Data Summary: Salient Wheel Impact

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Synopsis

Purpose

The purpose of the Salient Wheel Impact Data Summary is to allow car owners to view summarized performance measurements on their fleets. When not monitored, high impact wheels can escalate, causing additional wear to tracks and, combined with thin rims, can lead to some wheel breakages.

Background

Salient is one of several vendors that manufacture wayside wheel impact load detectors (WILD). These detectors measure vertical forces imparted by wheels on the rails. Vertical forces above nominal are typically due to wheel out-of-round (OOR) conditions. As the OOR section of the wheel rolls over the rail, it produces a higher impact force. WILD detectors report the forces in KIPS units. Any wheel measure at 90 or greater KIPS is considered condemnable.

Data Summary Elements

	Element Name	Element Text	Element Description	Format	Aggregation Method	Action
HEADER	Type	Type		TEXT		
	Format Version	Format Version	Version of the format used to create the Data Summary	NUMBER [1.0-999.99]		
	CreationTMST	Date opened	GMT timestamp for when the data summary was created and the time zone offset of the originating data location.	TIMESTAMP	Earliest	Update when data summary created

	RR_DB_Key	Key from originating railroad	Database key from the originating railroad (or detector owner)	NUMBER [0 -999999999]		
	LastUpdateTMST	Date of last update	GMT timestamp for when the data summary was last updated (any change other than closing) and the time zone offset of the originating data location.	TIMESTAMP	Latest	Update every time data summary is updated
	DSType	Type of Data Summary	Data summary type	TEXT		
	DS_Owner/Reporting_System	Who created the Data	Company ID (from Railinc) of	TEXT		

		Summary	the owner/creator of data summary			
	EquipmentMark	Equipment Mark	Current equipment initial	TEXT		
	EquipmentNumber	Equipment Number	Current equipment number	NUMBER [0 - 9999999999]		
	Location	Location	Location of the component			
	ComponentType	Component type	WHEEL	TEXT		
	ComponentName	Part of the component location	AXLE	TEXT		
	ComponentValue	Value for the component location		NUMBER [00-26]		
	ComponentName	Part of the component	SIDE	TEXT		

		location				
	ComponentValue	Value for the component location		TEXT [L|R]		
	State	Data Summary state	Current status of Open or Closed	TEXT		Update when data summary state changes
ELEMENTS	CNT_WLD_READS	Count of detector reads	Total number of WILD detector reads	NUMBER[0-999]	Sum	Update count for each read
	MAX_PEAK	Maximum KIPS reading	Maximum measured peak impact rounded to hundredths	NUMBER [0.0 -999.99]	Maximum	Update if peak reading > existing maximum peak
	MAX_DYNAMIC	Maximum dynamic KIPS value	Maximum measured dynamic (peak minus weight), rounded to hundredths	NUMBER [0.0 -999.99]	Maximum	Update if dynamic value > existing maximum dynamic

MAX_RATIO	Maximum ratio	Maximum measured ratio (peak/weight), rounded to hundredths	NUMBER [0.0 -999.99]	Maximum	Update if ratio > existing maximum ratio
FIRST_DATE_GE_30_DYN	First timestamp where dynamic >= 30 KIPS	GMT time stamp and the time zone offset of the originating data location when the data summary first indicated a dynamic impact greater than or equal to 30 kips	TIMESTAMP	Earliest	Update when first dynamic value of >= 30 KIPS is calculated
FIRST_DATE_GE_80_PK	First timestamp where peak >= 80 KIPS	GMT time stamp and the time zone offset of the	TIMESTAMP	Earliest	Update when first peak value of >= 80 KIPS is measure

		originating data location when the data summary first indicated a peak impact greater than or equal to 80 kips			
FIRST_DATE_GE_90_PK	First timestamp where peak >= 90 KIPS	GMT time stamp and the time zone offset of the originating data location when the data summary first indicated a peak impact greater than or equal to 90 kips	TIMESTAMP	Earliest	Update when first peak value of >= 90 KIPS is measure

CNT_GE_30_DYN	Count of dynamic readings >= 30 KIPS	Count of readings where the dynamic impact is greater than or equal to 30.00 kips	NUMBER[0-999]	Sum	Update if dynamic value >= 30 KIPS
CNT_GE_80_PK	Count of peak readings >= 80 KIPS	Count of readings where the peak impact is greater than or equal to 80.00 kips	NUMBER[0-999]	Sum	Update if peak value >= 80 KIPS
CNT_GE_90_PK	Count of peak readings >= 90 KIPS	Count of readings where the peak impact is greater than or equal to 90.00 kips	NUMBER[0-999]	Sum	Update if peak value >= 90 KIPS
LAST_DYNAMIC	Last dynamic reading	Last measured dynamic, rounded to hundredths	NUMBER[0.0-999.99]	Latest	Update for each reading

LAST_RATIO	Last ratio reading	Last measured ratio, rounded to hundredths	NUMBER[0.0-999.99]	Latest	Update for each reading
LAST_EQMT_SPEED	Last equipment speed	Last measured speed (mph), rounded to hundredths	NUMBER[0.0-999.99]	Latest	Update for each reading
LAST_TMST_GE_20_DYN_OR_GE_2_RATIO	Timestamp of last bad reading	GMT time stamp and the time zone offset of the originating data location when the wheel last indicated a dynamic impact greater than or equal to 20.00 kips or a ratio greater than or equal to 2.00	TIMESTAMP	Latest	Update if the dynamic value >= 20.00 KIPS or the ratio >= 2.00

TMST_1_LT20Dyn_and_LT2Ratio	Last good reading timestamp	GMT time stamp and the time zone offset of the originating data location when the wheel last indicated with a dynamic impact less than 20.00 kips and a ratio less than 2.00	TIMESTAMP	Latest/Autoclose	Update if the dynamic value < 20.00 KIPS and the ratio < 2.00
TMST_2_LT20Dyn_and_LT2Ratio	2nd to last good reading timestamp	GMT time stamp and the time zone offset of the originating data location when the wheel 2nd to last indicated	TIMESTAMP	Latest/Autoclose	Update if the dynamic value < 20.00 KIPS and the ratio < 2.00

		with a dynamic impact less than 20.00 kips and a ratio less than 2.00			
TMST_3_LT20Dyn_and_LT2Ratio	3rd to last good reading timestamp	GMT time stamp and the time zone offset of the originating data location when the wheel 3rd to last indicated with a dynamic impact less than 20.00 kips and a ratio less than 2.00	TIMESTAMP	Latest/Autoclose	Update if the dynamic value < 20.00 KIPS and the ratio < 2.00

Data Summary Roll Up Example

	Element Name	Aggregation	RR1	RR2	RR3
HEADER	Type	DS	DS	DS	DS
	Format Version	1	1	1	1
	CreationTMST	2015-03-01T11:11:11-05:00	2015-01-01T11:11:11-05:00	2015-01-03T11:11:11-05:00	2015-03-01T11:11:11-05:00
	RR_DB_Key		772762	657646	346545
	LastUpdateTMST	2015-06-18T11:11:11-05:00	2015-06-06T11:11:11-05:00	2015-05-03T11:11:11-05:00	2015-06-18T11:11:11-05:00
	DSType	SALIENT_WHEEL_IMPACT	SALIENT_WHEEL_IMPACT	SALIENT_WHEEL_IMPACT	SALIENT_WHEEL_IMPACT
	DS_Owner/Reporting_System		RR1	RR2	RR3
	EquipmentMark	CSXT	CSXT	CSXT	CSXT
	EquipmentNumber	610555	610555	610555	610555
	Location				
	ComponentType	WHEEL	WHEEL	WHEEL	WHEEL
	ComponentName	AXLE	AXLE	AXLE	AXLE

	Element Name	Aggregation	RR1	RR2	RR3
	ComponentValue	01	01	01	01
	ComponentName	SIDE	SIDE	SIDE	SIDE
	ComponentValue	R	R	R	R
	State	O	O	O	O
ELEMENTS	CNT_WLD_READS	24	8	11	5
	MAX_PEAK	95.21	84.33	88.11	95.21
	MAX_DYNAMIC	45.11	38.22	45.11	42.78
	MAX_RATIO	4.21	4.21	4.20	3.96
	FIRST_DATE_GE_30_DYN	2015-03-18T11:11:11-05:00	2015-02-06T11:11:11-05:00	2015-01-06T11:11:11-05:00	2015-03-18T11:11:11-05:00
	FIRST_DATE_GE_80_PK	2015-03-18T11:11:11-05:00	2015-02-06T11:11:11-05:00	2015-01-06T11:11:11-05:00	2015-03-18T11:11:11-05:00
	FIRST_DATE_GE_90_PK	2015-04-03T11:11:11-05:00	2015-05-06T11:11:11-05:00	2015-04-03T11:11:11-05:00	2015-05-18T11:11:11-05:00
	CNT_GE_30_DYN	10	4	4	2
	CNT_GE_80_PK	7	3	2	2
	CNT_GE_90_PK	4	2	1	1

	Element Name	Aggregation	RR1	RR2	RR3
	LAST_DYNAMIC	42.78	38.22	45.11	42.78
	LAST_RATIO	3.96	4.21	4.20	3.96
	LAST_EQMT_SPEED	48.44	35.21	28.77	48.44
	LAST_TMST_GE_20_DYN_OR_GE_2_RATIO	2015-05-18T11:11:11-05:00	2015-05-06T11:11:11-05:00	2015-04-03T11:11:11-05:00	2015-05-18T11:11:11-05:00
	TMST_1_LT20Dyn_and_LT2Ratio	2015-06-18T11:11:11-05:00	2015-06-06T11:11:11-05:00	2015-05-03T11:11:11-05:00	2015-06-18T11:11:11-05:00
	TMST_2_LT20Dyn_and_LT2Ratio				
	TMST_3_LT20Dyn_and_LT2Ratio				

Opening Criteria

If a data summary creator does not have an open data summary for the asset and location, a new data summary will be opened upon a WILD passing if any of these conditions are met:

- Dynamic Impact >= 30.0 KIPS
- OR Peak Impact >= 65.0 KIPS
- OR Ratio >= 3.0
- If a DS for an asset/location is opened by another DS creator, then a DS will be opened when a new WILD reading is made for that asset/location

Closing Criteria

- Wheelset Replaced (like MH or CRB jobcode) – Message published to DS owner indicating wheelset change date greater than the timestamp of the latest timestamp GE 20Dyn or GE 2Ratio on any data summary for this wheel. This message may originate from CRB jobcodes, processed by RailInc OR by a private/contract shop/company indicating a wheelset change using web service or EHMS website OR by a railroad using a web service.
- Wheelset Inspected and was found to be newer than the last date where it was measured >=20 kips dynamic or >=1.5 ratio (like MR) – Message published to DS owner indicating that someone performed the aforementioned inspection and believes that the wheelset was installed after the latest timestamp GE 20Dyn or GE 2Ratio on any data summary for this wheel. Message may come from web service input or from EHMS web site input.
- Wheelset OOR Runout Measured and found to be less than 0.020" (like MR) – Message published to DS owner indicating that someone performed the aforementioned inspection after the latest reading GE20Dyn or GE2Ratio. Message may come from web service input or from EHMS web site input.
- Administrative/Opened in Error (due to detector error, AEI matching error, incorrect AEI tag placement) (like MN) – Message may come from web service or from EHMS website input.
- Deleted in UMLER (Like MI) – Message will come from UMLER system.
- Autoclose logic: Three sequential WILD reads less than 20 Dynamic, less than 1.5 ratio, and train speed greater than 20 mph for any open data summary on a wheel. This is determined by three <TMST_n_LT20Dyn_and_LT2Ratio> timestamps greater than the latest <LAST_TMST_GE_20_DYN_OR_GE_2_RATIO> timestamp evaluated over all open data summaries for that asset and component location.
- Logic: If there exists 3 <TMST_n_LT20Dyn_and_LT2Ratio> with train speeds greater than 20 mph AFTER the latest <LAST_TMST_GE_20_DYN_OR_GE_2_RATIO > timestamp across all industry data summaries, then the data summary will be closed at Railinc and a close message will be sent to all data summary message subscribers.

Additional Information

- Autoclose timestamps (e.g., TMST_1_LT20Dyn_and_LT2Ratio) are reset to null when LAST_TMST_GE_20_DYN_OR_GE_2_RATIO is later. Autoclose timestamps (e.g., TMST_1_LT20Dyn_and_LT2Ratio) are cascaded (when a more recent one is found, it takes #1 position and #1 moves to #2, etc.).
- Closure of WILD data summaries also will close EHMS WILD alerts on the same component.

Appendix A. EHMS Display Information

Opening Criteria Display Text

Dynamic Impact >= 30 kips or Ratio >= 3.0 or Peak Impact >= 65 kips

Autoclose Display Text

Three consecutive reads less than 20 dynamic, less than 1.5 ratio, and train speed greater than 20 mph.