SHORT TERM SCIENTIFIC MISSION (STSM)
SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA17107
STSM title: optimising the car seat's breathability according to the driver's weight
STSM start and end date: 22/05/2021 to 31/05/2021
Grantee name: Funda Buyuk Mazari

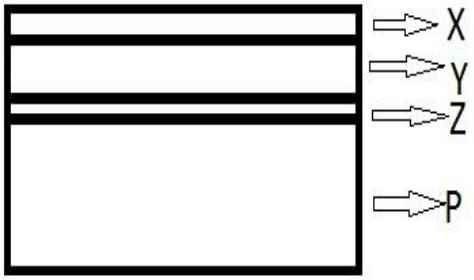
PURPOSE OF THE STSM:

Car seats are a combination of safety, comfort and affordability. In this research I will focus on the thermo-physiological comfort aspect of the car seat. The motivation of the research to develop a system in which car seat can adjust the breathability and transport of moisture according to the ambient conditions and weight and surface area covered by the driver. The main objective to keep the microclimate dry under different conditions like material of seating, driver's weight, ambient humidity etc. Objectives of the research are

1- To determine the breathability of car seat cover materials (single and as sandwiched layers)
2- Analyzing the maximum load and covered area by subjective analysis. (30-40 persons will be tested for the BMI, cover area and peak pressure on car seat)
3- Evaluate the afect of the loading on the breathability of the car seat
4- Optimizing the car seat's ventilation according to achieved results.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

1- Car seat samples are collected from companies in Turkey. These samples includes the single layer as well as the sandwiched car seat cover. All samples are tested for air and water vapor permeability. For the air permeability standard ISO9237 with the device FX3300 is used and for water vapour permeability the device Permatest and Sweated guarded hot plate is used according to standard ISO 11092.

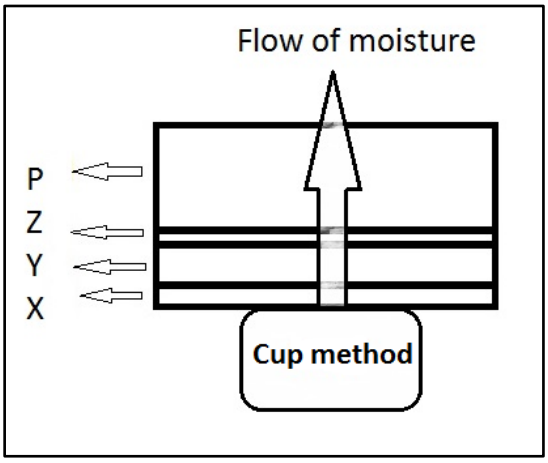


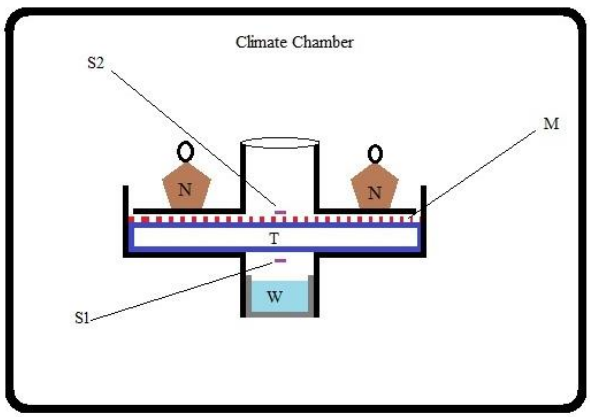
Layers of car seat

Where
X is top fabric layer which touches the person/driver
Y is second layer made of thin poly-urethane foam
Z is thin porous polyester mesh
P is thick 10cm PU-foam

2- The subjective analysis of the driver's sitting pressure and surface area will be evaluated, for this 20 students are selected randomly and test of peak pressure point on car seat is measured using the X-SENSOR sensor sheet.

3- The samples aretested for breathability under different static loads to determine how the load is effecting the pores and flow of moisture. This test is performed according to Desicant Cup method.





schematic diagram of the measuring device under load

Where W is distilled water for moisture source

T is the car seat cover material

N is the load on the sample

S1 and S2 are the humidity sensors

M is a porous sheet on the sample to apply even pressure.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

Following results are obtained

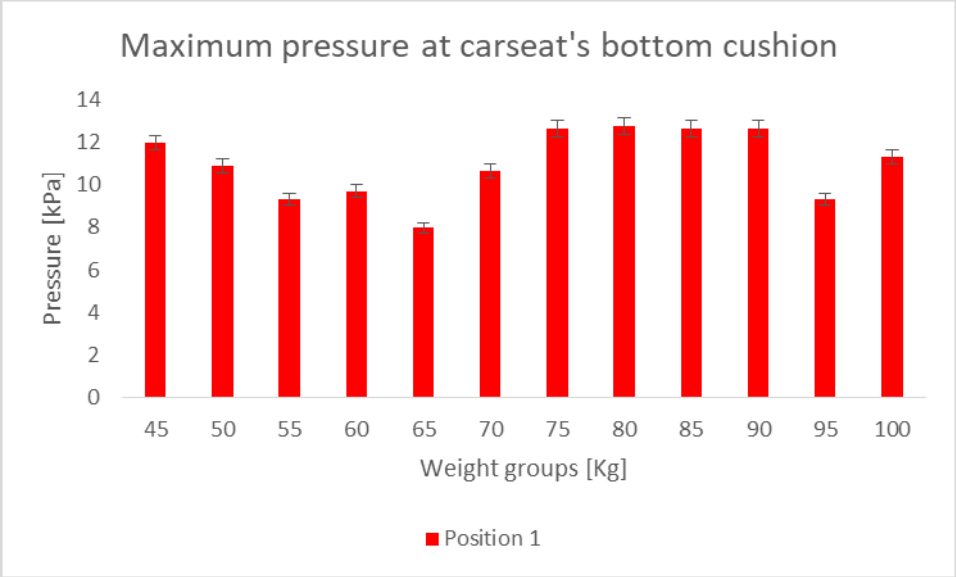
1- The breathability of each layer of the car seat cover material were obtained.

Material	Air permeability (Min – Max) [L/m^2/s]
Different top layers-X	1950-4300
PU-thin foam or fleece-Y	650-820
Knit mesh-Z	95000-9700
PU-foam -P	12-24

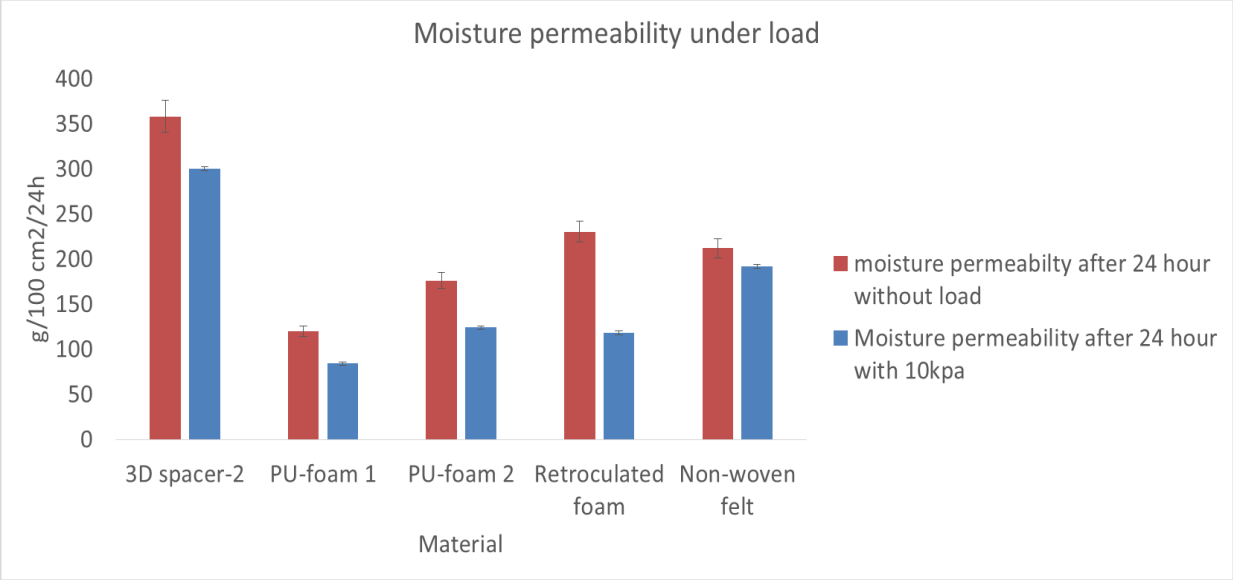
This information helps us to understand that even though some layers are very permeable but after they are combined the overall breathability will be effected by the non permeable layer like PU foam.

2-

It was observed that the peak pressure points are not connected with the weight of the person. Generally the peak pressure fro all weight range was around 10-12kPa.



3- The testing of moisture transport under load also showed a significant difference, this means that the human weight on the seat will negatively effect the breathability and comfort of car seats.



FUTURE COLLABORATIONS (if applicable)

The STSM was very useful to know the research capacbilities of both institutes and find opurtunities to apply for mutual projects.
The research work performed can alse be used for a conference proceedings.