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Fault Analysis of the Main Transfer

KAMAZ Vehicles

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Abstract

In the course of experimental studies have found a feature in the main transmission element failures in the operation of vehicles. It has been established that there are major failures: housing, shafts, gears and bearings. Introduced a dynamic system maintenance at the plant significantly improves the performance by reducing the number of failures compared to enterprise preventative system maintenance vehicles.

Keywords: Analysis; failure; a dynamic system; the main transmission, maintenance, repair

Introduction

Based on the analysis of a large number of methods and types of tests, the most appropriate research in an actual operation of the facilities to ensure getting the most accurate information about reliability [1].

Experiments were conducted to collect data for model development of operational reliability, as well as practical testing of theoretical methods.

On the proposed elements of the main transmission will create graphs for one car. First of all we are interested in how perspective dynamic system maintenance and current repair of vehicles based on the built-in diagnostics in comparison with the existing enterprises preventive service system [2, 3].

Experimental study

The main results of monitoring the work of KAMAZ trucks are presented in tables 1.2.

Table 1. Characteristics of the main transmission failures KAMAZ

№	Elements of the main transmission	Mileage, which occurred failures, thous.km	
		Scheduled preventative system maintenance and repair	Dynamic system maintenance and repair
1	Carter and his parts, bearings	11,71; 96,66; 101,79; 109,82; 110,03; 110,49; 110,64; 111,05; 114,52; 115,46; 118,07; 122,22; 127,96; 129,34; 129,46; 129,99; 130,98; 131,50; 133,22; 136,91; 137,56; 138,03; 139,75; 142,04; 143,64; 148,17; 148,67; 151,68; 152,52; 152,70; 154,17; 155,65; 156,43; 156,45; 158,97; 160,67; 161,26; 162,42; 166,80; 167,73; 168,10; 171,01; 172,40; 173,07; 174,03; 176,08; 177,76; 179,87; 194,46; 194,61; 196,24; 200,88; 202,53; 206,63; 212,65; 215,52; 216,07; 216,76; 217,93; 221,21; 221,81; 224,77; 226,13; 227,89; 232,34; 234,90; 239,76; 240,75; 272,99; 367,78; 373,78; 384,48	80,13; 105,60; 126,54; 130,37; 134,81; 135,29; 137,61; 140,65; 141,49; 142,90; 144,15; 146,19; 147,67; 153,16; 154,17; 163,87; 165,32; 167,67; 169,05; 174,33; 181,82; 182,27; 186,03; 188,48; 191,47; 192,59; 193,10; 200,81; 204,13; 205,97; 210,78; 212,59; 217,38; 222,28; 223,85; 226,76; 226,77; 228,96; 231,52; 233,19; 243,17; 245,62; 251,02; 252,02; 254,87; 259,79; 263,52; 267,94; 276,64; 279,30; 279,99; 281,67; 281,97; 285,31; 294,44; 300,06; 302,15; 308,68; 327,98; 336,30; 352,82

Table 1. (Continued): Characteristics of the main transmission failures KAMAZ

2	Shafts, gears	55,31; 105,28; 107,08; 111,72; 117,72; 122,92; 128,08; 132,25; 137,49; 140,55; 148,08; 149,33; 152,12; 152,35; 154,60; 154,66; 155,92; 157,42; 159,25; 159,78; 162,37; 164,07; 164,48; 166,34; 169,10; 172,99; 173,26; 176,07; 177,55; 177,60; 185,05; 188,94; 199,17; 204,88; 209,47; 216,47; 219,18; 220,09; 225,17; 226,18; 227,57; 233,41; 236,00; 241,73; 255,08; 296,14; 296,37; 376,98	105,10; 130,82; 137,33; 143,62; 145,35; 148,88; 159,01; 168,58; 177,11; 182,42; 184,22; 191,45; 191,50; 200,04; 212,03; 218,04; 218,13; 225,22; 226,06; 236,49; 244,51; 248,52; 252,97; 260,01; 265,04; 267,18; 267,23; 268,20; 271,24; 277,18; 280,35; 283,92; 284,16; 306,19; 320,45; 332,87; 371,94
3	Others	33,49; 91,47; 108,92; 114,27; 130,26; 135,14; 150,67; 164,47; 173,91; 200,26; 224,24; 324,76; 349,11	41,67; 112,47; 130,82; 142,90; 150,65; 151,59; 188,79; 229,66; 289,21; 305,54; 312,03; 351,94; 253,08; 274,21; 217,48

Table 2. The structure of the gearbox failure KAMAZ

Name of the mechanism, the element	number of failures, %	
	Scheduled preventative system maintenance and repair	dynamic system maintenance
Carter, bearings	54,13	53,87
Shafts, gears	36,09	32,76
Others	9,78	13,37

Passive experiment is to obtain information about the reliability and maintainability of KAMAZ vehicles. You need to create an array of experimental failures elements of cars that use of preventive and probabilistic and logical strategy for small trucking companies operating in isolation from the production base and follow the steps common methodology of the study.

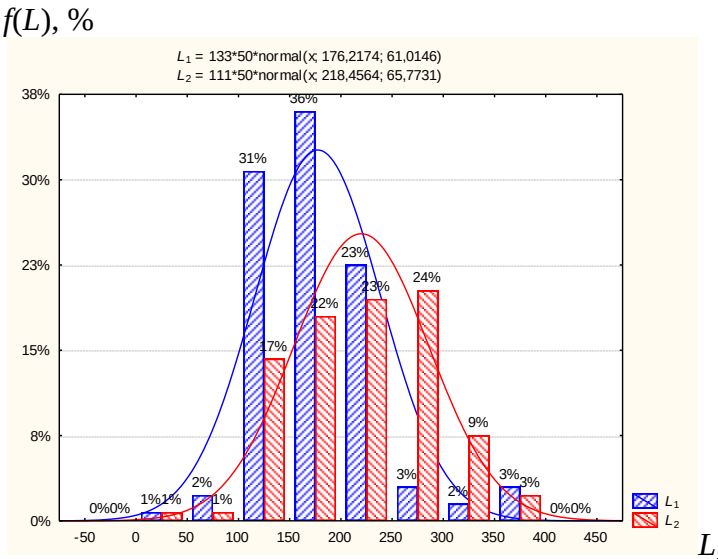
Cars, which was installed built-in diagnostics, perform transportation of building materials and bulk cargo. In general operation of KAMAZ vehicles were run in accordance with the "Design Manual" and "Regulations on the maintenance and repair of vehicles." Maintenance was carried out in full.

According to the controlled sample we need in each direction to make 48 test cars and dependability make the selection for further analysis using a dynamic system maintenance and repair of motor vehicles.

Selection of the main transfer as a research subject for the following reasons. The main gear unit is relatively complex, but much easier than the engine, which facilitates the analysis of its reliability. Therefore, an adjustment is required standards in relation to use of the vehicle on the routes under the short arm of the carriage of goods. Cars, which were established subjects main transmission of shipments of bulk cargo a distance of 50 km.

For the main transmission, the following major faults: gears, shafts, sump, gear selection, other.

As can be seen from the above data on the reliability of the elements of the main gear KAMAZ vehicles, indicators distribution patterns of failure indicates that not all of them can be described by a normal distribution (figure 1).



1) - for regular preventive system; 2) - for the dynamic system

Figure 1: Distribution of the value of MTBF main gear, depending on the choice of system maintenance

Conclusion

The studies on the collection of statistical information about the failure of the main transfer elements KAMAZ trucks, the data on the mean time to failure of each of the elements; A comparison of the results collected for the current and dynamic system of vehicle maintenance.

Set the share of failures of each of the elements of the main drive, which can then be used to normalize the need for replacement parts to ensure system health.

It has been established that there are major failures: housing, bearings, shafts, gears. Most prone to malfunction bearings, gears.

Introduced a dynamic system in the enterprise significantly improves performance by reducing the number of failures in the 16-21% for the main gear in comparison to enterprise.

References

[1] Lyandenburskiy V.V. Fundamentals of scientific research: a training manual / V.V. Lyandenburskiy, A.V. Bazhenov, V.V. Konovalov. Penza: PGUAS, 2013.- 388 p.

[2] Lyandenburskiy V.V. Probabilistic-logical method of Troubleshooting car: monograph / V.V. Lyandenburskiy, A.I. Tarasov - Penza, PGWS 2013. 220 p.

[3] Lyandenburskiy V.V. Fault analysis change gear boxes KamAZ / V.V. Lyandenburskiy, A.I. Tarasov, M.V. Nefedov, B.V. Nikolaevich // Internet-journal "SCIENCE", 2014. No. 5.
http://naukovedenie.ru/PDF/ 25TVN614.pdf

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