

## 1 Introduction

10<sup>th</sup> of May 2005 a tragic accident happened in Drammen, Norway during dismantling of a crane. Two persons died (29 and 48 years) when the counter-weight on the crane fell to the ground. This report gives a brief overview and experience learned from this accident. The report does not cover the way of work and procedures involved in the dismantling of the crane, it only covers the fall protection matters.

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## 2 The accident

The accident happened when the counter weight beam (back-bridge) on the top of the crane should be removed. This came out of control and fell freely 40 metres to the ground, together with one of the workers. This worker was wearing a full body harness, but was not connected to any anchor. The back-bridge that fell, had a weight of 5 to 6 tons.

The other worker was working from a small platform with rails, which is a part of the crane construction. He was protected by a full body harness and lanyard connected to the hand rail of the platform. The lanyard did not have any kind of fall absorption and it was knotted onto the rail. The other end of the lanyard was connected to the harness back attachment.

The construction that fell was integrated with the platform the worker was working from, and in the fall the weight of the back bridge bent the platform construction 90 degrees before they came apart (shown on the picture to the right with arrow towards the platform). The worker fell out of the platform, and it is estimated that he got a free fall (partly reduced by the friction in the bending construction) of between 8 and 10 metres including the length of his lanyard. He was then arrested by the harness, but without any shock absorption. It is not clear if he also collided with the main crane construction.



### 3 Medical observations

The worker was alive after the fall, and could be observed moving. He died in the ambulance about one hour after the fall. It was suspicion that he died from Suspension trauma, and the Police ordered full autopsy. The doctor that was responsible for the autopsy gave the following conclusion to the cause of death:

1. In addition to leg straps and shoulder straps, the harness had a waist strap. In the arrest by the back attachment, a very high force was taken by the waist strap which was pressed upon the bottom of the ribs (diafragma).
2. The force from the waist strap crushed the liver with a lethal injury.
3. The continued press from the waist strap did however compress the liver and limited bleedings. When the person was released from the harness, serious internally bleedings started.
4. The injury was lethal, and the person could probably not have been saved.

### 4 The rescue

No rescue plan or equipment was available at the site. A rescue team from the Fire Department was quickly on site, but did not have long enough ladders to reach the person directly. The Police feared that the whole crane could fall down over neighbouring houses without the counter weight, and did not allow any rescue to be started in the crane before it was stabilized. This was done by a secondary crane, and in total the person was suspended in his harness for 25 minutes.

During the rescue the person was lowered inside the crane for about 10 metres, and then taken onto the ladder on the fire engine. He was transported horizontally on a stretcher, from where he was picked up by the ladder.



### 5 Observations

1. The 48 year old would probably not have been saved by attachment to the construction, as he fell together with the construction that would be the natural anchor. This should however not be a reason for choosing not to use fall protection equipment correct, because this would save falls by the person alone.
2. The lack of shock absorber was a serious mistake, and probably cause of the fatal injury to the 29 year old.
3. CEN should investigate full body harnesses with back attachment and waist strap. It is important to find out if the force on the body by the waist strap, during the arrest of falls by the back attachment is acceptable. This is not taken into account by free fall tests on a dummy.
4. A rescue plan including necessary equipment and trained personnel should have been made, but would not have saved the persons involved in this accident.
5. Although Suspension trauma was not the cause of death in this situation, it demonstrates that rescue personnel is not aware of this risk and transports the person horizontally. This was a classic situation where Suspension trauma could occur, and rescue personnel should be trained in correct rescue of persons suspended in a harness.