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THE REACTION OF GLASS IN A FIRE from International Civil Defense No. 338, page 5

It is well known that glass is a fragile substance and this is because of the absence of plastic deformation; in fact until it breaks under the influence of external forces, glass only undergoes elastic deformation. The breaking of window-panes and other types of glass is almost inevitable in the event of fire, but the exact moment of breakage varies considerably and is almost unforeseeable; as long as glass is subjected to radiation and hot convectional gases, but remains out of the reach of flames, it heats slowly and can resist for relatively long periods. According to the tests carried out breakage occurs when the temperature of the glass reaches 100-180 degrees but such breakage is almost immediate as soon as the flames themselves come into direct contact with glass surfaces. The reaction of reinforced glass differs little from that of ordinary glass; it breaks at the very start of the fire, but the fragments are kept in place by the metallic mesh and thus it continues to provide an effective barrier which obstructs the passage of fresh air from without and hot gases from within. It should be noted that what is known as safety glass is only safe from accidental breakage of mechanical origin and offers no more resistance than ordinary glass.

Held by their cement coating, glass paving stones, cobble-stones and bricks resist longer than window panes and other types of glass. Even when cracked, they continue to block the passage of hot gasses. It goes without saying that they do not give off any combustible gases themselves. Consequently, partitions, walls and ceilings made from these elements constitute what is known as flame-resistant for an appreciable length of time, the duration of which varies according to the type, size and way in which they are assembled. These elements are flame-resistant for over half an hour and sometimes even one hour or two when they are doubled. However they are only fire-resistant for a negligible period of time which hardly reaches fifteen minutes because of the energy radiated by the fire.

FATIGUE AT THE WHEEL from International Civil Defense No. 338, pages 6-8

Every experienced driver is aware that the feeling of fatigue which can develop quite rapidly are caused by a number of factors. First of all there are

external conditions which can take their toll on the driver depending on whether he is driving in urban traffic or on long-distance trips, in bumper-to-bumper traffic or alone on the road, driving by day or by night; in fog or sunshine, on road surfaces which are dry or wet, snow or sand-covered and so forth. Needless to say, the load placed on the driver by these factors is perceived differently by each individual and in extremely different ways at different times. Similarly the elements of fatigue may not be present. Consequently, both average and extreme values exist and it is these values which certain institutes have attempted to determine. All the experiments have one point in common, they cannot be carried out in daily traffic since the limits of the subject's capacity only appear at the onset of fatigue. If at that point in time the subject had been driving a vehicle on the road, an accident would inevitably have occurred.

Laboratory Values

Since no one - in particular other road-users - could be asked to run such risks, another means of studying resistance capacity and fatigue levels as well as the timing and duration of rest periods had to be found. This dilemma could only be solved by means of experiments under laboratory conditions and even though they only provide laboratory values, they are nevertheless a source or invaluable information. The desired results were obtained with the aid of a type of simulator. However it should be pointed out that the latter itself very abstract and could not for example be compared to a flight simulator. Considering the importance of motorized transport today, and bearing in mind that large numbers of adults in possession of driving permits drive some sort of motorized vehicle on a regular or at least temporary basis, it is surprising to note that institutes which focus on the medical, physiological and psychological aspects of transport are so few and far between. It is interesting to note that the research on which this article is based was carried out by an institute called the Research Center and Laboratory for Production Techniques attached to the University of Bremen (FRG). The Director of Research is Professor Holger Luczak, who by calling is neither a physician nor a psychologist. He undertook in-depth research on fatigue and resistance capacity and his activities brought him into contact with drivers of a large variety of vehicles.

Fatigue

The existence of various types of fatigue certainly did not render the task any easier. A distinction is drawn between physical and psychological fatigue, peripheral and central fatigue and partial and general fatigue. All of these elements play a role in the case of road users. Most often physical fatigue is minimal since very little physical strength is required to drive a motorized vehicle nowadays. Fatigue arises from the need to maintain a relatively high level of concentration until the body reaches a state where - both for physical and psychological reasons - rest or even sleep becomes imperative. The psychological load (maintaining one's alertness and avoiding all errors) is the main factor. As fatigue is perceived differently according to the individual, laboratory experiments, in particular, can only provide average values. Motivation, that is whether one has to drive or may drive also intervenes.

Work

The work involved in driving a car consists of the reception of information from the environment, the processing of this information in the brain and central nervous system, its assimilation and the issuing of instructions to the lower structures, that is, the muscles responsible for the proper control of the steering wheel, pedals, etc., and those which control movements of the head and

eyes. In experiments to determine levels of fatigue and the duration of rest periods where thought faculties are being used, only one method has proved admissible to date: mental calculation. Laboratory results give insight into the subject's concentration capacities. In these experiments importance is not given to the accuracy of the mental calculations but rather to the load which the subject can endure and the onset of fatigue. Our aim when applying this method to drivers is not to determine their driving abilities but rather to determine how heavy a load a driver can endure until he reaches a point where the pursuit of his activities is not permissible either for him or for the other road-users whose lives he endangers.

Degrees of fatigue

Four different levels of fatigue have been defined. The first symptoms of the onset of fatigue consist of disorders in the organic systems directly involved: the auditory and optical mechanisms and the muscles being used. The second degree has been reached when the subject himself notices these disorders. Errors in performance occur more frequently and he tries, by exerting his will, to maintain his performance at the previous level. In the third stage those systems of the body which are not in direct use are affected. The driver experiences general fatigue and respectively a fatigue of will-power. In the fourth stage fatigue reaches a level similar to that of exhaustion and eventually the driver has difficulties maintaining consciousness. Under normal circumstances, the body will cease to function, if not earlier, at least at the onset of this stage. The symptoms described vary from individual to individual. They can be partially overcome by motivation in the second and third stages but in the absence of motivation in these two stages, they become more generalized.

Rest periods...

The aim of this survey was to determine maximum resistance and a program of rest periods (relaxation). To this end the experiments were carried out in three phases. In the first phase brief experiments served as a basis for analyzing the relationship between the size of the load and performance, or errors in performance. In the second stage, the aspect of maximum resistance was studied. On each occasion the experiment was only interrupted upon the onset of exhaustion (inability to execute a mental task). The third phase was designed to determine the duration of rest-periods. Thus it was observed that symptoms pointing to a decrement in performance began to appear after two-thirds or three-quarters of the subject's maximum resistance had been reached. This finding indicated that a rest period is imperative after the driver reaches the two-thirds mark of maximum resistance. It is the only means of preventing the onslaught of exhaustion.

...and their duration

Owing to the pause - which takes the form of a recovery period - exhaustion is postponed. One could therefore speak of an increase in maximum resistance. Curiously enough, relatively rigorous relationships have been noted; the increase in maximum resistance is in almost direct proportion to the duration of the recovery period. For example, if under a given load maximum resistance is of 75 minutes, and activity is interrupted by a 10 minute pause after 60 minutes, the increase in the duration of recovery will be 20%. If applied to road conditions, these findings relate to an average driver operation under very precise circumstances. In such a situation, that is 50 minutes followed by a ten-minute pause it is presumed that exhaustion only appears after approximately 300 minutes (respectively 5 hours). If a driver is less resistant he must find another rhythm for example 35 minutes of driving followed by a

nine-minute pause since a less resistant driver must be granted a duration supplement of about 25%. Conversely, a very resistant driver who needs only a supplementary recovery duration of about 10% requires approximately a seven-minute rest period after 70 minutes of driving.

An empirical confirmation

As we have said these figures are the results of laboratory experiments using certain load conditions. Nevertheless they cannot be considered as purely theoretical; on the contrary, they confirm experiments carried out under practical circumstances and to a great extent are in concordance with them. For an average driver - and this applies to about 80% of all persons at the wheel - the 20% supplement is indicated. In other words, practice has established a general, basic rule: after driving for two to three hours in relatively normal conditions, a pause of about half an hour is required after driving for 150 minutes there should be a pause of 30 minutes. This corresponds to a laboratory value of 20% after which the driver can resume his activities for another two to three hours. Of course these indications should be applied with all the necessary flexibility. Apart from personal elements (physical, psychic and mental), external circumstances which determine the conditions of load should also be taken into consideration.

JUST A MIRAGE - by Harvie L. Sims Jr.

Just miles from the city of Mexico a group of foreigners from the United States were making their way to Rio Grande through to Texas. In a old jeep which would soon be the start of a long and timely experience. So stopping in a town not too far from the Rio Grande and the desert. The foreigners stopped to prepare for their venture through the deserts. Driving the jeep was Clara a middle age woman with her two sons, Daniel and Carl. With Daniel was his soon to be wife who was from Nicaragua. Grabbing their bags they purchased a room only to stay for a few days, to rest for their venture across the Rio Grande and the deserts. In their rooms Carl and Daniel checked their maps making certain their route. "It's forty miles across," said Carl looking out of a window near the bed inside the hotel. We must prepare ourselves and the jeep, 'cause if something was to happen there is nothing but desert. "You take care of the jeep Daniel, while I go look for something we may need." The next day they packed all the things they needed for their venture, water food and first aid. But only one thing was left out. They then started their way up the trails. Clara driving like she was being chased by the law. Entering the Rio-Grande they soon made their way to the desert, and soon they had hoped to be in Texas. The day was hot as ever and the jeep was starting to feel the heat just as bad as they. Then, "BAM!" Like a giant tea pot the jeep went off. Now stopped on a road in the middle of nowhere in the middle of the desert, Daniel and Carl got out and started arguing. "Did you check the jeep," said Carl with a sarcastic look about him.

And Daniel answered, "What do you think I did?"

"The jeep is finished," said Carl, "the block busted, somebody didn't put any oil in it."

Slaming the hood Carl then sat, wearing an old U.S. army uniform. They were in the desert too far to turn back. Then Carl pulled out his map and said "We only have 26 more miles to go, and only food for maybe four days."

"But I can't walk 26 miles," said Clara "you will just have to go and come back with help."

"But the walk will take maybe a day or two," said Carl, "Either you walk or die here waiting."

So they grabbed their things and started their hike through the desert. They hiked their way through the desert, a few hours had passed. The sunshine was mean and the temperature was hot. Clera who was the oldest, had started to fall back, Daniel decided to stop and to rest a few minutes. That went on the whole day. .

The next day

Camped under some hills of sand, they slept until morning. That morning they started early before the sun came up. It was nice and cool. That day they hiked pretty far, the sunshine was hot and the temperature was mean. Carl who was up ahead of the others saw something, and the others saw it too. It looked like a town in the middle of the desert. Stopping, Carl pulled out his map, "There are no small towns here on my map," said Carl, "just desert." He waited until the others caught up with him.

"Yes, it's a town," said Clera. Then they all started running, and when they got to the entrance there were some people standing there.

"Welcome, welcome to Sangred."

There were only a few people and mostly old. "Let us show you our town," said an old man who along with all his people were pretty well dressed.

"Sure," said Clera, who was exhausted and ready to do anything the old guy said, because she was attracted by some strange erotic thought.

In the town there were only three buildings, a hotel, a police station, and a court house. Showing Clera, Carl, Daniel and his girl the town, the strange people then made their way to the hotel. "How do you survive out here with out water and food?" said Carl.

"Go now to the hotel," said the old man, "we will answer those questions later."

Stepping inside the hotel Clera, Carl, Daniel and his girl were approached by a young boy. Then a well dressed middle age man came in, "Take their things," he said. "Hello, welcome to SangreN, my name is Professor Summers and I built this town me and my Grandfather. Well what are you names?"

Clera answered, "I am Clera, these are my two sons Carl, Daniel and his wife.

"We're not married yet, Mom," said Daniel.

"We have given you all separate rooms, except Daniel and his wife. We will serve supper in two hours. So I know you must be exhausted from your venture across the desert."

"Yes," said Clera.

"Why isn't your town on my map?" asked Carl.

"Go and freshen up, your question will be answered after supper," said the Professor.

A few hours later sitting at the table in the hotel they had finished. "Now," the Professor said, "Carl there are questions to be answered, come with me down in the basement, I work here alone, and I also accomplish a few experiments. Here look into that barrel."

"Why it's water," said Carl

"Now I created the water from the air in which you now breathe and the food you just ate."

"Yes, Professor it was good," said Carl.

"Yes good wasn't it, it was fungus and cortinariu mushrooms found beneath those big rocks at the edge of the desert. The good flavor was chopped skin of snakes and scorpions."

"I'm sorry Professor," said Carl, "In my mind I sense something wrong."

"It's okay Carl, I know the feeling. Up stairs being entertained by the young boy is Clera and the others. Go and prepare the guest rooms for your rest. I am going to rest too."

"We have one important rule here in Sangred," said the Professor. "When my grandfather and father built this town he intended it to be a place where any old retired person could come and stay his life time if he chose to do so. He

set a small list of town rules only one we insist on being obeyed after ten o'clock. No one must leave their room if any thing is needed there is a little button on the wall switch push that and an assistant will be on the way. If you chose not to obey the crime is punishable by imprisonment thirty days without food and water. For some of the old kids here in town that means their life. So stay in your rooms, breakfast will be served at seven o'clock. Sleep tight."

During the Night

Full and exhausted Clera climbed into bed. She soon felt relaxed and her mind started to wonder. She was dreaming erotic thoughts of her when she was young, dancing with her fellow. In the room next to hers Carl had finally stopped pacing up and down his room wondering when should they leave. He then laid down in exhaustion and closed his eyes. He then opened them and to his surprise he was strapped to a table, above him were white, blinding lights. Carl started to sweat.

"I'm sorry Carl, but I need you to continue my experiments," said the Professor standing next to a table full of chemistry equipment. I am working on a new genetec discovery, did you see that young boy who took your bags and was playing that guitar?"

"Yeah," said Carl.

"That's my grandfather, he's 96 years old. Two years ago my grandfather was sick and on his death bed. I had been experimenting with the interphase and telophase of mitosis, in genes and cell creation. By lowering the base of the amino acid in DNA, this increased his RNA and the function of mitosis started to reverse itself. And now my Grandfather grows younger everyday. I am going to inject you with something Carl, and if it works you will start to grow old."

"Wait! No! Wait!" Carl cried.

Down the hall Daniel and his soon to be wife were asleep and suddenly smoke filled their room. Daniel woke and so did his girl, he then ran for the door, it was jammed. "Fire! Fire!" Daniel yelled and then the door opened, but fire filled the hallways, Daniel then ran back inside. "The window! The window!" he cried, and he broke the glass and together they jumped.

In the dawn sky with the sun beginning to rise, a sandy storm began to clear as a chopper blew sand in all directions on the surface the crew of the craft spotted some movement, on the ground Clera, Daniel and his girl lay unconscious. A distant away laying near a large cactus, rolling in shock was Carl, "Wait! No! Wait!"

The crew of the chopper then radioed their base. "Three Alpha Five! Three Alpha Five! come in. We have spotted the occupants of that jeep."

"Proceed with rescue "Alpha-Eight"."

"Ten four, "Three Alpha Five", ten four."