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Comparison comfort of the car seat at a freezing temperature

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Abstract. The seat comfort is assessed from several aspects. Static comfort and dynamic comfort are defined. In both cases, the seat is comfortably seated on the seat. The main properties of these comforts are the mechanical, vibro-isolation properties of the PUR car seat. The properties of the PUR filler are mainly temperature-dependent (freezing temperature) and also the PUR hygroscopic for chemical reasons. In this paper, the influence of temperature on the size of the contact pressure distribution and thus on the mechanical properties of the PUR filler and the whole car seat is described.

Introduction

One of the parameters describing the overall characteristics of the seat is the mechanical comfort characteristics. It was not the seated person's seat characteristics. In the short term, the person sitting on the automobile seat mainly considers the feeling of contact with the seat - the size of the contact area, the place with the greater contact pressure. After sitting in the seat and getting the first impressions of static comfort, the seated man starts and uses the vehicle to ride. At this point, the seat behaves differently. The seat is operated in dynamic mode. This state can be described by dynamic comfort. In this case, the sitting person observes the unpleasant feelings of the selections that enter him from the moving vehicle to the seat. One of the characteristics of the incoming vibrations to humans is the transmission characteristics of the car seat Fig.1. This characteristic not only depends on the mechanical characteristics of the seat itself, but also on the size (weight) of the seated person. This is the so-called working point on the hysteresis characteristics of the seat Fig. 2. The PUR padding has the greatest influence on the shape of the seat hysteresis curve. When PUR material is used in non-standard conditions such as frost, the material solidifies, ceases to be flexible and pliable. The seat is hard and no longer has the original comfort features. For this reason, the use of automotive seat heating has started, among other things. In addition to heating a seated person, the task is to return the standard use conditions to the seat in the shortest possible time.

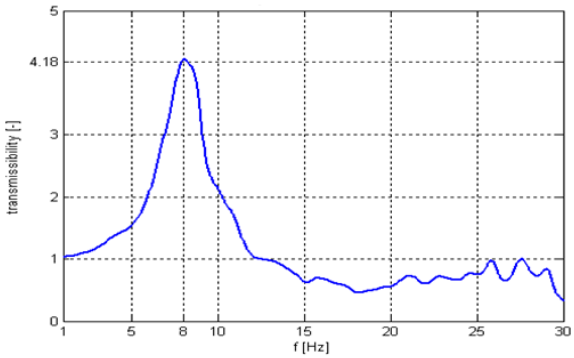

Fig. 1: Transmissibility characteristic of the car seat

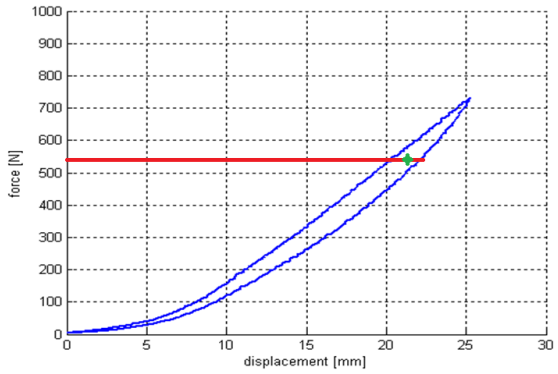

Fig. 2: Hysteresis curve of car seat

Experiment

For the experimental verification, a serial car seat Fig. 3 equipped with electric heating.This seat was placed in a special air-conditioned box. The K-type thermocouple (Ni-NiCr) thermocouples thermocouples with a measuring range of -40 ° C to 200 ° C were placed on the seat. A contact pressure sensor from X-senaor Technology Corporation, Canada was used to determine the shape and size of the contact pressure fields.


Fig. 3: serial car seat with a heated coating – thermočlánky, X-senzor

The thermocouple set was deployed in the area of the seat and back to specific locations, such as instead of the expected peak contact pressure - below the hip joints and the position of the wire guide and the position beyond that path. A total of 5 temperature characteristics on the seat were measured and 6 were referenced on the inside of the box climate. Experimenting was the simulation of getting into a frozen car, turning on the seat heating to the maximum and "turning on" the heating of the car salon by heating. This warming up of the car salon was simulated by opening one of the box walls and thus the possibility of changing the freezing air with warm air from the outside area by the laboratory. At the same time contact pressure distribution maps were measured over time. Exemplary features are shown in Figs 4 and 5.

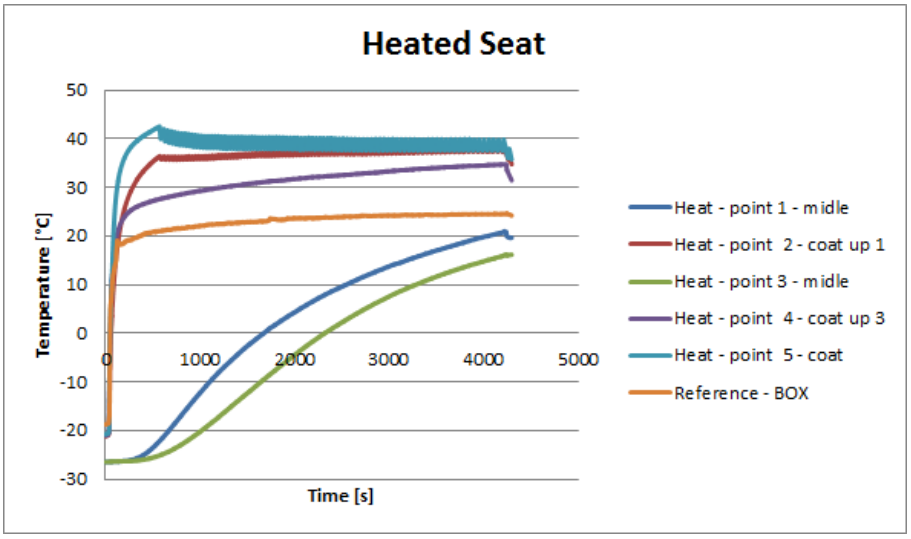

Fig 4: teplotní charakteristiky

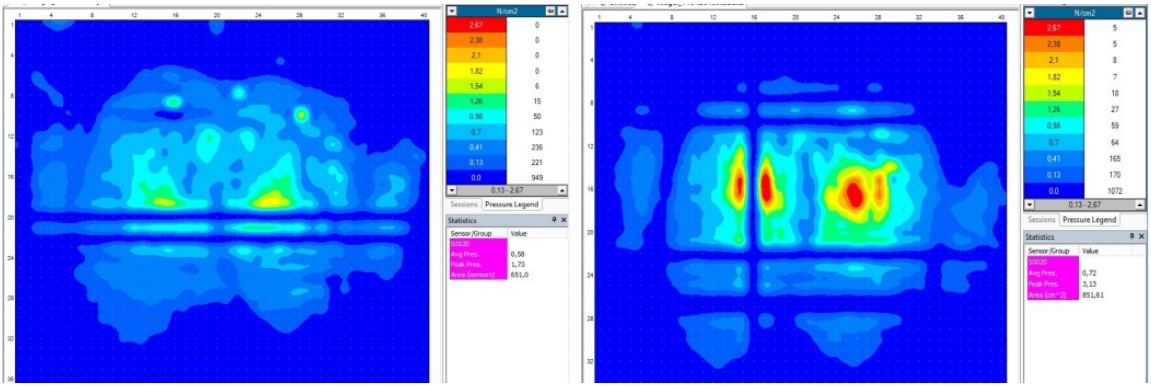

Fig. 5: mapy kontaktního tlaku při teplotě -20°C and 20 °C

Results

As can be seen from the light brown curve, the air in the box changed during the first minute. The remaining curves above this reference curve correspond to the points on the top of the coating, either at or outside the heating wire. The two curves below this reference curve correspond to the locations within the PUR fill. As can be seen from the curves, these sites

did not warm up above 0 ° C or 1500 ° C. 2000 sec - 25 and 33 minute. The same applies to pressure maps. Although there was already a temperature of 20 ° C in the contact area after the first minutes, the pressure field showed an incorrect contact pressure distribution of the frozen seat. The return of the standard pressure distribution occurred at the same time as the temperature I in the core of the core fill, ie after 1 hour of warming.

Conclusions

Thus, the following conclusions can be drawn from the measured experimental results. The distribution of contact pressures at different temperatures makes it possible to assess the effect on static and dynamic comfort, the discomfort of the car seat. It is evident from the measured temperature characteristics that even in the case of forced heating of the seat, the car seat does not obtain the original proposed mechanical, vibroisolation properties. Thus, if in winter we only use the vehicle for short, several minute journeys, the utomobil seat behaves like a hard, rigid part without much vibro-isolation properties. Thus, not only cold starts and short journeys do not indicate the vehicle engine but also other components in the vehicle. The worse it is that it is a car seat that is in direct interaction with man. The question would be how such a seat behaves at higher temperatures, for example in hot summer, when the warmth of the car is above 50 ° C. This could be the subject of further research.

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