



CORONERS COURT OF QUEENSLAND

FINDINGS OF INVESTIGATION

CITATION: **Non-inquest findings into the death of Alan Macklin Shaw**

TITLE OF COURT: Coroners Court

JURISDICTION: BRISBANE

DATE: 20/10/2022

FILE NO(s): 2020/3917

FINDINGS OF: Christine Clements, Brisbane Coroner

CATCHWORDS: CORONERS: Roller door failure, design fault, multi residential premises.

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Introduction

Alan Macklin Shaw lived in an apartment with his wife Beverley Currie-Shaw at Princess Edward Parade, Redcliffe in Queensland.

Alan was aged 86 years and in good health and he was generally fit.

On 7th September 2020 Mr Shaw sustained serious injury when he attempted to manoeuvre a large four wheeled bin back into the garage area. The garage had a remote-controlled roller door which suddenly fell in an uncontrolled manner knocking Mr Shaw over and he fell to the ground, unconscious. He was discovered and transferred to the Royal Brisbane and Women's Hospital. Despite treatment he did not survive and died on 11 September 2020.

Cause of death

Mr Shaw's death was initially reported by the hospital to the coronial registrar. The circumstances of his injury were outlined. It was noted Mr Shaw had ischaemic heart disease with previous stenting. His other medical history included hypertension and dyslipidaemia.

He was unconscious when admitted to the Royal Brisbane and Women's Hospital. A large scalp laceration was stapled and he was treated to stabilise his condition. CT imaging showed a large subdural haemorrhage with midline shift of the brain.

Neurosurgical opinion was sought and it was confirmed that Mr Shaw's injury was not survivable. It was also noted that he had background of dual antiplatelet therapy. In all the circumstances and after consultation with his wife the decision was reached for palliative care until the time of his death on 11 September 2020.

In these background circumstances the hospital was able to provide a cause of death certificate which was authorised by the coroner. The cause of death was traumatic subdural haemorrhage. Other significant conditions contributing to his death were identified as hypertension and dyslipidaemia.

Investigation

Police investigated the circumstances of the incident leading to Mr Shaw's injury and death. CCTV security footage operating at the address had recorded the incident. The recording is taken from the outside of the building showing the full width of the double garage roller door. The roller door commences opening and Mr Shaw is seen at one end of the roller door, closest to the camera position, as he ducks his head as it opens and he exits outside. He walks towards the four wheeled general waste rubbish bin which is on the grass verge at the lefthand side of the camera vision. The bin is on a grassed area closer to the building than the concrete footpath. He disappears beyond the scope of the camera. It is evident that the bin has been left on its side and Mr Shaw lifts it into an upright position. He is then facing the building with the bin in front of him, with the open lid on the side opposite to his position. He retrieves the bin, with one hand on a handle on the corner, pivoting it around. As he turns, he is then facing the building he sees the roller door has automatically already commenced to close the garage entry as it descends.

He continues towards the descending roller door with the bin at an approximate 45-degree angle to the door, leading with one corner of the bin. The leading wheel is momentarily slowed as it crosses a brick surface edging on the garage entry. He just manages to propel the front corner of the bin into the garage as the door descends and contacts the top flat edge of the bin.

The roller door cannot continue to the ground. Mr Shaw has nothing in his hands, which are on the bin as he pushes/ jiggles the bin under the door. It appears the bottom rails are being compressed and then the door commences to move upwards. Mr Shaw cannot see inside the garage. As soon as the door starts to go up, Mr Shaw pushes the bin ahead of him, still at an angle to the entry while the door is lifting. The bin is then rotated so that it is "square" to the roller door entry. He changes hands so that the bin is now on his lefthand side with his left hand on the handle on the side of the bin as he steps under the roller door. By this time he has moved ahead of the bin and he is directly beneath the roller door, which suddenly falls down in an uncontrolled manner. The roller door can be seen outside the guide restriction rail. It appears that the door has hit him on the head, which knocks him and he falls backwards to the ground. The camera shows part of Mr Shaw. The roller door has stopped its descent as it contacted at right angles across the top of the bin. The roller door can be seen to be still vibrating and flapping and it is evident it is out of its proper position restricting the descent in a set pathway.

Mr Shaw was discovered and taken to hospital.

Police obtained a statement from Timothy Henry, a representative from the body corporate committee for the Amity apartment complex. There are 16 units in the group. Mr Henry stated to his knowledge the roller shutter has worked without incident or any mechanical issues. He stated the roller shutter was installed and manufactured by Steel-Line Garage Door Company. He was aware the roller shutter had not been serviced. He said it was supposed to be serviced annually at the cost of the Body Corporate Committee.

Since February 2019 at least one service of the roller shutter should have been completed.

He explained the roller shutter is controlled by tenants manually using a fob device. The fob can activate the door to raise it from either inside or outside the garage. The lowering of the roller shutter is based on a timer. He was unaware of the actual time. There is a sensor beam located on the inside of the shutter tracks, set back a few centimetres, which is positioned at vehicle wheel height. There is a sensor on each side designed to trigger if an object hits the beam. This design immediately stops the door descending for safety reasons.

Mr Henry said tenants mainly use the roller shutter for vehicular traffic but people do sometimes use the roller shutter to exit and enter the ground level car park to take the complex's rubbish bins in and out every Monday and Tuesday. He knew Mr Alan Shaw and his wife who were residents in the complex. He described Mr Shaw as an active, social and healthy man who volunteered several tasks within the complex from gardening to general helping. This included taking the complex rubbish bin inside after it had been emptied.

The large general waste bin is stored in a purpose built area of the ground level car park under a rubbish chute. Mr Henry stated whoever takes the bin out and in, would activate the roller shutter by using their personal issue fob. There is no button inside the garage within reach to activate the roller shutter. The manual release button is not readily accessible. It is at the top of the door control box requiring a stepladder to reach it, or a chain, also at height, which would need to be pulled.

Mr Henry arranged for the retrieval of the CCTV footage on 7 September 2020 after he was informed of the incident. He arranged attendance of a local garage door company to attend on 8 September to disable and render safe the roller shutter. The side tracks had to be removed and then the roller shutter was fed back into the tracks, and then manually lowered to the ground and then manually raised back to the top. The shutter was then secured in an open position and the power was isolated.

Mr Henry liaised with the police investigation and assisted as required.

Re-enactment

Sergeant Spencer from the Redcliffe Police Station led the investigation. On 24 September 2020 the roller door shutter was tested by employees from Steel- Line, with police in attendance, recording the exercise. The roller shutter was examined and a reenactment occurred after inspection. The roller door was undamaged by the events and was placed back into operational condition without any mechanical work required.

In the course of setting it up to operate again, the technician referred to the roller “had flipped over” and was therefore not operating within its pre-set range.

Once the range of movement of the roller door was re-set, the exercise of reenactment occurred, and the roller shutter was tested and deemed safe and operational. No operational issues or faults were identified during the testing. It was identified that the roller shutter was operating and functioning in the same manner at the time when Mr Shaw was struck. The technician and engineer in attendance at the reenactment determined the roller shutter was operating correctly as per the manufacturer's guidelines and standards. No faults were identified in the mechanical or electrical operation.

In reviewing the CCTV footage (prior to the reenactment) it looked like the roller door hit the corner of the bin before the safety beam was activated, so the drum powered by the motor was continuing to drive the door down. This led to the over spilling of the door being driven by the motor. If the safety beam was interrupted, the door stops and ascends. The pre-set timer then restarts.

The safety beam is set at car tyre level.

When a remote fob is activated to raise the door, it stays up for the pre-set time of 20 seconds, and then descends. If interrupted by the sensor trigger again, the engine will stop and commence the 20 second timer again before it restarts. (It was noted that the timing on the day established it was 20 seconds, not 15 seconds, as expressed by the technician.)

The reenactment showed when the descending door comes to the bin obstruction **above** the level of the sensor, it is physically halted but the engine continued to operate, turning the remaining roll of the door around and around in looser rolls inside the garage. This then “spools” in an uncontrolled manner. The sensor beam was then triggered and the door lifts open but the roller door crashes down in an uncontrolled manner a sit flips over. It did not remain “up” for 20 seconds.

It was established the door was operating as designed. The door is driven by the motor to pre-set positions, then after a pre- set period (20 seconds), the door is driven down. This happens unless the trigger is activated by interruption of the sensor.

When the bin was tested in the position underneath the roller door it stopped the door physically. But the safety beam was not triggered, (because the bin was not far enough inside to trigger the offset beam. Therefore there was nothing telling the motor to stop. The motor continues to drive the turning shaft for 6-7 seconds. During this period the door “bags” off the drum.

Then on the way back up, this bagging flips over at the top and comes out of the side metal track which is designed to constrain the pathway of the roller door.

When asked by police whether there was any other way this uncontrolled descent could occur, the technician said he has seen instances involving a trailer not triggering the sensor and it comes down and flips over.

The technician expressed the view Mr Shaw's actions had contributed to what had occurred.

It was the bin itself, when pushed in further by Mr Shaw, triggered the sensor and raised the door.

The re-enactment demonstrated what had occurred.

It was noted that the remote is a "slave" device which cannot override the setting on the door. The remote is the switch activating the raising of the door, which then operates in a set range.

Concerns expressed

Mr Shaw's wife, Beverley expressed her concerns, particularly that the investigation and review was not independent of the roller door manufacturers. She provided commentary and advice from a retired engineer about the necessity of independence in any review to understand the root cause of the incident occurring and the risk of recurrence, as demonstrated in the re-enactment. This included Australian and New Zealand standards for the maximum forces that can be applied to the obstructing object. The duration of the maximum force must not exceed 2 seconds.

Further coronial investigation

The coronial investigation considered it was necessary to seek an independent examination of the circumstances, particularly as replication of the incident revealed exactly how such an incident could occur again. The coronial process is aimed to establish facts leading to a death occurring and considering public safety to reduce the risk of recurrence of such an incident.

In the reenactment itself the technician who installs and services these roller doors identified the limitations of the system and the parameters of the design. He could recall another instance when the sensor has not been triggered despite passage through the doorway with a similar problem of pre-set automatic activation of the door's ascent and descent.

Independent review

Independent expert opinion was obtained from Dr P C Carnavas, Forensic Engineering Consulting Pty Ltd. He was provided with all the information as detailed in his report.

Dr Carnavas analysed and documented with timing exactly what occurred, as recorded by the CCTV footage. He identified the components involved and the dimensions and the position of the sensor which was about 500mm above the ground and 50-100mm inside the door opening.

He described the normal operation of the roller door, operated by remote control, running between two guide channels located on each side of the door opening. The closing edge of the door remained between the guide channels at all times during normal operation. Door movement is between upper and lower limits set on the controller at installation by programming. Once fully open the door would remain in that position for 20 seconds before it begins to close automatically.

If at any time the sensor beam was interrupted, the door would begin to open and once fully open;

- would remain in the fully open position if the sensor beam continued to be interrupted
- would begin to close after a delay of 20 seconds once any obstruction had cleared the sensor beam.

Dr Carnavas agreed the reenactment between stated times was very similar to the actual incident. The view from inside the garage provide additional information about the door behaviour.

Dr Carnavas analysis identified a design flaw when the roller door hit the bin but was not detected by the sensor beam.

An object in the path of the door should be detected and any significant door contact avoided.

This occurred because the sensor was offset towards the inside of the door and the bin was not sufficiently inside the door to disrupt the sensor. If the sensor beam had been in line with the door opening it would have been disrupted, and the door would have opened "normally" boat once the bend had been detected.

Vision from inside the garage showed the continued rotation of the door shaft driving the door downwards, however because its lower edge is blocked by the bin beneath, the door unspooled from the shaft with a portion of the door hanging down from the shaft (or bagging).

This is a designed flaw. The drive unit should have stopped or the door opened before any significant "bagging" occurred.

Dr Carnavas assumed that Mr Shaw pushed/rotated the bin underneath the door. This movement positioned the bin sufficiently inside the door opening to disrupt the sensor beam, causing the driver unit to begin opening the door. In the reenactment a third party disrupted the sensor to cause the door to commence opening.

The vision obtained from inside the garage confirmed the unspooling of the door from the shaft and how significant this was. A significant portion of the door had already spooled from the door shaft earlier and further shaft rotation during opening led to further unspooling. The upward movement of the lower edge of the door gave the impression that it was opening normally, but the overhanging weight of the portion of the door was pulling the lower portion of the door upwards in an uncontrolled manner.

Meanwhile Mr Shaw walked under the roller door. A portion of the roller door unspooled and dropped onto him. The lower portion of the door had been pulled up out of the guide channels by the weight of the unspooled portion of the door hanging down from the shaft. The lower portion of the door then flipped over the door shaft and fell down onto Mr Shaw.

Dr Carnavas confirmed the door ran out of its guide channels and fell in an uncontrolled manner onto Mr Shaw. This was abnormal behaviour due to inappropriate design. Appropriately designed roller shutter doors should only operate within its guide channels and in a controlled manner. The underlying design flaws identified are:

- (i) The sensor arrangement was in adequate and unable to detect an obstruction in the path of the door
- (ii) Despite an obstruction in the path of the door, the drive unit continued to operate to try to close the door.

Dr Carnavas disagreed that the behaviour of the door during the reenactment was "typical" and "normal operation". A roller shutter door is designed to operate within the established opening and closing limits set during installation. The door motion within the set limits should always be controlled and not pose any risk of injury. Normal operation only includes the controlled movement of the door. What occurred in this incident was not the normal operation of the door—it had been pulled out from between its guide channels and fell in an uncontrolled manner.

Dr Carnavas stated the operation of the door at the time of the incident was able to be

reproduced during the enactment because the design flaws were inherent in the door system and the triggering events identified in the CCTV footage could be easily replicated.

Significantly, the expert was asked what design modifications should be implemented to prevent this from occurring.

Dr Carnavas set out the 3 steps leading to Mr Shaw being struck by the door.

- (i) The sensor failed to detect an object in the path of the closing door.
- (ii) The door continued to try to close despite the presence of the object. This resulted in a portion of the door unspooling from the shaft.
- (iii) The object was detected and the door began to open. This caused a larger portion of the door to unspool from the shaft, the closing edge of the door to be pulled out of the guide channels and a portion of the door falling down in an uncontrolled manner, striking Mr Shaw.

The incident would not have occurred in any of these steps had not happened.

Finally, Dr Carnavas provided design modifications to prevent recurrence of such an incident.

Modification A

Changing the existing sensor so that it would have detected the bin in the direct path of the closing door.

If the sensor had been positioned in line with the door path (rather than offset to the door path) the bin would have been detected.

However, a single beam sensor can be defeated by an object of unexpected size or shape. Therefore this modification may have prevented the incident but may not prevent other similar incidents from occurring when other objects are involved.

Modification B

Installation of a "light curtain" type sensor instead of the single beam sensor.

A light curtain provides multiple detection beams with more extensive coverage. A light curtain option compatible with the drive unit and control was available at the time of installation. It can be installed within the door guide channels or immediately on either side. It is more expensive but improves safety significantly:

- (i) It generates multiple beams across the height range providing more rigorous detection of unexpected objects than a single beam at a fixed height
- (ii) A light curtain can typically be installed within or on both sides of the guide channels ensuring its detection area includes the door closing path, which is the area of highest risk.

Modification C

Prevention of door movement outside of the guide channels.

Dr Carnavas stated this alternative was less straight forward. An example is a sensing device on the guide channels informing the control about the position of the door closing edge, so that the control can stop the door movement before the door or closing edge moves out of the guide channels. A secondary mechanical safety device may be necessary to achieve the desired effect ceasing door shaft rotation.

Dr Carnavas preferred recommendation B, for modification via a light curtain type sensor installation. This is sufficient if the door behaviour remains controlled at all times within its set limits.

However, if uncontrolled door behaviour could occur leading to door unspooling, the preferred

modification is a combination of modification 'B', the sensor curtain, together with modification "C", prevention of door movement outside of the guide channels.

Ideally, when designing the appropriate combination of door drive unit and control, the door dimensions, weight, site details and other variants have been determined and considered, including what would be expected to pass through the door opening. This should include the highest risk candidates, for example a small child, and should not be limited by the most common object, such as a car leaving the car park. The sensor should be chosen to prevent injury or damage in any possible circumstances.

I accept the analysis, conclusion and preferred design in Dr Carnavas' review.

The findings will be distributed to increase the knowledge of potential risks of roller doors, and the issues to consider when managing and reducing the risk.

In conclusion the coroner accepts there were two design flaws in the roller door arrangement at the Amity apartment which allowed the incident to occur.

The roller door system did not detect an object directly in the path of the door.

The door shaft driver continued rotation of the door downwards, after its lower edge had been blocked. The door unspooled from the shaft with a portion hanging down from the shaft.

Conclusions

Findings required by s.45

Identity of the deceased –	Alan Macklin Shaw
How he died –	Mr Shaw sustained serious injury when he attempted to manoeuvre a large 4 wheeled bin back into the garage area. The garage had a remote-controlled roller door which suddenly fell in an uncontrolled manner knocking Mr Shaw over and he fell to the ground, unconscious.
Place of death –	Royal Brisbane and Women's Hospital HERSTON QLD 4006 AUSTRALIA
Date of death–	11/09/2020
Cause of death-	1(a) Traumatic Subdural Haemorrhage 2 Hypertension, Dyslipidaemia

I close the investigations.

Christine Clements
Brisbane Coroner