

Incident Summary (Reference #5615856) (Final)

SUPPORTING INFORMATION	Incident Date		April 21, 2017	
	Location		Surrey	
	Regulated industry sector		Elevating Device- Construction Hoist	
	Impact	Injury	Qty injuries	0
			Injury description	0
			Injury rating	N/A
	Damage	Damage description	Construction Hoist governor brake device sustained significant internal damage.	
		Damage rating	Minor	
Incident rating		Minor		
Incident overview		Construction hoist (construction elevator) governor safety brake malfunctioned causing internal governor brake damage. The governor brake stopped the elevator. Passengers self evacuated at the floor that the elevator stopped at.		
INVESTIGATION CONCLUSIONS	Site, system and components		Construction hoists are temporarily installed elevators used to move construction workers and materials to floors of buildings under construction. The construction hoist governor is designed to apply an internal brake and stop a construction hoist in the event of a construction hoist malfunction causing the device to move at higher than normal operating speed (over speed down).	
	Failure scenario(s)		An internal drilled part of the construction hoist governor safety brake broke. The part may have been free in the unit for some time. The part became lodged in the internal moving mechanism and caused damage to the governor’s moving parts. The governor jammed and stopped the elevator.	
	Facts and evidence		<p>Operator statement:</p> <ul style="list-style-type: none">“ Governor was making noise for several months”“ had a car full of people, governor failed and stopped the car close enough to a floor that everyone could get out.”The operator stated that the governor noise had been reported to duty holder maintenance on several occasions. <p>On-site investigation:</p> <ul style="list-style-type: none">Governor removed and brought to owner workshop.Engineer and SO witnessed governor dismantlingVisually confirmed the presence of a broken piece of internal mechanism flat bar.Observed significant damage to internal components.(see attached photos) <p>Engineer Report:</p> <ul style="list-style-type: none">Units are to be replaced after 5 years. This unit failed in 3 years and 5 months.The backing bar in the failed unit, cracked and eventually failed. Cracking initiated in the drilled hole closest to the free end of the trigger plate and the backing bar. Once the failed section of the backing bar fell into the rotating machinery, it was severely deformed on a number of occasions.Due to the size of this piece of hardened steel, it could lodge in positions where it was not interfering with the rotating components. The appearance of the battered piece indicates numerous adventures among the heavy rotating parts over some period of time inside the over speed device.	

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		<ul style="list-style-type: none"> The final abrupt failure for the over speed device unit occurred when the hardened piece of steel moved into a position where it could not fit and failed the unit. We have examined all the components removed from the site visually with a binocular microscope. We found that the backing bar was cracked prior to eventual fracture. There is evidence of fatigue crack growth prior to fracture. We found no evidence of material defect.
	Causes and contributing factors	<p>It is highly likely that a flawed part (from manufacture) inside the governor broke and became lodged in the internal moving mechanism causing internal mechanism damage. It is likely that the broken part had been moving about the internal mechanism without causing failure for some time.</p> <p>The duty holder not removing the device from service after reports of unusual device noise may have contributed to the event.</p>

Photos



Fig. 1 Failed Over Speed Device SAJ60 on right, identical new unit on left.

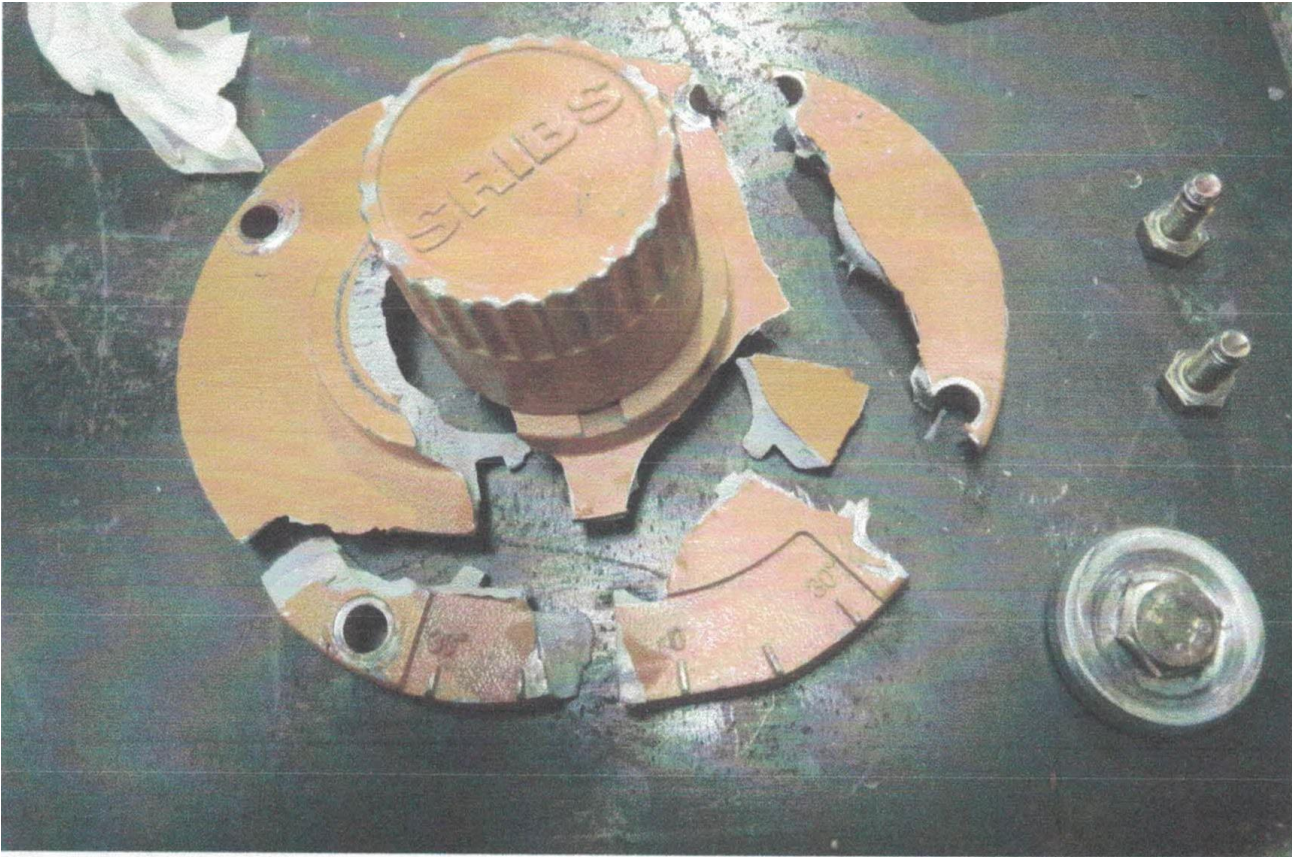


Fig 4 Top failed aluminum casting pieces, heavy steel washer deformed with failed bolt sitting in washer.

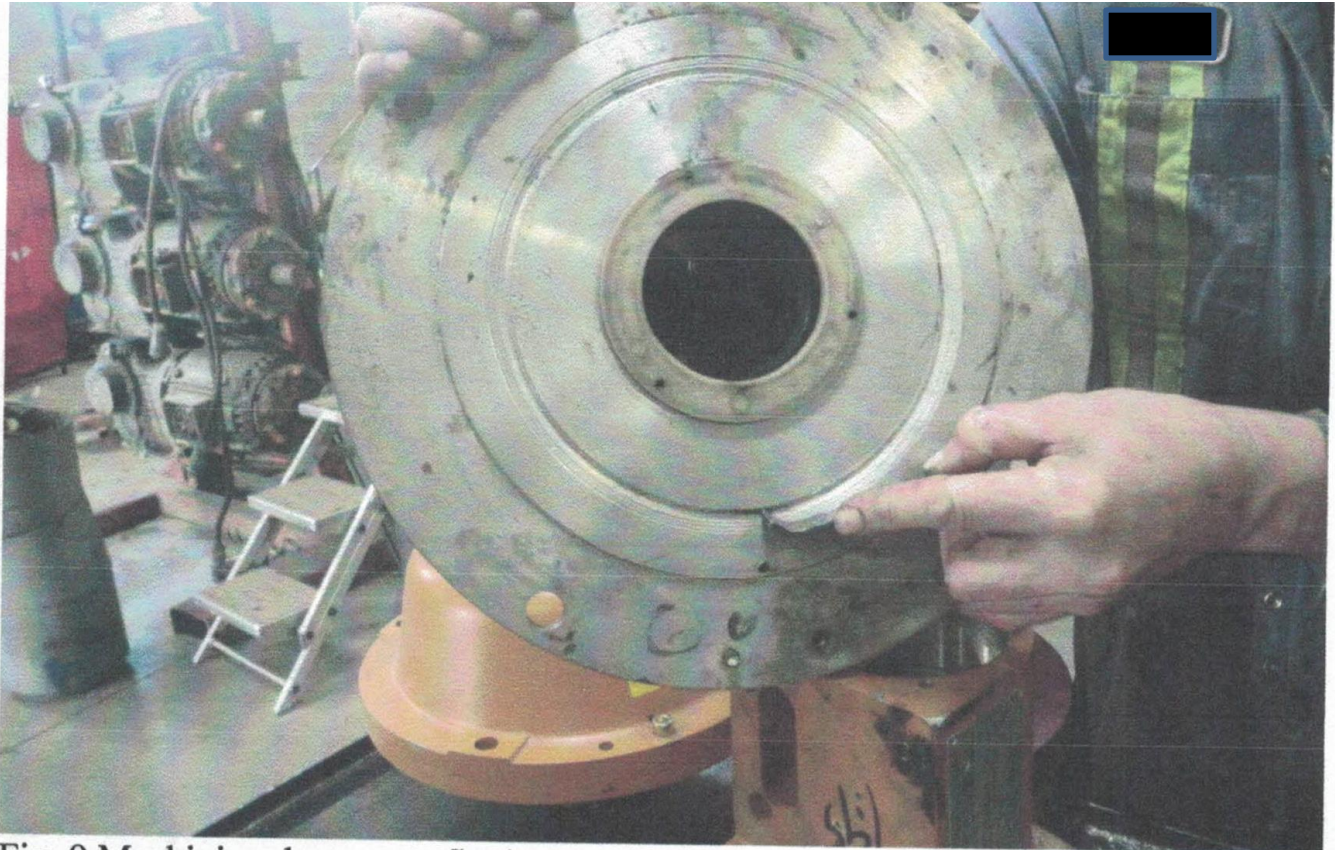


Fig. 9 Machining damage to flat bottom plate by jamming of steel backing plate inside the rotating components. See Fig 7 for aluminum shavings.

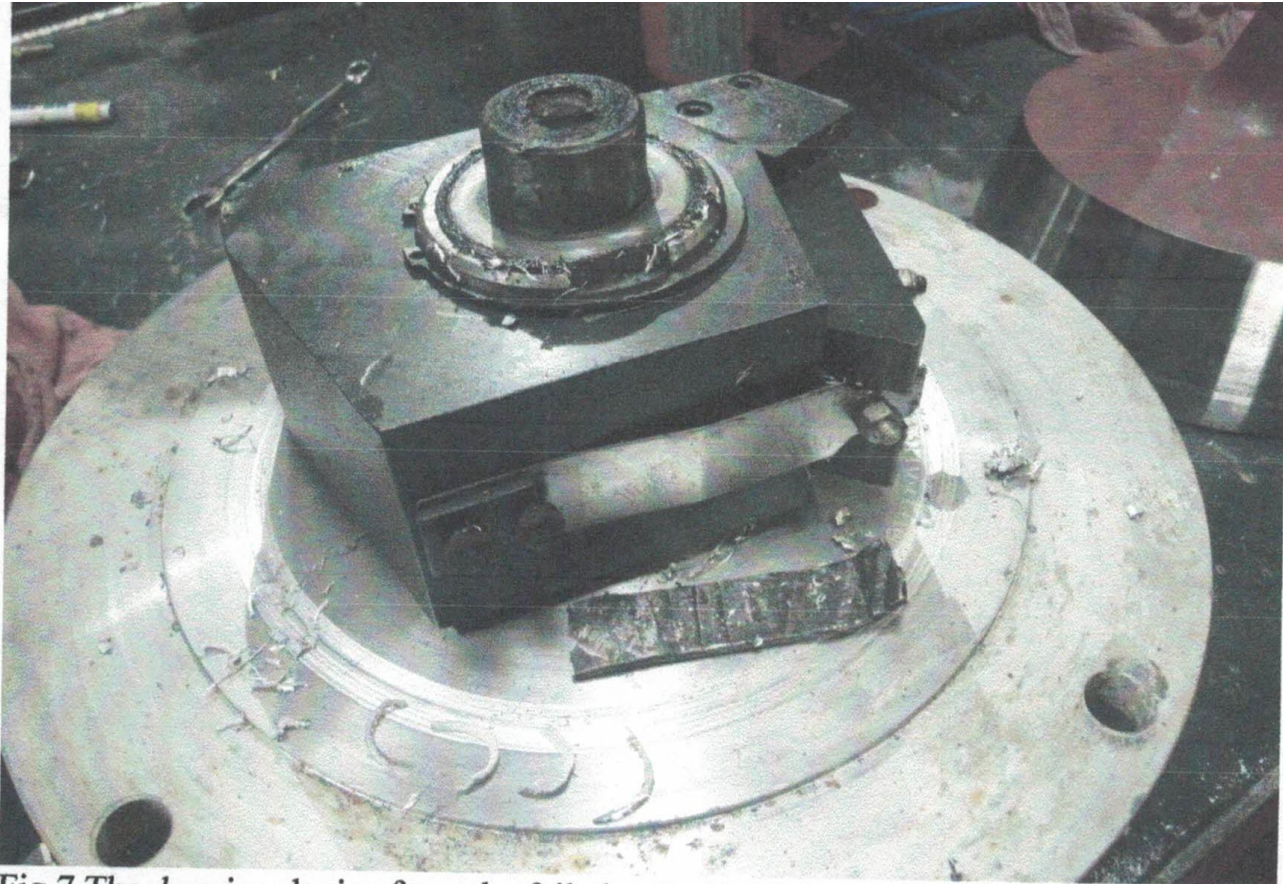


Fig 7 The dogging device from the failed unit. Note thin stainless steel adjustable trigger plate and badly damaged backing bar that failed.

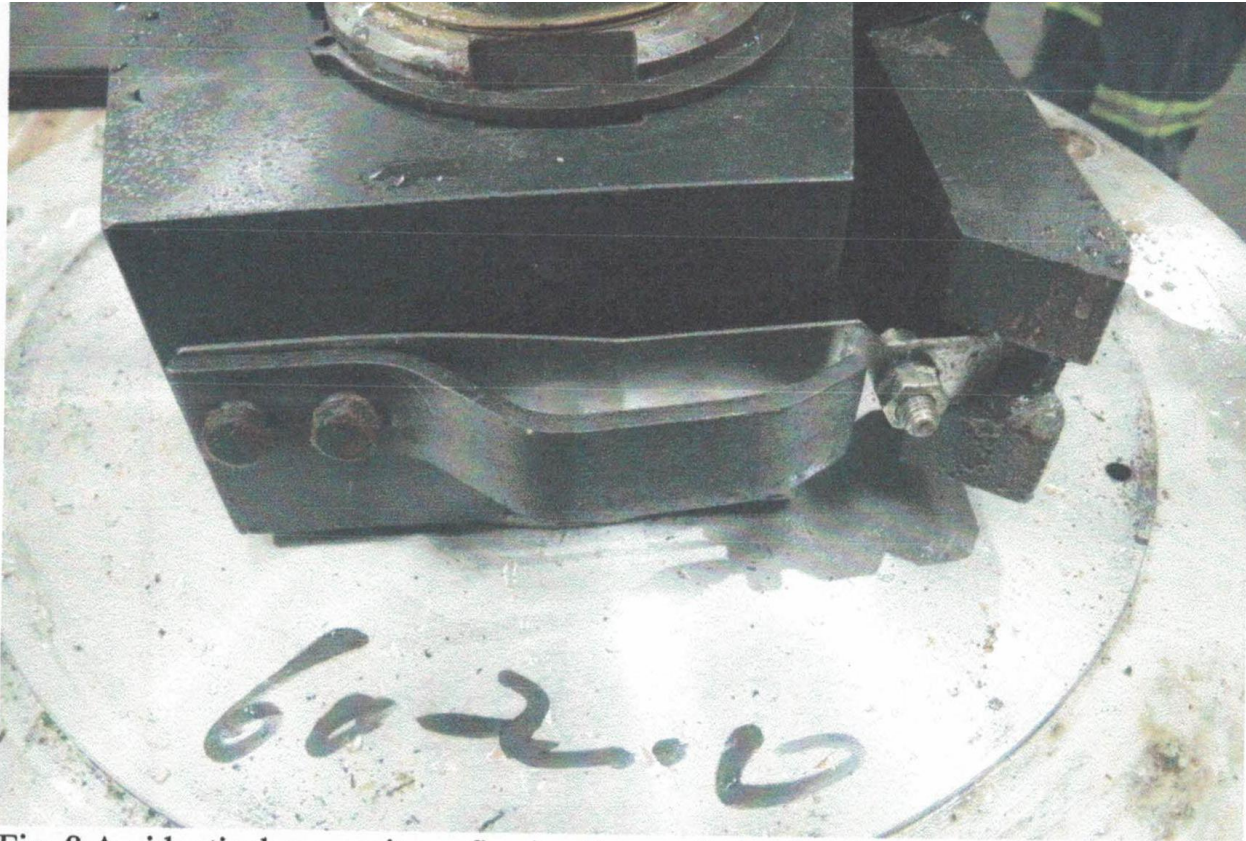


Fig. 8 An identical new unit confirming the configuration for the stainless steel adjustable trigger plate and carbon steel backing bar.

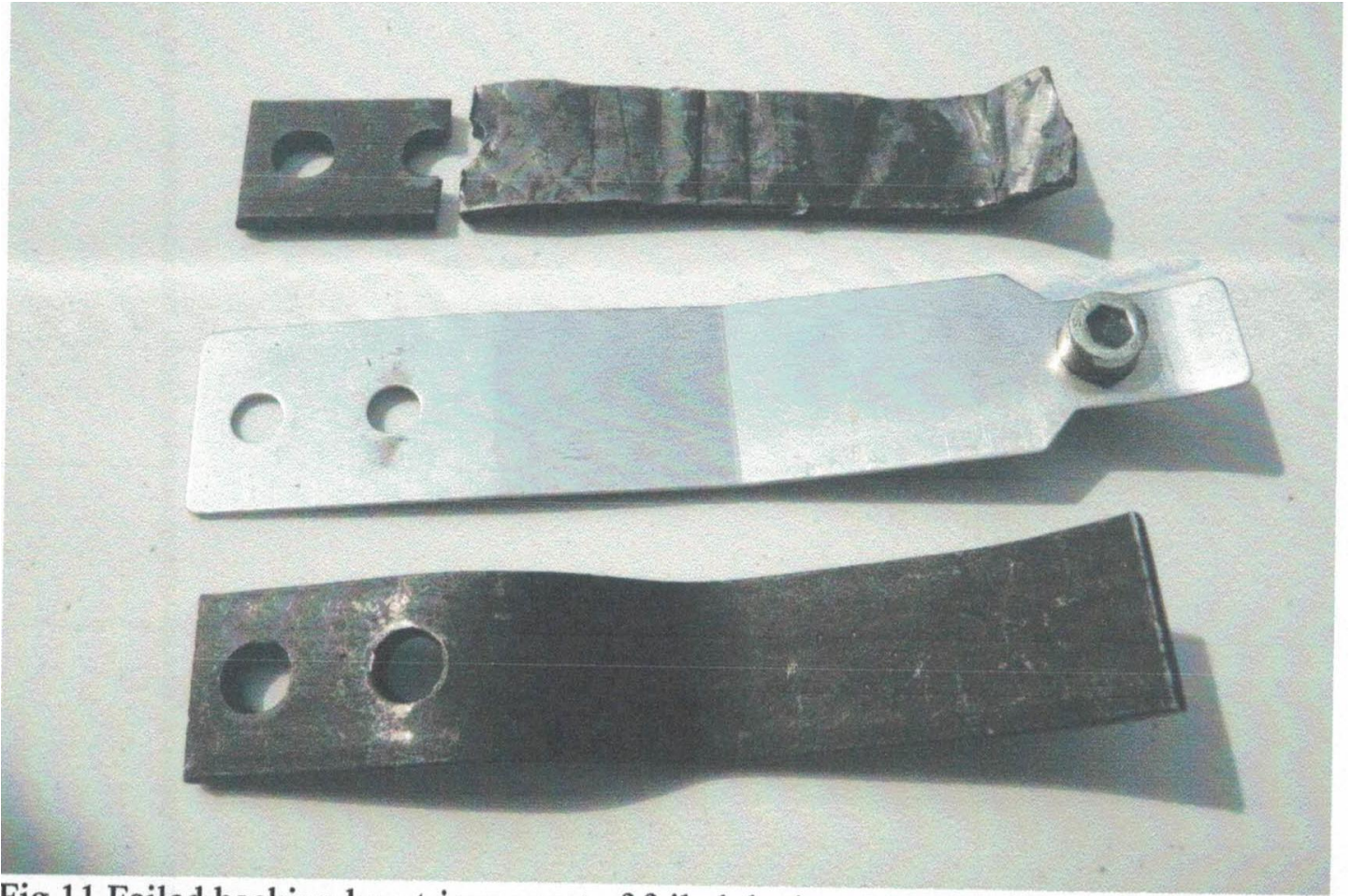


Fig 11 Failed backing bar, trigger part of failed device. New backing bar at bottom.