Safer ironing

If the water tank of a steam iron is damaged, it can cause a short-circuit – involving injuries to persons and the risk of fire. Steam irons therefore have to pass a drop test. This test can now be simulated, saving both time and money.

Every electrical appliance has to have a ‘CE’ label. An abbreviation for ‘Communauté Européenne’, this means that the appliance has satisfied the statutory requirements of the European Union. Additional safety certifications are the ‘GS’ label in Germany and the ‘UL’ standard of the Underwriter Laboratories in the USA. These various seals of approval pose a real challenge to development engineers. Before an iron, for instance, can be put on the market, the manufacturer has to carry out extensive tests: “Every prototype has to survive a fall from a height of one meter onto a slab of wood in the laboratory without compromising the safety of the appliance,” states André Heinrietz of the Fraunhofer Institute for Structural Durability and System Reliability LBF in Darmstadt. “These investigations have always been very time-consuming, as a prototype had to be built in order to carry them out. Then, whenever an appliance failed the drop test, expensive modifications had to be made to the highly complex die-casting mold.” In a joint project with a manufacturer of household appliances, the Fraunhofer research scientists have developed a simulation model that enables this drop test to be carried out at the planning stage – long before the first prototype has been built.

Obviously, a simulation tool of this kind will only be of use to manufacturers if it truly reflects the real-life situation. To test whether the virtual drop test produces the same results as the actual test, the engineers investigated the dynamic processes that take place inside an iron when it falls off the ironing board. Their study proved that cracks appeared in the same place in both the real and the simulated drop tests – namely between the back cover and the tank. The simulation also illustrated the exact path of the damage: First of all, one of the retaining pins on the cover snaps. The cover shifts out of place, causing heavy forces to act on the screw joints. This, in turn, leads to cracks in the wall of the tank. Thanks to the results of the simulation, the engineers were able to redesign the cover. “A minor change to the shape of the cover alters the distribution of forces so that there is no more risk of water escaping from the tank,” explains André Heinrietz. These “computer-aided” methods enabled the scientists to

avoid modifications to the highly complex die-casting mold and thus to save costs. “The simulation tool enables us to reconcile the design and function of steam irons with their operational safety.”For further information:

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