Title: Return Vehicle Parts Analysis

Background:

Litens automotive group develop products for the vehicle FEAD (Front End Accessories Drive), to reduce the noise, vibration and by this increase durability and reliability of all belt drive accessories. In the next figure please see example of the FEAD system:

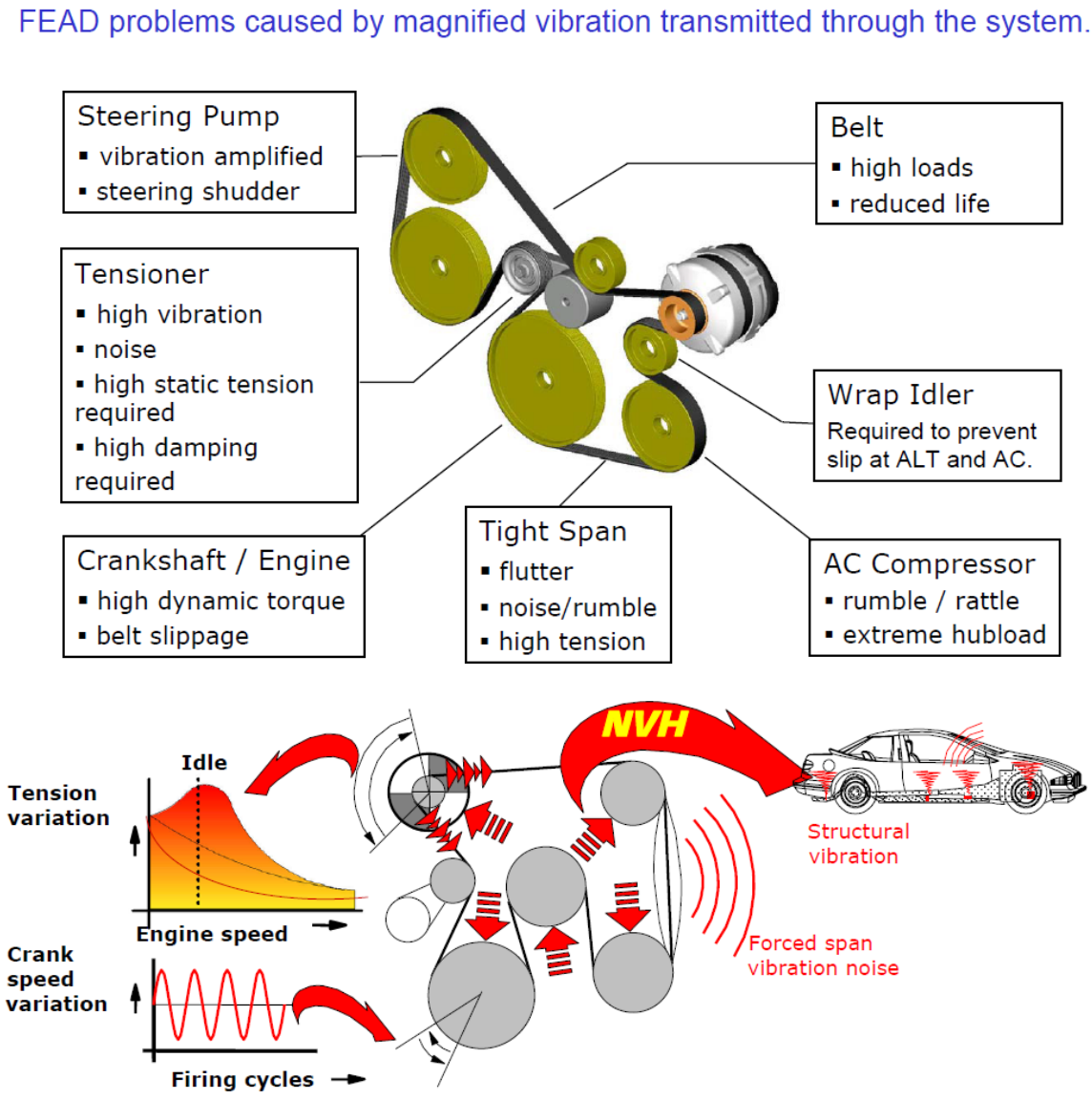


Figure 1.
FEAD example.

This research will be focused on three products, OAD (Overrun Alternator De-coupler), ADT (Accessories Drive Tensioner) and TBT (Time Belt Tensioner). The main function of OAD as for example is to reduce torsional vibration coming from the engine, and respond to fast shifts events by taking all the alternator inertia, please see effect of OAD in the next figure:

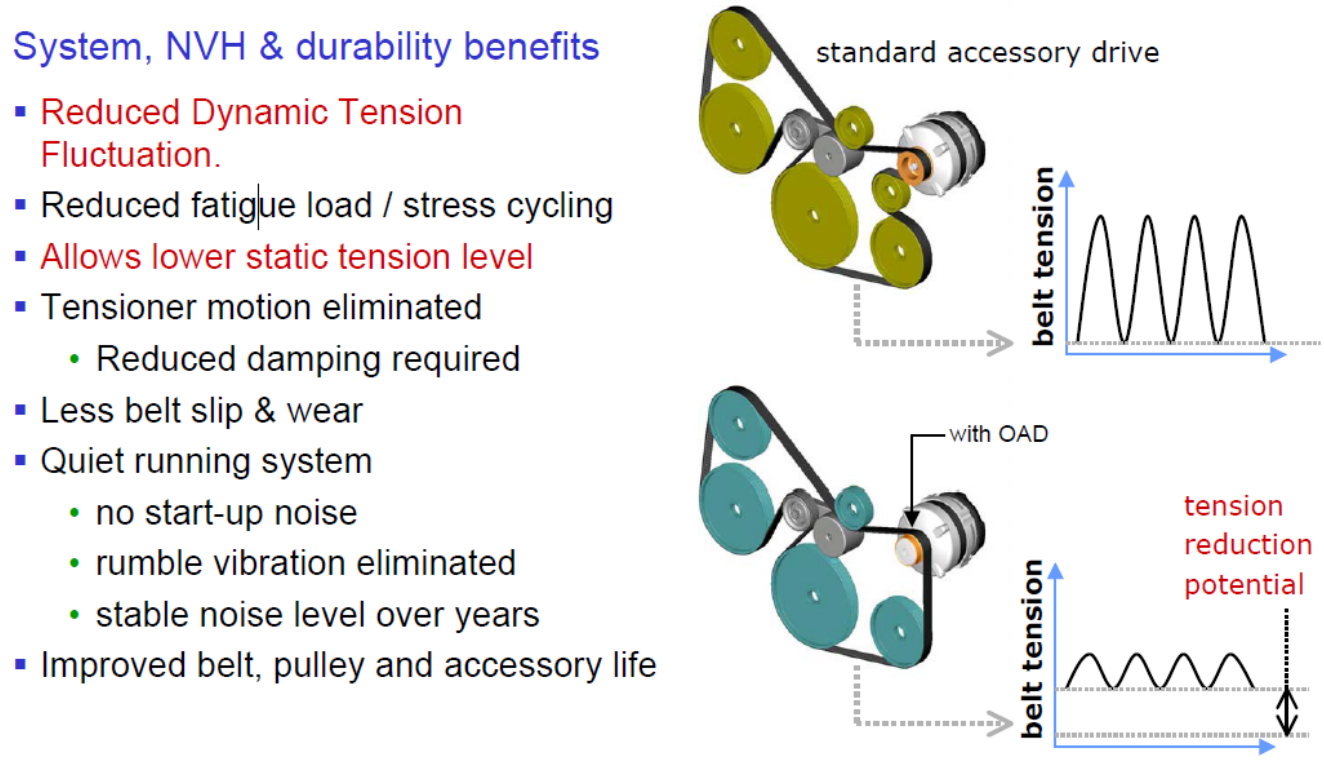
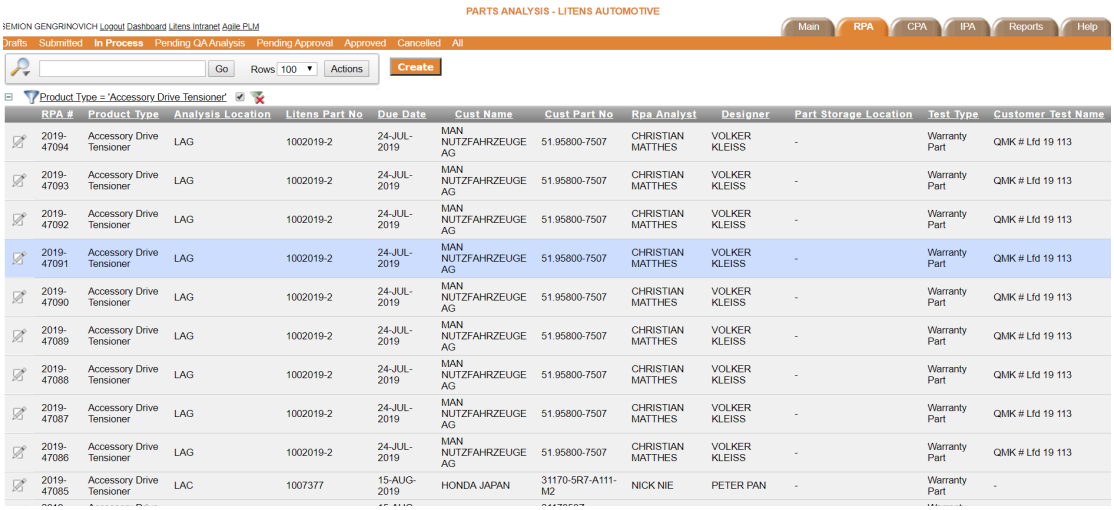


Figure 2.

OAD (Overrun Alternator De-coupler) effect on the belt system example.

The RPA (Return Part Analysis) system looks like the next sample:



RPA #	Product Type	Analysis Location	Litens Part No	Due Date	Cust Name	Cust Part No	Rpa Analyst	Designer	Part Storage Location	Test Type	Customer Test Name
2019-47094	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47093	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47092	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47091	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47090	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47089	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47088	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47087	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47086	Accessory Drive Tensioner	LAG	1002019-2	24-JUL-2019	MAN NUTZFAHRZEUGE AG	51.95800-7507	CHRISTIAN MATTHES	VOLKER KLEISS	-	Warranty Part	QMK # Lfd 19 113
2019-47085	Accessory Drive Tensioner	LAC	1007377	15-AUG-2019	HONDA JAPAN	31170-5R7-A111-M2	NICK NIE	PETER PAN	-	Warranty Part	-

Figure 3.

RPA (Return Parts Analysis) screenshot from the database sysytem.

The total available columns in the RPA database is 87, please see next table with the naming:

Rpa Number	Bearing Report
Product Type	Bearing Sent To Supplier Date
Analysis Location	Inspected By
Litens Part No	Creator
Cust Name	Part Mileage
Status	Time In Service
Part Storage Location	Submitted By
Customer Test Name	Submission Date
Date Code	Date Modified
Failure Check	Submitted For Qa Analysis Date
Requester	Qa Analysis Submitted By
Request Date	Qa Analysis Submitted Date
Due Date	Approved By
Rpa Type	Approval Date
Rpa Level	Received Date
Bearing Analysis From Supplier	Submitted For Qa Analysis By
Shipping Tracking No	Received By
Date Received From Cust	Fiscal Year
Cust Contact	Date Created
Cust Location	Test Type
Cust Part No	Cancelled By
Cust Claim No	Cancellation Date
Manufactured Date	Designer

Vin No	Rpa Analyst
Fault Found	Approver Name
Failed Comp	Qa Technician
Couse Of Failure	Rpa Editor Name
Observation	Revoked By
Conclusion	Revoke Date
Counter Measure	Counter Measure Date
Supplier	Vehicle Platform
Bearing Sent To Supplier	Alternator Manufacturer
Bearing Returned Date	Alternator Model
Functional Check	Alternator Part No
Qa Instructions	Analysis Type
Time In Service Unit	

Objective:

This analysis will include the data from 2011-2017 years or 7 years of return parts. Next questions we will try to answer in this study:

From all products that return to the company, what is percentage that failed and what is still in functional condition?

From the parts that defined as failed, what was the spread of failure modes:

Fatigue like steel cracks, material imperfection? (Related to infant mortality failures)

Wear out failure, like plastics wear, bushing degradation, grease degradation? (Related to the end of life of product)

Do the failures have spikes per specific period?

Relation Between the return parts and the time in service, need to investigate if the product has infant mortality failure and see if change in revision fixed it.

Does any specific OEM or World location have significant more failures than other?

Data Size period of time 7 years (2011-2017):

OAD matrix: 87(columns) x 8238 (rows)

ADT matrix: 87(columns) x 5572 (rows)

TBT matrix: 87(columns) x 3348 (rows)