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Thermal Analysis of gear box for different oil using CFD

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Abstract

In this paper thermal analysis has been carried out on different oil having different viscosity which is affecting the performance of gear box. For that a model of gear box is generated with the help of pro-e and analysis is carried out in ansys software.

1. Introduction

In this paper thermal analysis of gear box is carried out for different viscosity oils. For the analysis purpose design of maruti Omni's gear box is used. Compression of thermal analysis is done for different viscosity oils as listed below

1) SAE 85W 140
2) SAE 80W 90
3) SAE 75W 90
4) SAE EDIB

2. SAE 85W 140

Properties of SAE 85W 140 is listed below

SAE 85W 140	properties
API gravity	26.0
Viscosity at 40° c	352
Viscosity at 100° c	25.5
Viscosity index	100

These properties are inserted in ansys and CFD analysis is done. The result of CFD analysis is shown in figure 1.

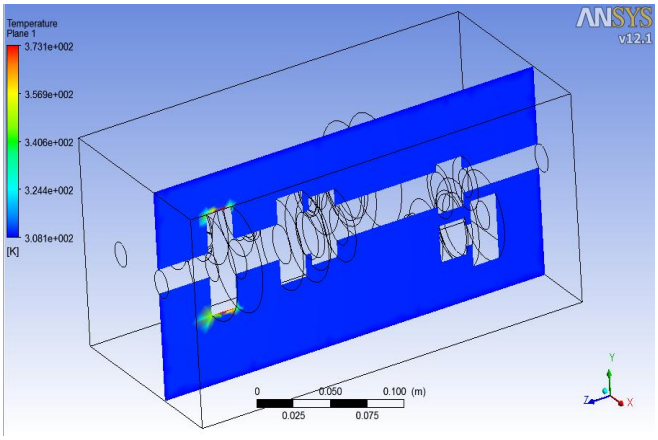

Fig. 1 Temperature distribution in gear box using SAE 85W 140

From the Fig.1 temperature difference found 65K

3. SAE 80W 90

Properties of SAE 80W 90 is listed below

SAE 80W 90	properties
API gravity	27.5
Viscosity at 40° c	130
Viscosity at 100° c	14.0
Viscosity index	100

These properties are inserted in ansys and CFD analysis is done. The result of CFD analysis is shown in figure 2.

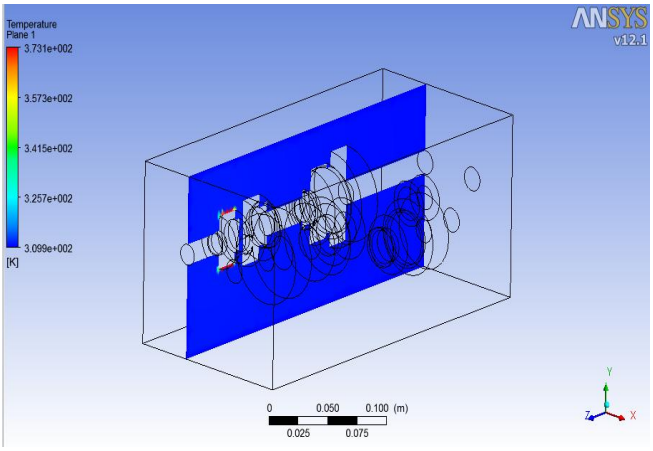

Fig. 2 temperature distribution in gear box using SAE 80W 90

From the Fig.1 temperature difference found 63.2K

4. SAE 75W 90

Properties of SAE 75W 90 is listed below

SAE 75W 90	properties
API gravity	
Viscosity at 40° c	129.7
Viscosity at 100° c	16.6
Viscosity index	137

These properties are inserted in ansys and CFD analysis is done. The result of CFD analysis is shown in figure 3.

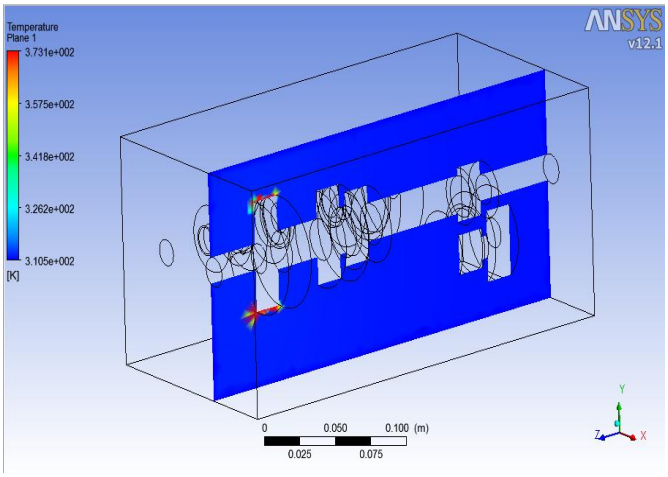

Fig. 3 Temperature distribution in gear box using SAE 75W 90

From the Fig.1 temperature difference found 62.6 K

5. SAE EDIB

Properties of SAE EDIB is listed below

SAE EDIB	properties
API gravity	26.0
Viscosity at 40° c	35.2
Viscosity at 100° c	25.5
Viscosity index	100

These properties are inserted in ansys and CFD analysis is done. The result of CFD analysis is shown in figure 4.

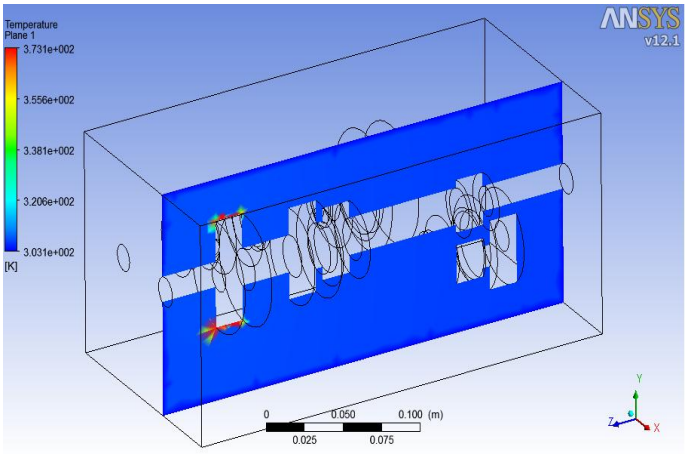

Fig. 4 temperature distribution in gear box using SAE EDIB

From the Fig.1 temperature difference found 70K

6. Conclusion

From the above result it is observed that the maximum temperature difference is in the case of SAE EDIB oil . So it is more desirable to prefer SAE EDIB as a engine oil.

7. References:

1) ANSYS V 12.1
2) Pro-E Wild Fire
3) www.peakantifreeze.com