

# FATAL CRANE INCIDENT 22<sup>nd</sup> October 2007

Germano Construction Site Brazil

## LESSONS LEARNED



DATE: 22<sup>nd</sup> October 2007

TIME: 1126 hours.

### **Incident Description:**

During the construction activity of lifting and moving the steel structure (trestle) that supports the conveyor at the Alegria 8/9 stockpile to a new location, the crane lost stability, rolled over onto its sides coming to a stop against a section of a conveyor gallery that was being pre assembled adjacent to the crane location. Due to the roll over, the crane cabin with the operator onboard, was crushed against the conveyor gallery structure pinning the operator in his cabin and causing fatal injuries.

- **Geraldo Roberto da Silva,**
- **From Belo Horizonte**
- **45 years of age**
- **Married with 1 son (14) and 1 daughter (17)**
- **Employed by MIP for 7 months**
- **7 years experience as a crane operator.**
- **Family is being supported by Samarco and MIP.**



## **Crane:**

- Tadano GT-600B All Terrain Crane.
- Maximum lifting capacity – 60 tonnes @ 2.5M radius.
- Manufactured in September 2006.
- Vehicle plate number: HEW 4196.
- Crane registration number: 0405-00-34.

## **Crane condition:**

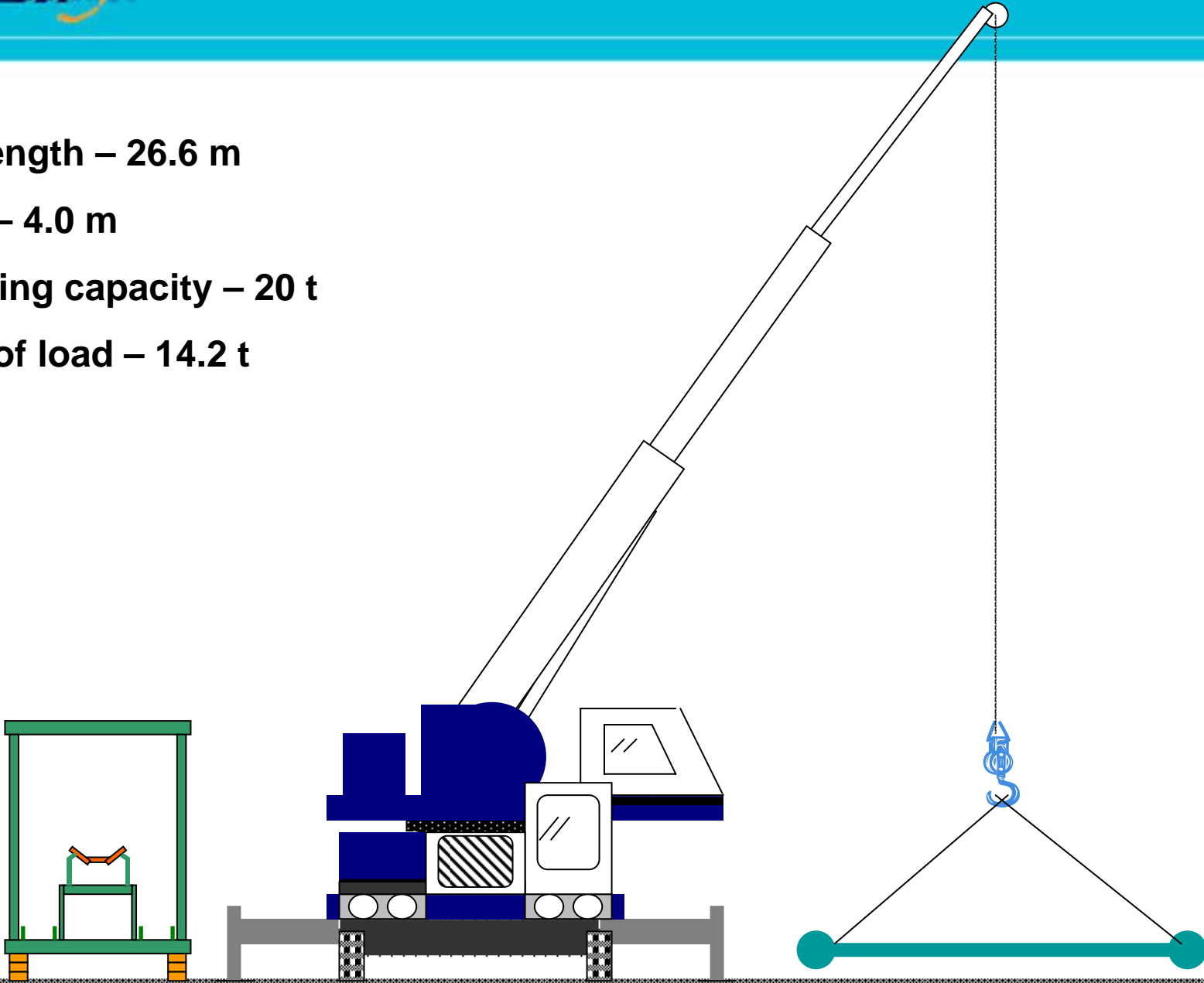
- The crane was inspected prior to starting on site and again on the 11th October 2007. There were no defects noted from either of these inspections and tests and no defects noted on the daily inspection sheet by the crane operator during the two weeks prior to the incident occurring.

**Boom length – 26.6 m**

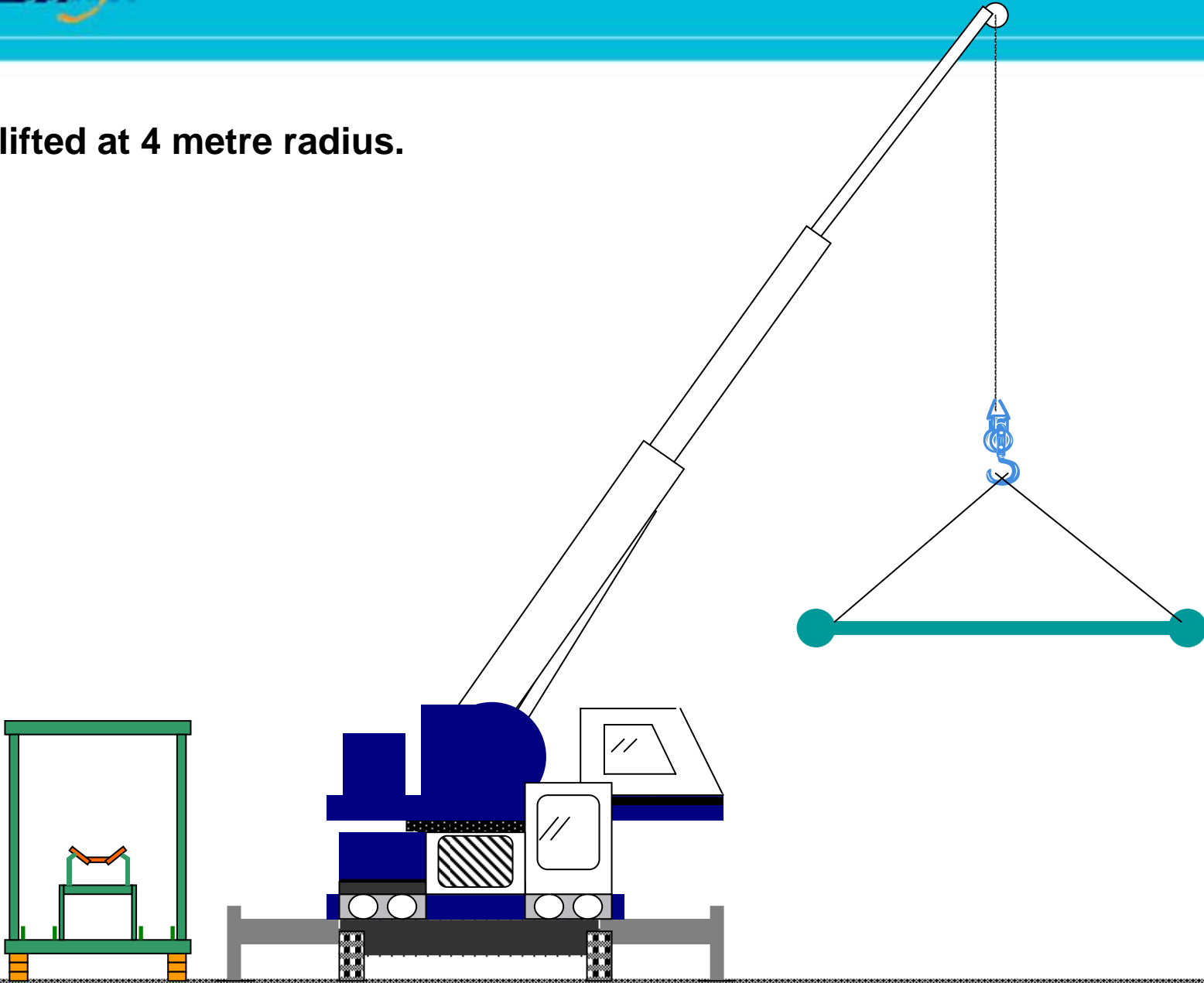
**Radius – 4.0 m**

**Max Lifting capacity – 20 t**

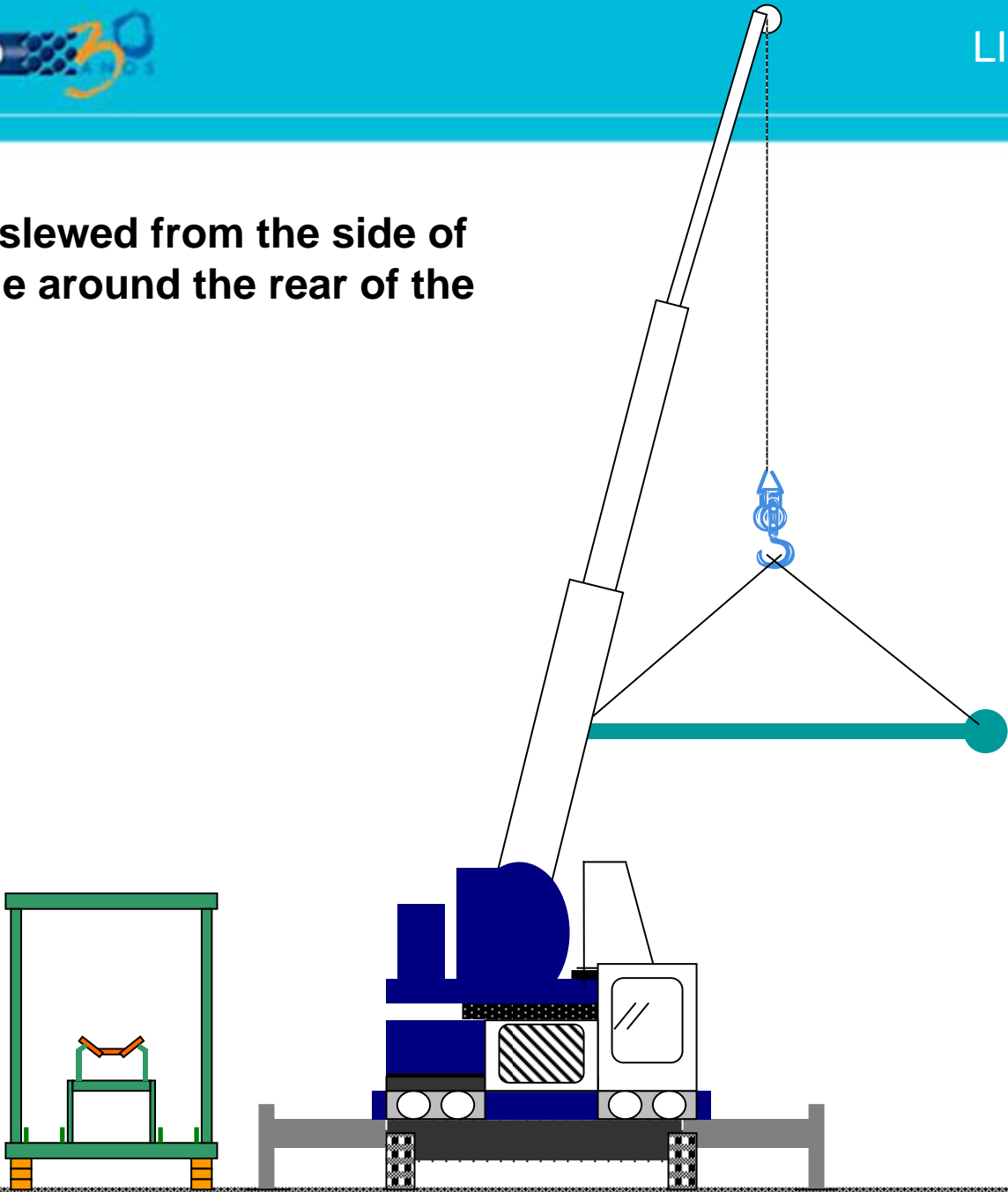
**Weight of load – 14.2 t**



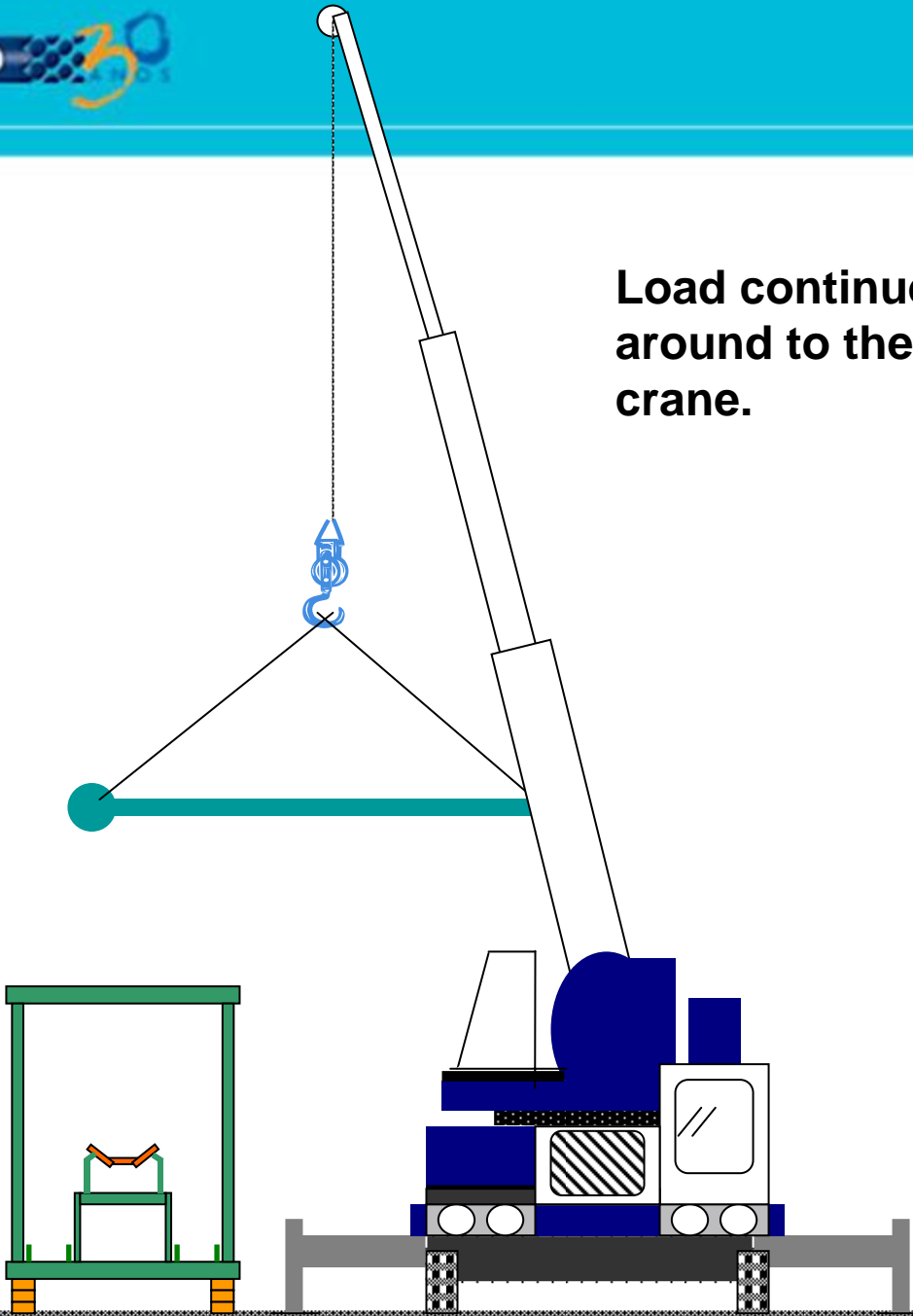
Load is lifted at 4 metre radius.



**Load is slewed from the side of the crane around the rear of the crane.**



**Load continues to be slewed around to the other side of the crane.**

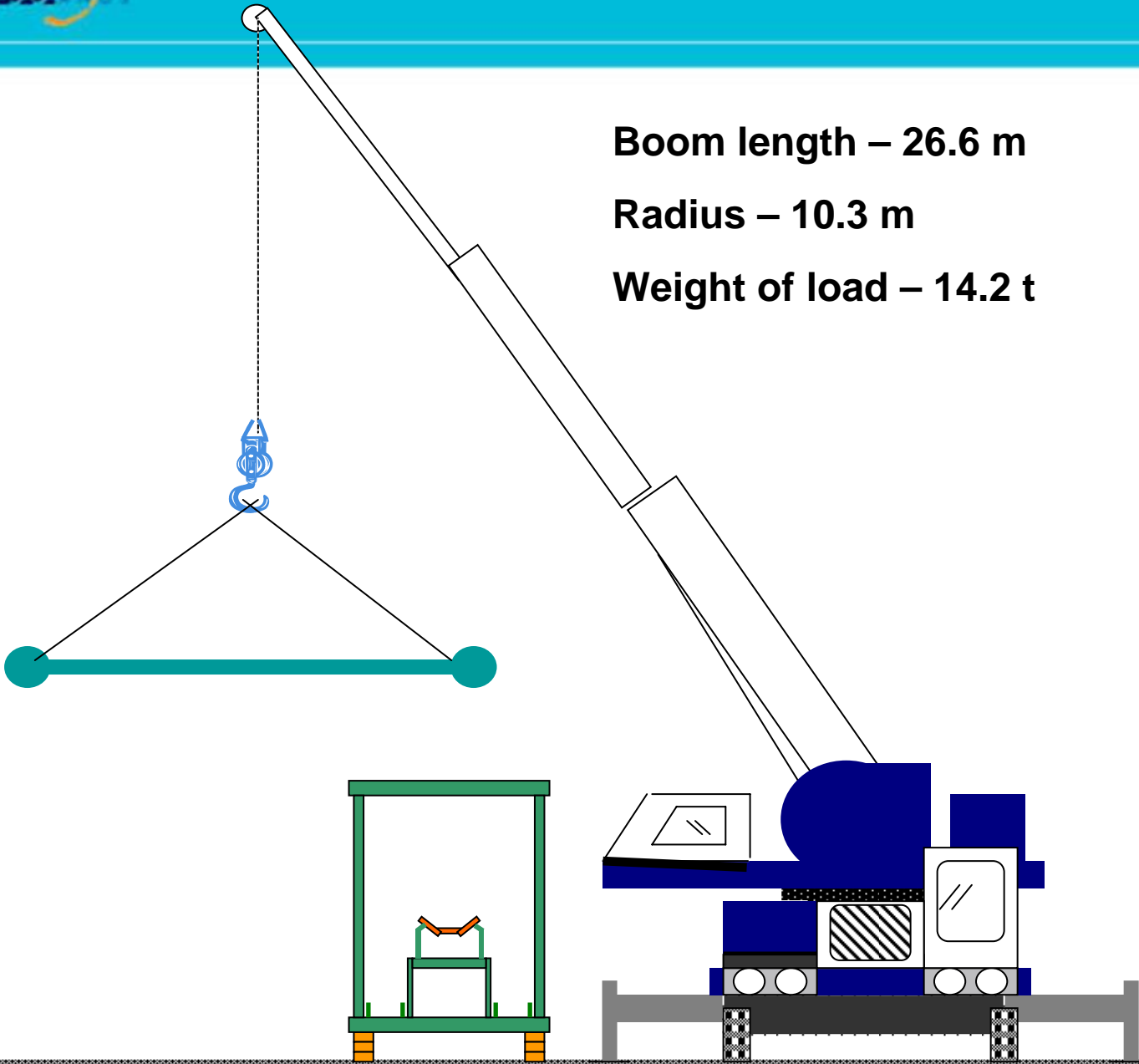




**Boom length – 26.6 m**

**Radius – 10.3 m**

**Weight of load – 14.2 t**

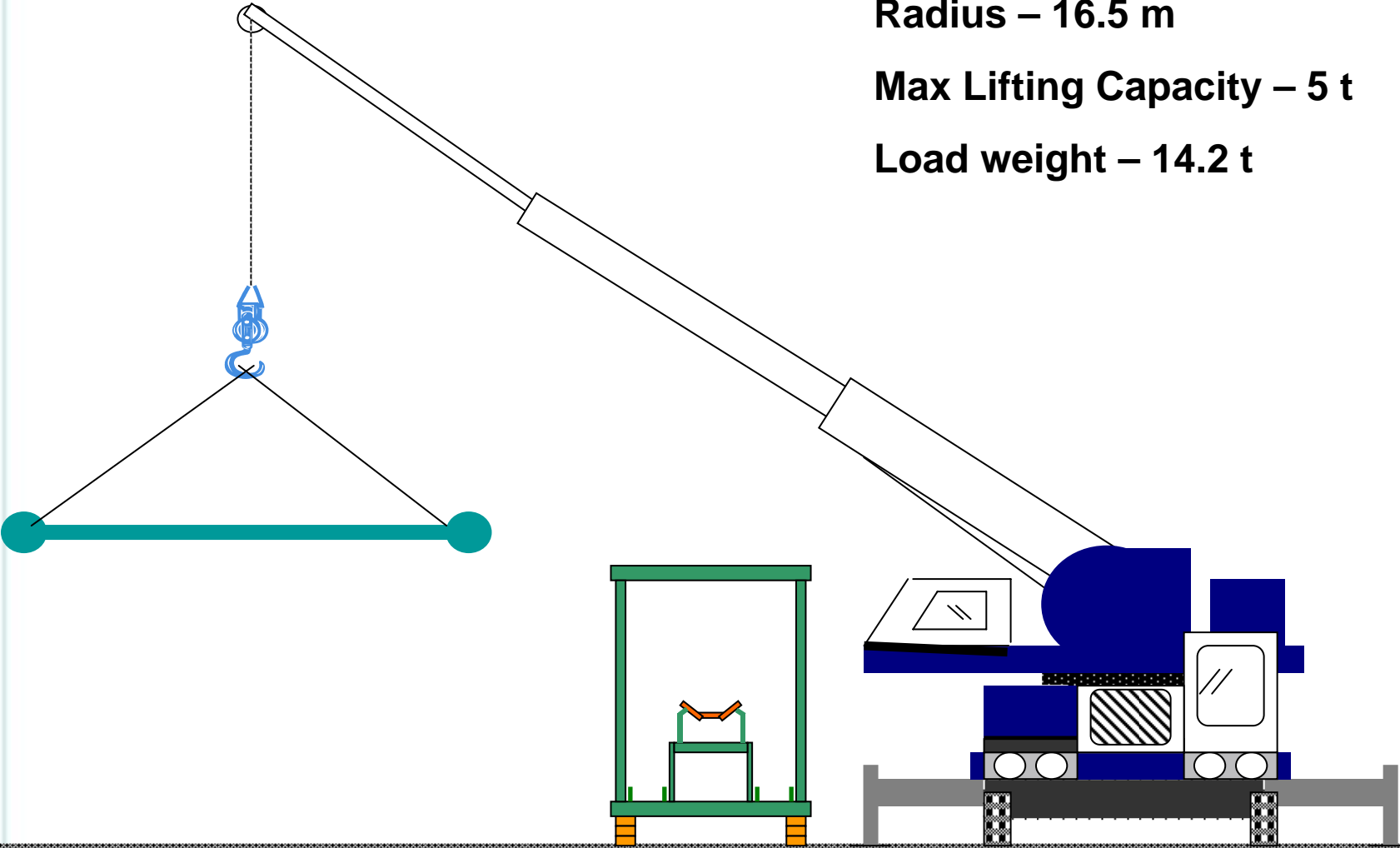


**Boom length – 26.6 m**

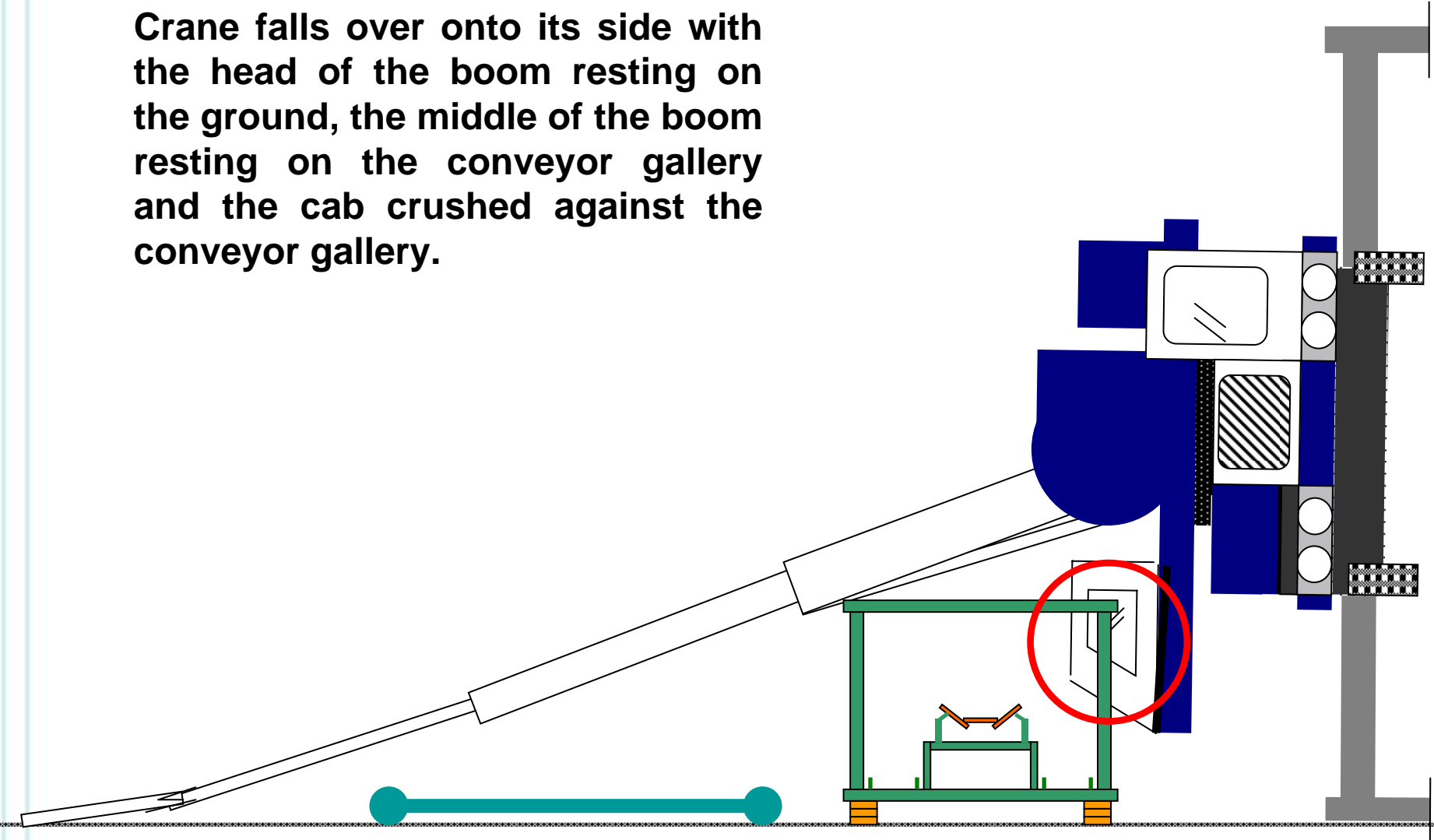
**Radius – 16.5 m**

**Max Lifting Capacity – 5 t**

**Load weight – 14.2 t**



**Crane falls over onto its side with the head of the boom resting on the ground, the middle of the boom resting on the conveyor gallery and the cab crushed against the conveyor gallery.**





## Primary causes

- **The crane was out of radius for its set up and the weight of the load;**
- **The automatic safety interlocks for the crane operation were immobilised at the key outside of the operators cab and the crane operator deliberately overrode the crane limits from the manual switch in the cabin.**
- **There was no Rigging Plan in place for the lift;**
- **Wrong crane used for the lifting task;**

## Contributing factors

- **The crane operator had a history of overriding the crane limits and overloading the crane. Shown by computer records from the crane over 40 overloading incidents during October 2007);**
- **The supervisor was confident with the Crane Operators ability and did not review the lift as per the site procedures;**
- **The crane lift was not reviewed by an APS Safety Technician and approved as required by the JSA for the work activity;**
- **The crane operator had not been formally trained or assessed as competent to operate the Tadano GT-600B all terrain crane;**
- **A JSA was in place for work at the Alegria 8 & 9 works areas of which this was a part. The JSA has insufficient detail for lifting operations;**
- **Poor culture amongst front line supervision who were aware that the crane operator was taking risks and overriding the crane automatic safety controls;**
- **Wrong information on the structure weight given by the contractor supervisor;**
- **Contractor leadership very confident of the crane operators expertise;**
- **Activity considered as secondary task;**
- **No alignment of the lifting strategy or correct planning for the task of lifting the “A” frame between the various levels managing the work;**
- **High tolerance to the poor safety behavior by MIP Leadership;**

## Lessons Learned

- **Lack of commitment by the contractor's leadership increases the chance and opportunity for risk taking and consequently for injuries;**
- **There was tacit approval of the crane operator's behaviours by contractor supervision when they allowed risk taking to continue;**
- **If a Rigging Plan for the lift had been in place as required by site procedures, this would have required a suitably qualified and experienced safety person to review the lift in detail and approve the lift. This would most likely have caused the lift to be stopped as it was obviously unsafe;**
- **Personnel require to be trained and assessed as competent to operate each type of crane as they are all different.**



The automatic safety interlocks for the crane operation were immobilised at the key outside of the operators cab by the crane operator.







The crane operator had a history of overriding the crane limits and overloading the crane. Shown by computer records from the crane over 40 overloading incidents during October 2007



Organisational Factors	Task/Enviro Factors	Individual / Team Actions	Absent or Failed Defences	Incident
Crane operator was not trained or assessed to operate the crane	PTP filled out as a pro forma and not relevant to the lift	Crane safety interlocks bypassed and overridden by operator	Crane safety interlocks bypassed and overridden by operator	Crane rolled over onto side operator crushed and fatally injured.
Planning for the lift was inadequate	Personnel believed that the load was less than 10 tonnes	Personnel did not check the drawings to confirm the weight of the load	No Rigging Plan in place for the "A" frame lift	
JSA for the work generic and not specific for lifting operations	JSA inadequate for the work activity	JSA requirement for APS review of all Lifting Plans not complied with	JSA (risk assessment) for the work activity inadequate	
Lifting Plan procedure for crane lifts under 10 tonnes informal and inadequate	No Lifting Plan in place for the lift	Personnel failed to follow the project procedure and have the lift reviewed	No Lifting Plan in place for the lift	
Commitment from the contractor's leadership poor	Misunderstanding between MIP team	Supervisor knew weight of load but did not inform others	PTP inadequate, it was poorly completed for the lift not used by the crew	
The toleration of sub standard behaviour by the contractor's supervision	Operator had too much confidence in his ability	Personnel did not read or sign off the PTP for the lift		
	Over 40 bypass situations by operator during October 2007	Supervision had confidence in operator		
	Frame move seen as a secondary task	No communications or planning of the task with APS or Logos		

## SAMARCO SITES (1)

1. All Crane operators are to be formally assessed by a competent person in the operation of every crane prior to operating that crane on the site.
2. All Crane Operators, Riggers and others assisting in lifting operations are formally trained in the lifting procedures and practices for the project. This to include information regarding this incident.
3. Lifting Coordinators be appointed to the project to coordinate all lifting activities, mentor lifting personnel and ensure compliance to the lifting procedures.
4. The Lifting plan procedure for loads under ten tones be reviewed and made a formal procedure that requires sign off by an appointed Lifting Coordinator.
5. JSA's are developed by the work groups for specific activities such as craneage, lifting and slinging and there no longer be reliance on generic JSA's for the overall construction activity.
6. All personnel in the work group must take part in the development of all JSA'S (where possible), be educated in the JSA and sign on to the JSA before taking part in any activity covered by a JSA.
7. Site supervision be trained formally in the lifting procedures and practices to ensure lifting is managed adequately and all related work activities are correctly controlled. This to include legal responsibilities.
8. The requirement for a Rigging Plan is lowered from 10 tonnes to 5 tonnes.

## SAMARCO SITES (2)

9. All Rigging Plans and PTP's to be signed off by APS and Logos.
10. Fines to be imposed on contractors for non conformance to project procedures and practices.
11. Supervisor and Safety Technician involved in incident to be terminated from the project.
12. Daily planning meetings to be held between all contractors, APS and Logos.
13. A procedure to be developed for non conformance and sub standard behaviours.
14. All crane manuals to be written in Portuguese.

## ALL SITES

1. The computers in all site cranes (where fitted) have their data downloaded to investigate if the overloading of cranes is a general violation or restricted to this crane operator.
2. Emergency bypass controls are to be locked in the off position at all times.
3. Crane operators are to ensure that the all emergency bypass controls are locked in the off position at the Start of each shift.
4. Supervision is to inspect all emergency bypass controls during each shift to ensure they are locked in the off position.
5. Crane operational data from the onboard computer is to be downloaded each month to review the safe use and operation of the crane for the month.