Incident Summary (Reference # 5620638) Final

SUPPORTING INFORMATION	Incident Date			*June 30, 2017*
	Location			*Vancouver*
	Regulated industry sector			*Escalator*
	Impact	Injury	Qty injuries	*1*
			Injury description	*Unknown*
			Injury rating	*Insignificant*
		Damage	Damage description	*No damage to equipment*
			Damage rating	*None*
	Incident rating			*Insignificant*
	Incident overview			*The escalator in question was removed from service by an attendant after noticing a burning smell coming from the escalator. After the unit was removed from service, passengers exiting the station continued to use the escalator as a means of egress. At some point enough people were occupying the escalator stairs at one time to overcome the holding force of the escalator brakes. The escalator began to move in the down direction causing people to fall at the bottom of the escalator.*
INVESTIGATION CONCLUSIONS	Site, system and components			*When power is removed from the escalator, the escalator brakes are designed to hold the escalator stationary under load when properly adjusted and maintained. Escalator brakes have a brake wear switch that monitors the proper adjustment of the brake and minimum brake pad thickness. The brake wear switch is designed to shut down the escalator if the brake pad wear is beyond the wear range and or the brake force is out of adjustment.*
	Failure scenario(s)			*Maintenance personnel had recently replaced brake pads and a brake actuating coil. After the brake maintenance, the escalator was shutting down intermittently by the brake wear switch. Maintenance personnel made adjustments to the brake force spring thus affecting braking torque force to stop the brake wear switch from actuating. The escalator brake linings were able to drag on the brake drum causing wear and a burning smell. The brake wear switch was not adjusted properly to sense this. The escalator was shut down, The escalator brake linings were beyond the wear limit and the escalator brake torque setting was not sufficient to hold the combined weight of the passengers on the steps of the stationary escalator. The passenger weight was sufficient enough to overcome the braking force of the escalator brake and the escalator began to move in the downward direction. (see photo)*
	Facts and evidence			**Statement was provided by the contractor**: • On June 7, 2017 Maintenance personnel performed brake maintenance on this escalator. The brake shoes were replaced along with the brake actuating coil. • During the time between when the brakes and coil was replaced and the incident, adjustments were made to the brake wear switch (monitors the brake wear) due to the switch was being activated on several occasions. This switch when activate would remove power from the escalator and cause the unit to stop. • A mechanic was sent to the unit to resolve the nuisance stopping issue. The mechanic made an adjustment (loosened the brake tension spring) to the brake spring tension without retesting the brake torque settings to ensure the adjustment was within manufacturer's specifications. **On-site investigation findings:**

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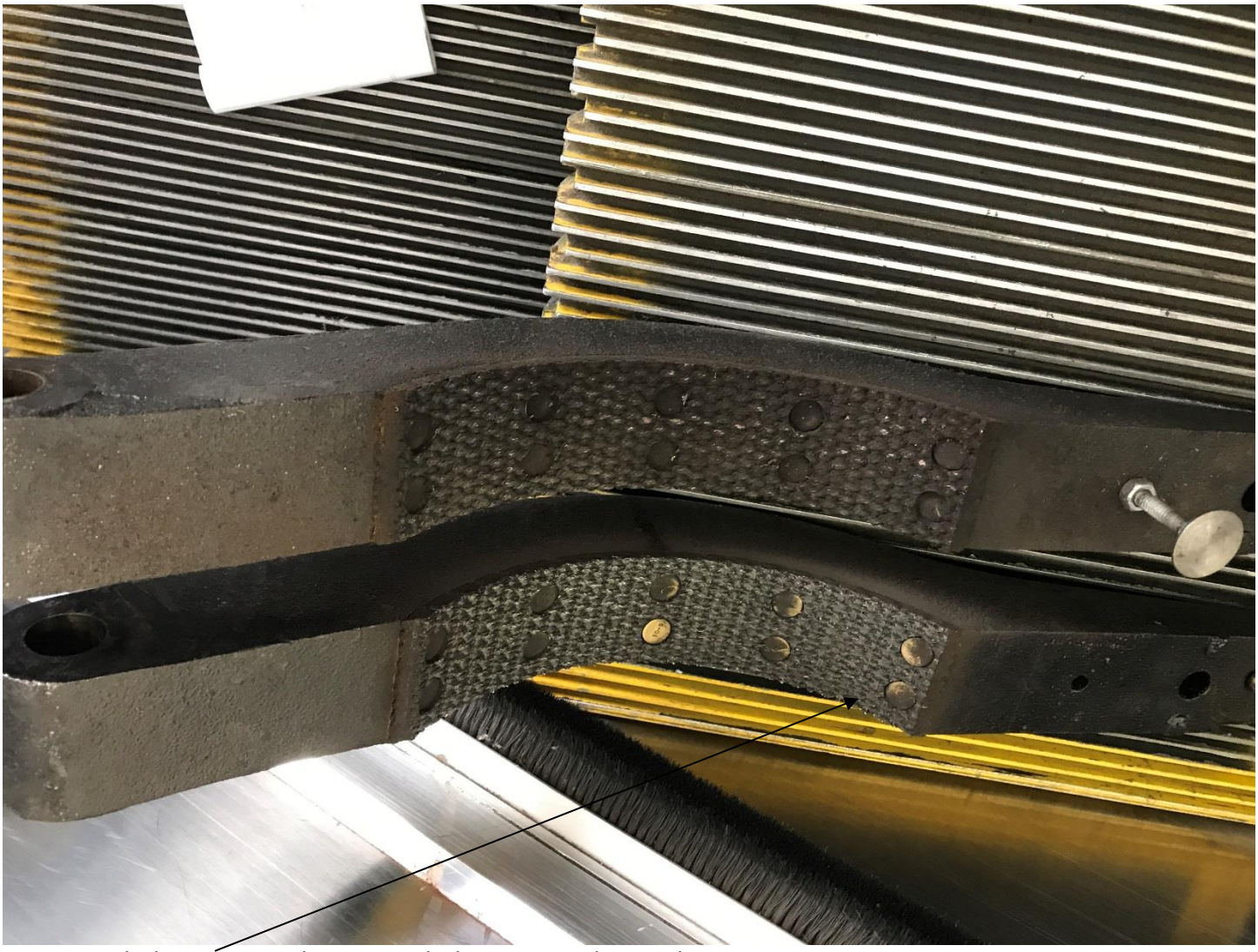
		• Brake spring tension measurement did not meet manufacturer's specifications. • The brake linings was very close to being worn out (see photo & see comment in failure scenario above). • The brake pads were not wearing evenly.
	Causes and contributing factors	It is highly likely that the adjustments to the brake caused a reduction in braking force. The combined weight of the passengers overcame the escalator brake holding force. Uneven brake pad contact likely contributed to the incident.

Photos or diagrams (if necessary)



Brake linings unevenly worn. Brake linings worn down to lining retaining rivets.