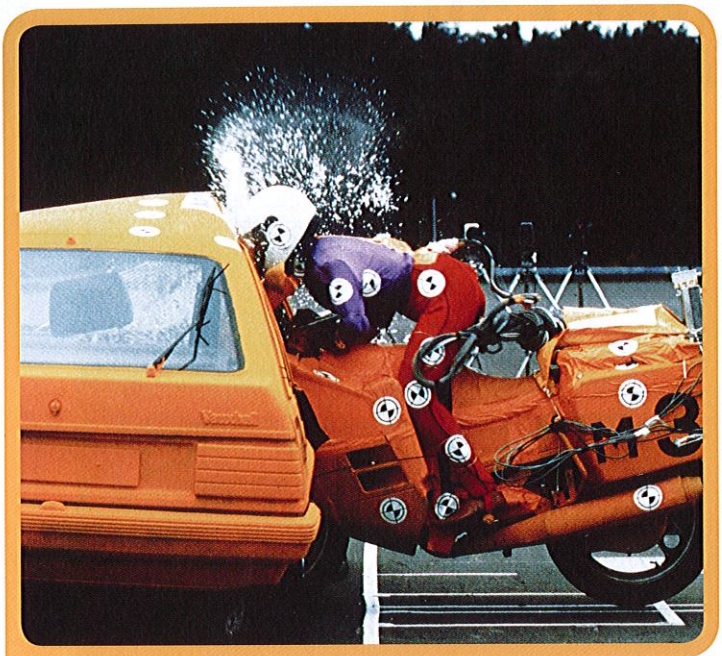

Fig 5.3.1 The crash test dummy on the motorbike continued at the same speed until it hit the car.

If a car is travelling at 60 km/h, then so are you. If the car is involved in an accident, it will stop very quickly (typically in about 0.1 to 0.2 of a second). Unbelted passengers will keep travelling, however, at 60 km/h, until stopped by the windscreen or dash. Our head tends to be the first part of the body struck. Seatbelts provide a restraining force and allow you to decelerate with the car. They also spread the stopping force across the chest and waist. Airbags also allow us to stop with the car.

Science Focus

Project BBQ

Crash test dummies have been used for over 30 years to develop safer cars. Before that, live but anaesthetised pigs were used in crash tests. A large pork BBQ often followed. Human corpses (cadavers) were also used in tests. Accelerometers and force meters were implanted in the cadavers to measure what was occurring. The results from these experiments led to the development of the modern crash test dummy, the Hybrid 3.

Newton's First Law further states:

Anything that is moving will keep moving at the same speed and in the same direction unless a force changes it.

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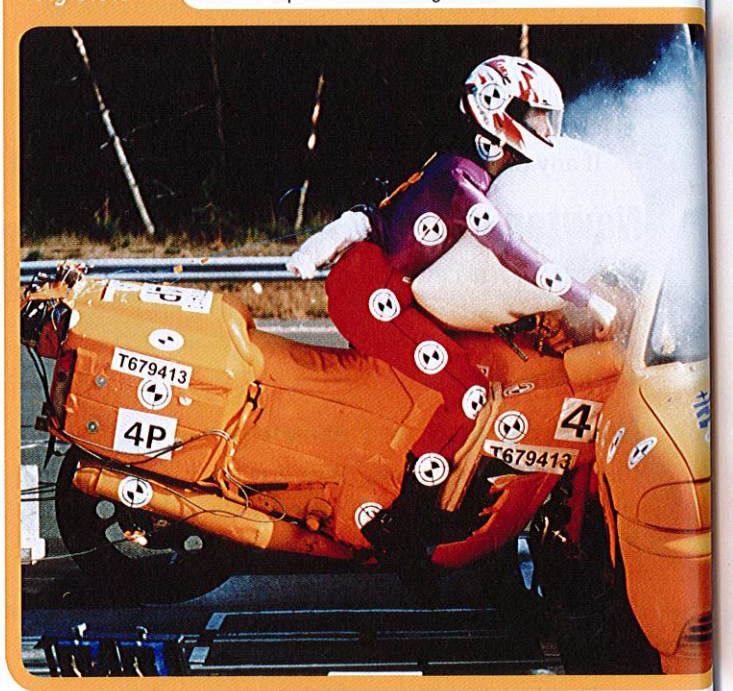
Fig 5.3.3 The crash test dummy on the motorbike with an experimental airbag fitted



Science Focus

Crash test humans

Crash test dummies were first developed by the US Air Force to determine the injuries that pilots would sustain if they ejected from aircraft in flight. Live humans were tested before the invention of the dummies, and Colonel John Stapp underwent 26 tests. In one, he sat in a rocket-powered open sled that accelerated to a speed of 1000 km/h in five seconds, but then was stopped in less than a second. Inertia kept his internal body parts and blood moving and he stated later that he felt as if his eyes would fly out of his skull. Blood vessels in his eyes burst and they bled profusely for 10 minutes after the test. His lungs also collapsed, but he recovered quickly, proving that it was possible to survive such extreme forces.

Fig 5.3.2 Inertia 'pushes' John Stapp back as he accelerates, and his body continues moving forward when the sled stops.