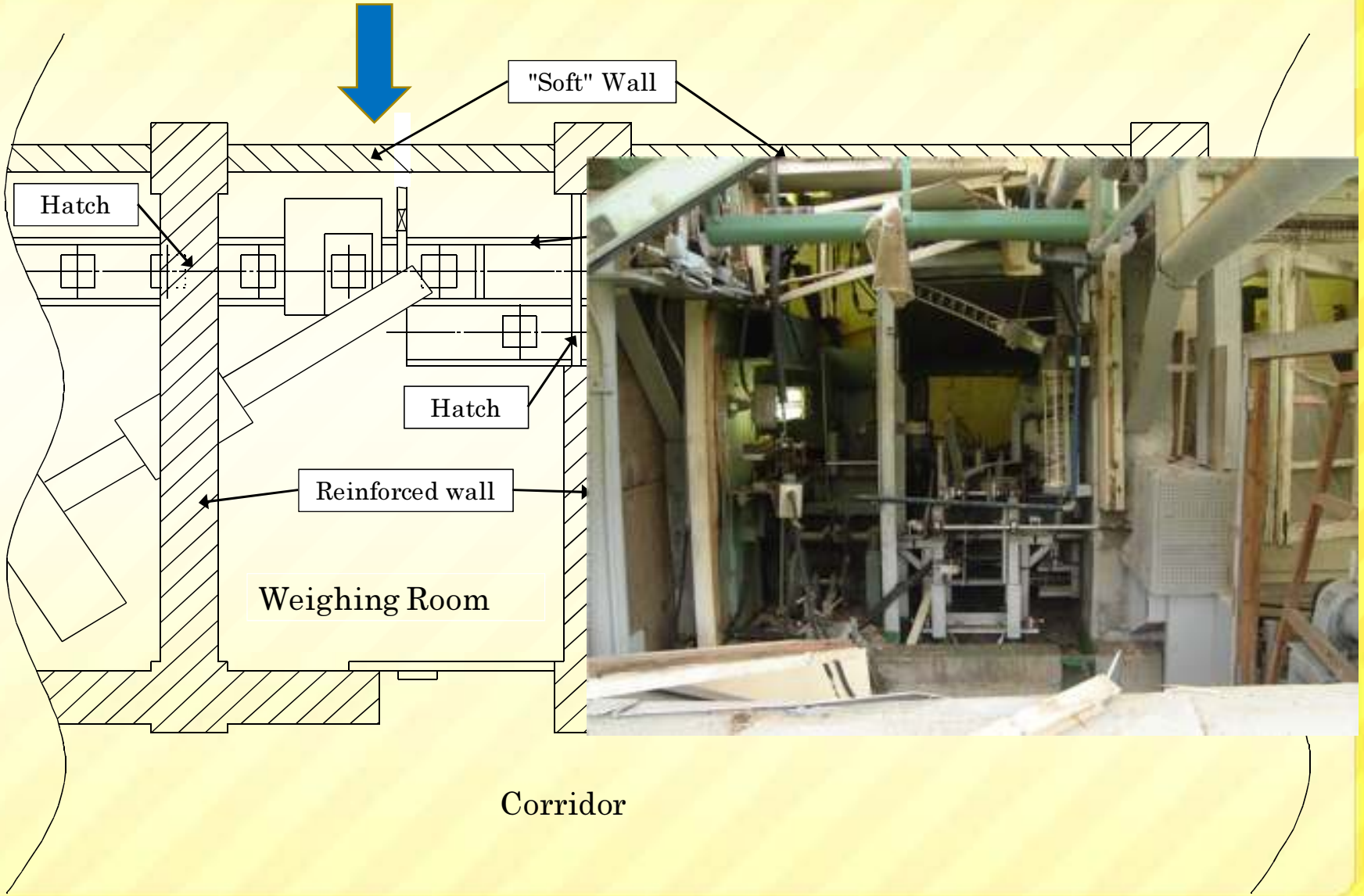
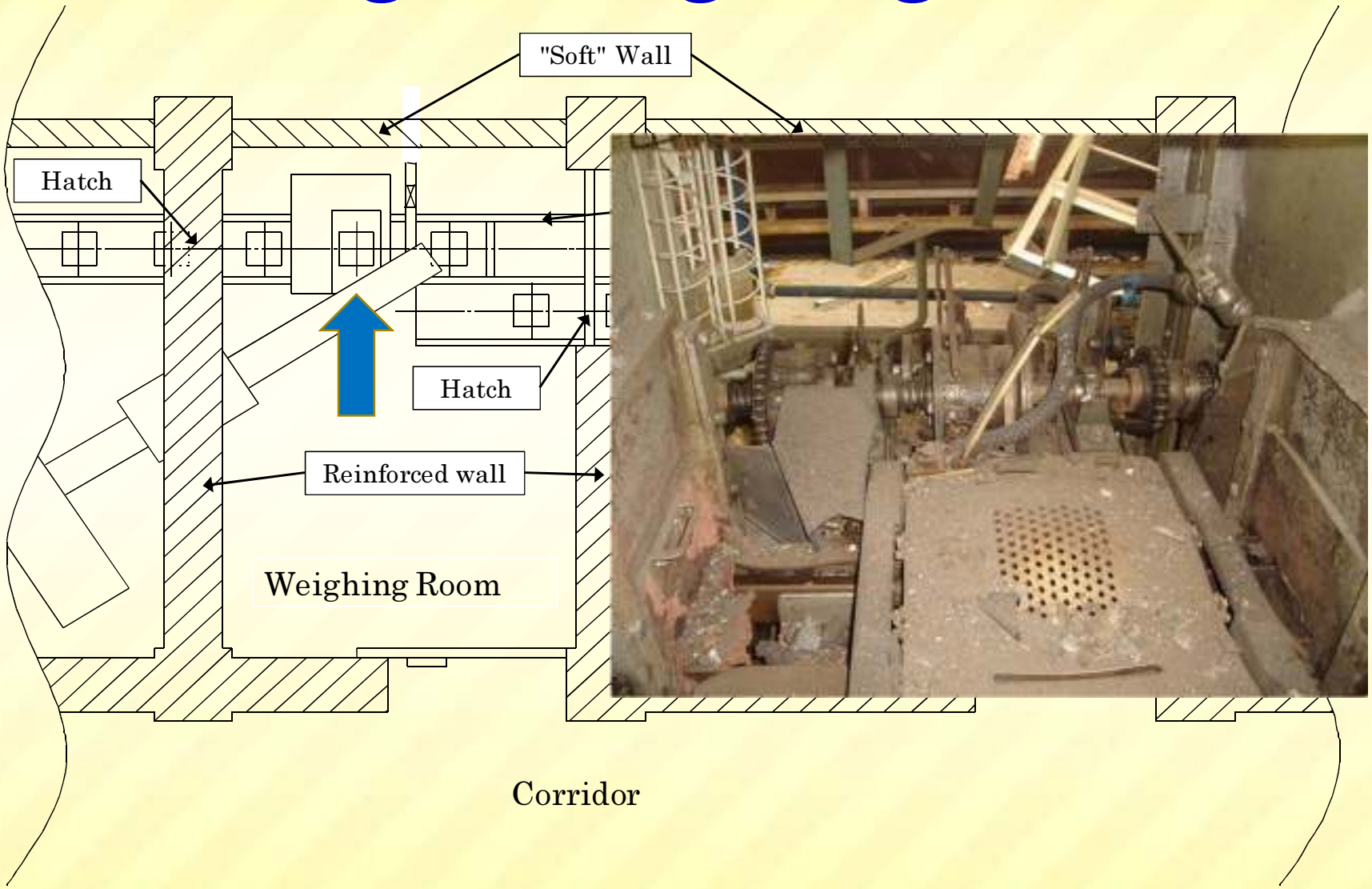
Damage(Weighing Room)



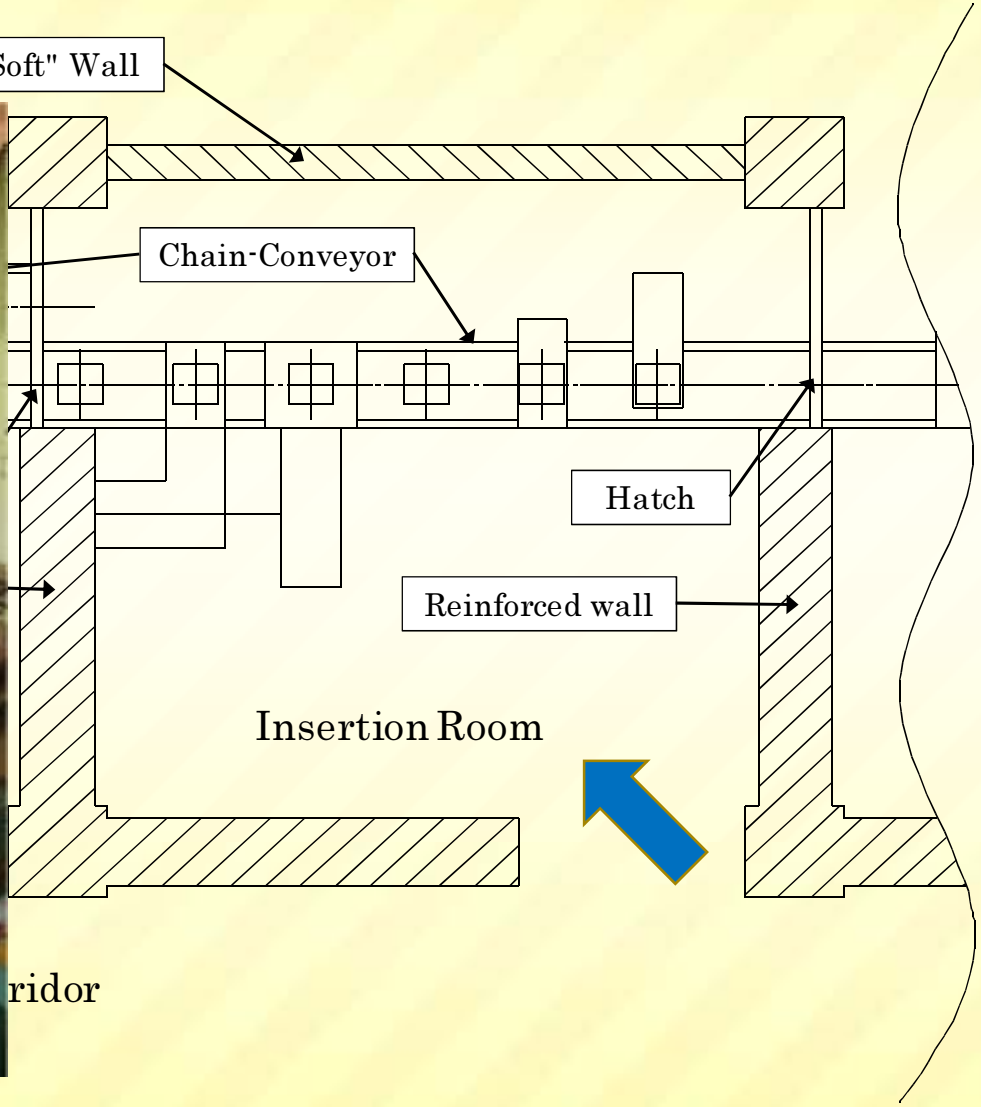
Damage(Weighing Room)



Damage(Weighing Room)



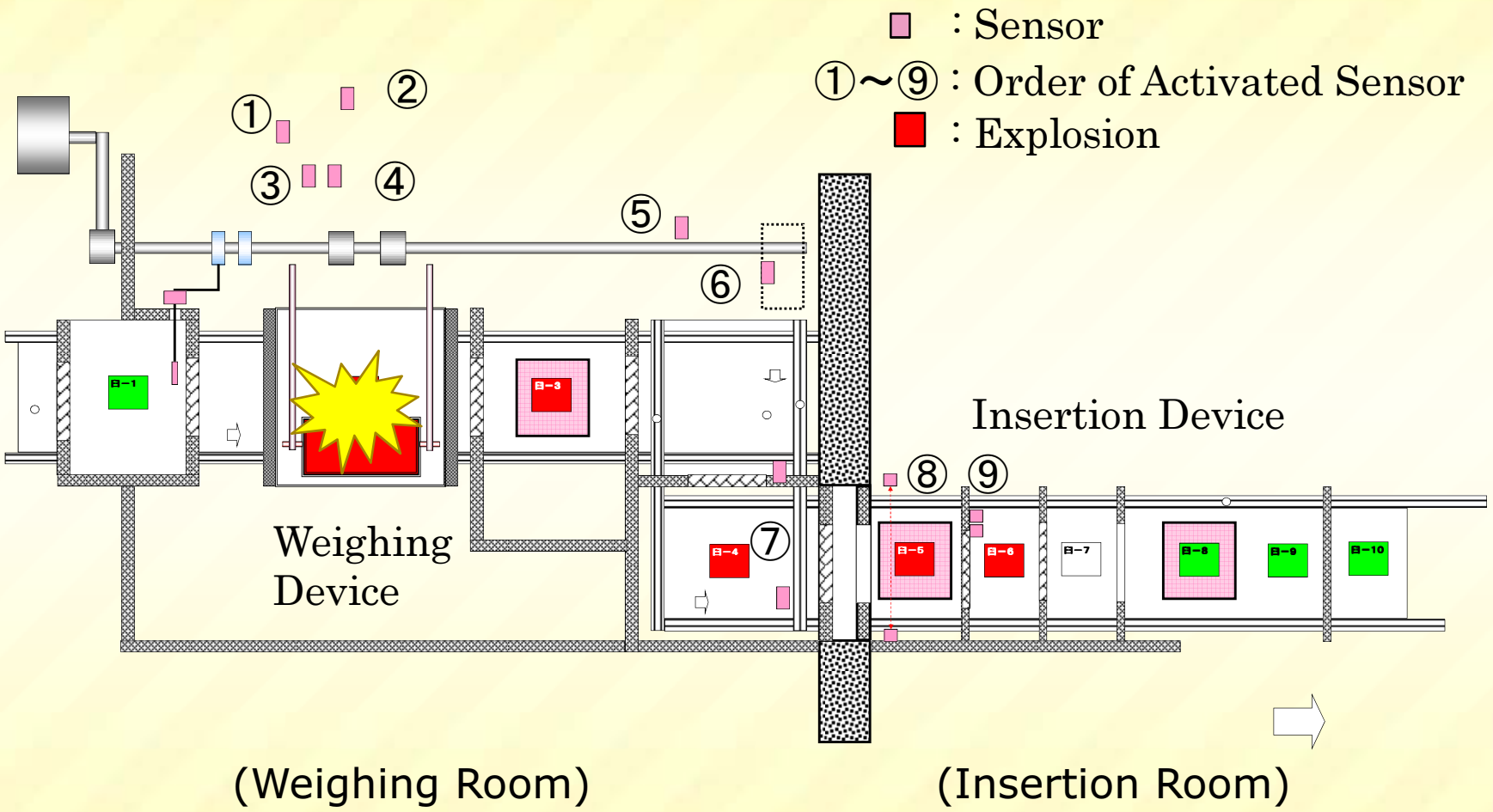
Damage(Insertion Room)



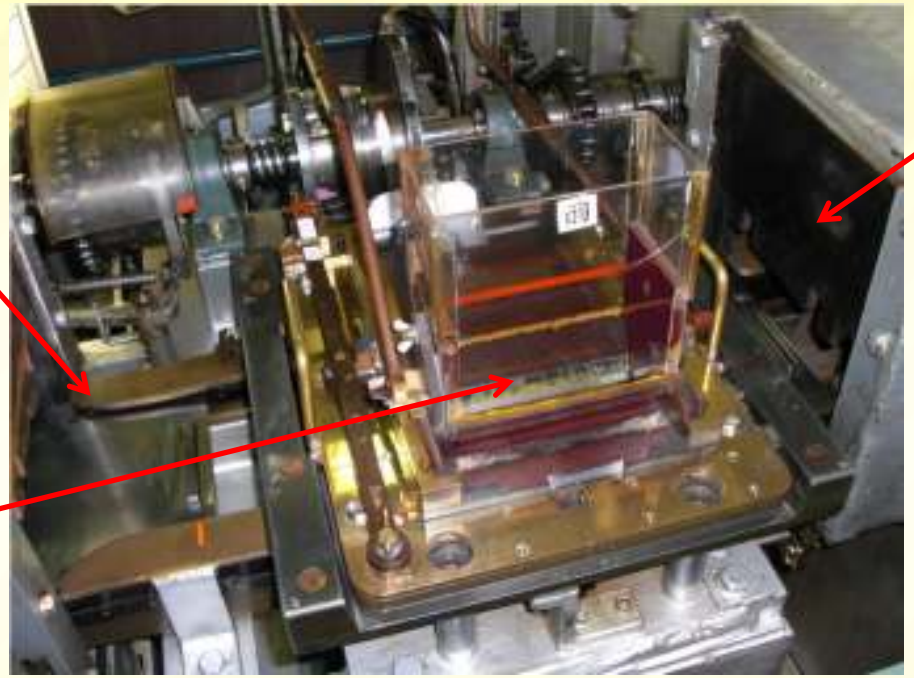
Damage(Insertion Room)

Damage(Insertion Room)

Where did the accident start?



When did the accident happen?

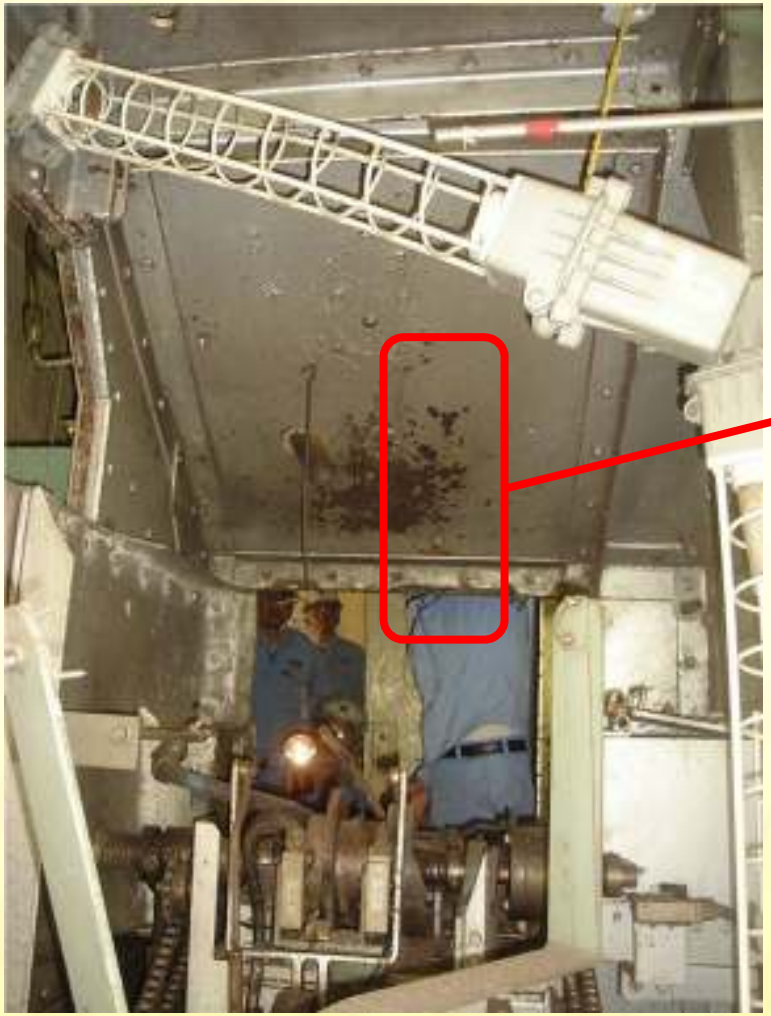


one cycle (12s)

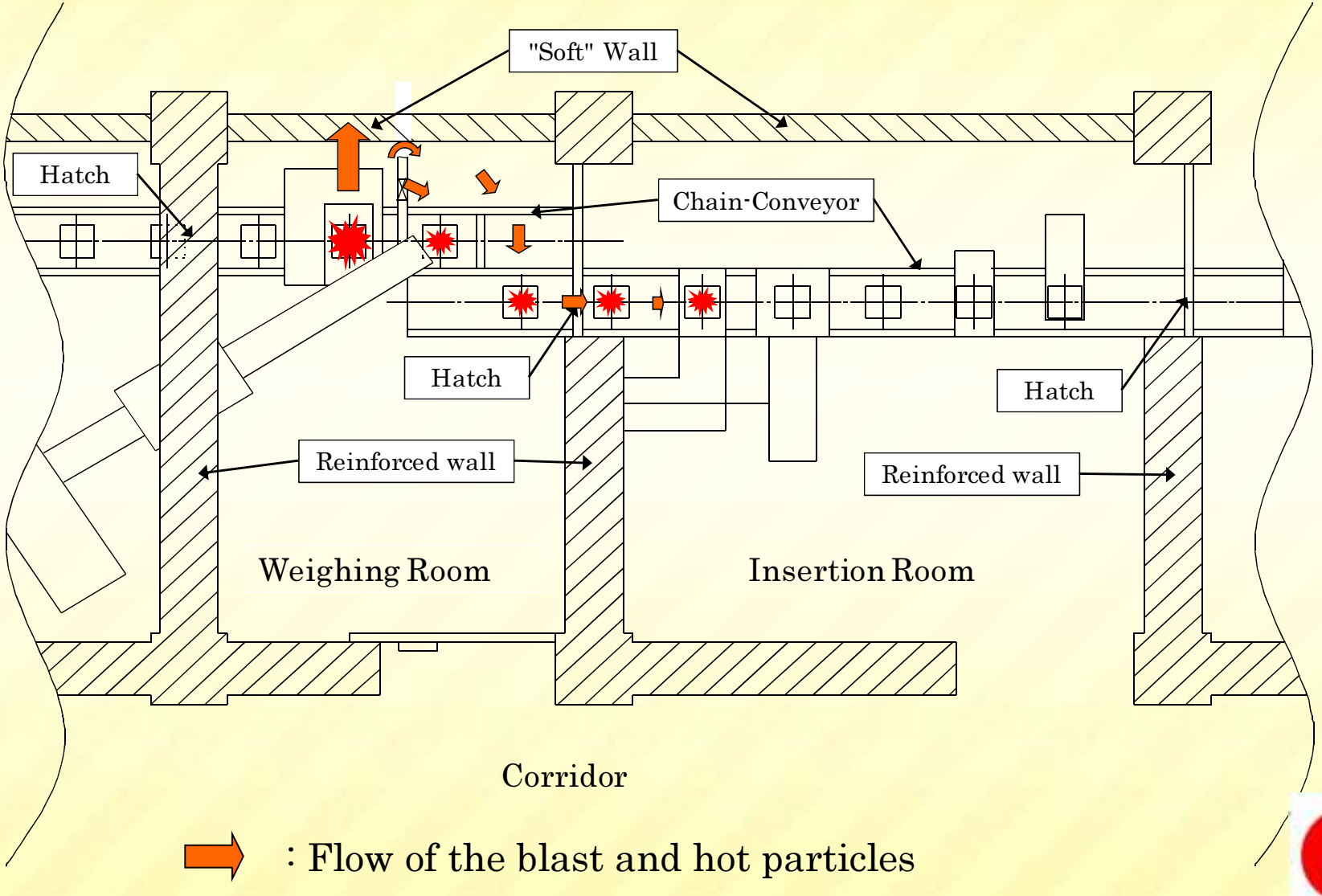
Time (second)	1	2	3	4	5	6	7	8	9	10	11	12
Shutter	■	■			■	■						
Chain-Conveyor		■	■	■	■	■						
Weighing Device			■	■	■	■	■	■	■	■		

■ work □ rest

Why did it happen?



How did an explosion spread?



: Flow of the blast and hot particles

How to prevent it?

Before

After

1. Removal of the bolts on the weighing devices
2. Revision of the method for cleaning the weighing device

How to prevent it?

3. Check of unnecessary parts (bolts, nuts and so on) for all other process
4. Revision of the inspection standards and schedules for old equipment with special emphasis on corrosion
5. Use of non-corrosive materials for critical parts and equipment

Learning Point

1. A simple check is not enough to prevent an incident. Thorough inspection including that of very small parts is necessary.
2. In the design of machinery and equipment key components should be accessible for checking and routine maintenance.
3. The practice of lacing nuts and bolts that can fall into explosives should be considered wherever possible.

Learning Point

4. Where there is the possibility of corrosion, non-corrosive material should be considered when appropriate and maintenance schedules should incorporate checks or replacements of components that can corrode.
5. Redundant components and materials should not be retained in the workplace but eliminated.
6. The effectiveness of the design and placement of barricades should be reviewed.

Learning Point

7. Old plants periodically require a total review of the operation, design, maintenance, Operating Instructions and training of personnel.