VOLVO

Press Release

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Are you sitting comfortably?

About forty years ago, Volvo achieved a world first when it introduced a steplessly adjustable lumbar support in the front seats of its Amazon car. And Volvo seats have been regarded as probably the best in the business ever since.

The reasons for this continued leadership are many; however, technology, ergonomics and safety are important keywords in this context – as is appearance, since a Volvo seat is also designed to be attractive!

"A world first" proclaimed Ratten, the Volvo customer magazine, in 1964 describing the new front seats in the Volvo Amazon. The most newsworthy feature was the new lumbar support, which could be adjusted with a screwdriver to suit the anatomical characteristics of the individual driver.

Volvo engineers had developed the seats in consultation with medical experts (the science of ergonomics was practically unknown at the time). The seats were of a particularly modern design, with cushions of foamed polyester for optimum support and comfort. Both the height and longitudinal position could be adjusted, while the backrest angle could be varied by means of a handwheel.

Customer requirements dictate

Closer study of the Amazon seat reveals why the development was regarded as something of a revolution. After its introduction, Volvo quickly acquired a reputation for superb seats which it still enjoys today.

The seats and seat cushions used in current Volvo models are the product of cooperation between the company's own engineers and the seat suppliers. The suppliers are basically responsible for all of the development work, while Volvo engineers verify the results in what are known as complete vehicle tests.

Volvo Cars product planners translate the customer's requirements into an order, which the supplier uses to produce the seats with the aid of drawings, simulations, crash testing, strength testing, and so on.

In addition, development activities at Volvo have recently been divided among two groups – a group of eleven working on front seats and a nine-person group responsible for rear seats.

Emotionally charged

"The requirements have gradually become so diverse that this step became necessary," explains Malcolm Resare, head of the front seat group, adding that the group has also been strengthened by the addition of comfort expertise.

Malcolm explains that the design of the seats and cushions is discussed at an early stage when drawing up the specifications of a new car. The seats are complex products which represent a high proportion of the value and are also emotionally charged:

"We have ambitious goals. The driver must find the seat comfortable on both long and short journeys. It must also be designed to suit all kinds of male and female drivers, whether they are short, tall, light or heavy. It must be attractive in appearance, comply with the highest standards of safety and ergonomics, and keep its fresh appearance – in other words, it must retain its 'new car' feel for a long time.

"Development is a process involving many 'loops'," he goes on. "This means that we test as we go and modify the design accordingly. Then we test again, modify again – and repeat the procedure as often as it takes."

Still tops

"After testing for comfort, vibrations and other characteristics, the seats are matched with the styling. Visual harmony is essential since this aspect is very important to the customer. We must ensure that the appearance makes a good first impression."

Malcolm Resare remarks that Volvo's styling is conservative. Upholstery fabrics, colours and materials must harmonise, and must clearly bear the 'Volvo' imprint. The range of variants is large, as is the number of functions. Although the lumbar support and other adjustable features may no longer be world news, combinations of them, together with the choice of materials, ensure that Volvo seats are still the best in terms of comfort and safety.

Own standards higher

Car seat design appears to be influenced to some degree by 'cultural' differences. For example, German carmakers often choose harder upholstery padding, as well as different springs and elastic webbing, compared with Volvo.

"We believe that more care goes into a Volvo seat," maintains Malcolm Resare.

He tells us that perhaps 90% of the requirements which apply to a seat are of statutory origin. Volvo bases the remaining 10% on its own goals and on the need for safety margins. Among other things, the safety requirements for front seats cover seat belts, side airbags, whiplash protection, head restraints and seat mountings.

Importance of ergonomics

As mentioned above, medical experts were involved in the development of the famous Amazon seat introduced in 1964. In this context, Volvo has had the inestimable advantage of working for many years with Professor Alf Nachemson, the renowned Gothenburg specialist in back problems.

The term 'ergonomics' was still unknown in 1964. Ergonomics began as a science at about that time and has grown dramatically in importance since then. The Volvo Cars product development department now includes a number of ergonomics specialists from various basic disciplines who also work with independent researchers.

Ergonomics is often used loosely to describe seating comfort. However, the term covers infinitely more. For example, HMI (Human-Machine Interface) is an area of the science which is growing rapidly.

Sporty seat in S60

Industrial designer Lennart Liedberg joined Ergonomics in 1994, having worked as a consultant in production ergonomics. His first working assignment was on the cars which were subsequently to be launched as the new V70 and S60.

"The S80 was first introduced as part of the big platform, so that the basic design of its seats was already determined," he explains. "However, the V70 and S60 were a challenge. In this case, a new foam was to be used and the upholstery was to be of a different cut. The seats were to be sportier, with a lower seating position and a pronounced bucket shape, especially in an optional variant.

"A car driver occasionally needs to change position for reasons of comfort; in other words, to

move a little in the seat. A ‘sports’ seat limits freedom of movement somewhat more. Although the seating position is stable and secure, it is also more difficult to change. The challenge is to design a shape providing the optimum balance between stability and support for a large number of body types.

"We really wondered if Volvo buyers would accept the sportier seat – but they did!"

Completely new seat in XC90

Needless to say, Lennart Liedberg’s latest project was the XC90, which has a completely individual seat with a unique foam and upholstery fabric. In this case, Ergonomics cooperated intensively with Design in a large number of ‘loops’. As always, the demands of high comfort and consistent design language competed with the demand for low cost – naturally without compromising Volvo’s high safety standards.

Under the title of System analysis of ergonomics aspects, Lennart’s area of development responsibility involved cooperation with almost all of the development groups working on interior and climate issues.

Lennart Liedberg stresses that the purpose of every Volvo seat is to ensure that the occupant sits in, not on it. The occupant must enjoy a stable position, while having the freedom to move in the seat.

"It is a huge challenge to design a comfortable and safe driving position for people ranging from 150 cm (4’11") to 200 cm (6’3") in height," he asserts.

Two types of ergonomics

He mentions that the 16-strong Ergonomics staff is focusing on two main areas – HMI (Human-Machine Interface) and physical ergonomics.

HMI deals with the user interface between the different on-board functions and the human being behind the wheel. This involves practical problems, like changing the climate in the car, or how the driver is to understand and operate the various instruments, buttons and controls.

"I believe that we have reached the limit in terms of the number of controls in a car," says Lennart Liedberg. "As a result, several functions may now be combined in one and the same control, with a display. However, we need direct access to certain functions. An example is the radio in the XC90 which, for this reason, is of somewhat modified design with logically grouped function controls.

"To put it simply, we must not make things more difficult for the ‘normal’ user, who represents 80% of all car owners. The driver must not be made to feel uncomfortable or unsafe by having to shift his or her gaze too long from the road to look at a display. Essential displays must be located as close as possible to the normal field of vision without being perceived as disturbing."

A pleasant all-day journey

Physical ergonomics deal with the car’s architecture, such as door openings, seating geometry, space requirements, ease of access to controls, and so on. Both inside and outside the car.

"How to lower the seats, how to change a bulb and things like that are also ergonomics," explains Lennart.

"Our common goal is to design a car which is a mix of everything and which suits our customers. We must understand the total picture, understand how the customer experiences his or her car, and what expectations they have – preferably so that we can surpass them.

"With this complete understanding, we can deliver a good product. For example, the driver must not react to the seat – it should simply be there. And at the end of a long, all-day journey, the driver must feel just as fresh as when starting out!

"This is our criterion for success!"

Captions:

1. Lennart Liedberg, systems manager, Ergonomics (left) and Malcolm Resare, head of front seat development. ((P2003_1253))

2. Nicknamed ‘Mr. Chairman’, the SAE dummy takes the place of the human occupant in development tests. ((P2003_1254))

3. The 1964 Amazon seat was a world first in several respects. The adjustable lumbar support was the biggest innovation. The following year, its designer, Nils Bohlin – who also invented the three-point seat belt – was awarded the Assar Gabrielsson fellowship in recognition of his achievement. ((P1960_1339))

4. Volvo seats have been among the best on the market for almost 40 years. ((P2002_7656))

5. The driver must feel just good at the end of an all-day trip as when starting out. The is the aim of Volvo Cars product developers. ((P2002_8271))

6. The Volvo XC90 is equipped with seats with a new upholstery padding and with a new appearance. The owner must feel at home in the seat, even if the seating position is considerably higher, and the car is bigger and completely different. ((P2002_7274))

7. The seat must not only be comfortable, it must also be attractive and more than comply with all safety standards – for seat belts, airbags, whiplash protection, head restraints and other details. ((P2000_4814))

FACTFILE

Ergonomics in brief

Derived from the Greek ergon, meaning work, and nomia, meaning knowledge or science, the word ‘ergonomics’ is the study of human work (and the methods used to perform it). It can also be described as the interaction between the human being and his working tools. Ergonomics is a young, cross-disciplinary science which emerged in the 1950s. It is characterised by the combination of biology, technology and psychology used to analyse the interaction between human beings and machines.

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