SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF AUTOMOBILE ENGINEERING

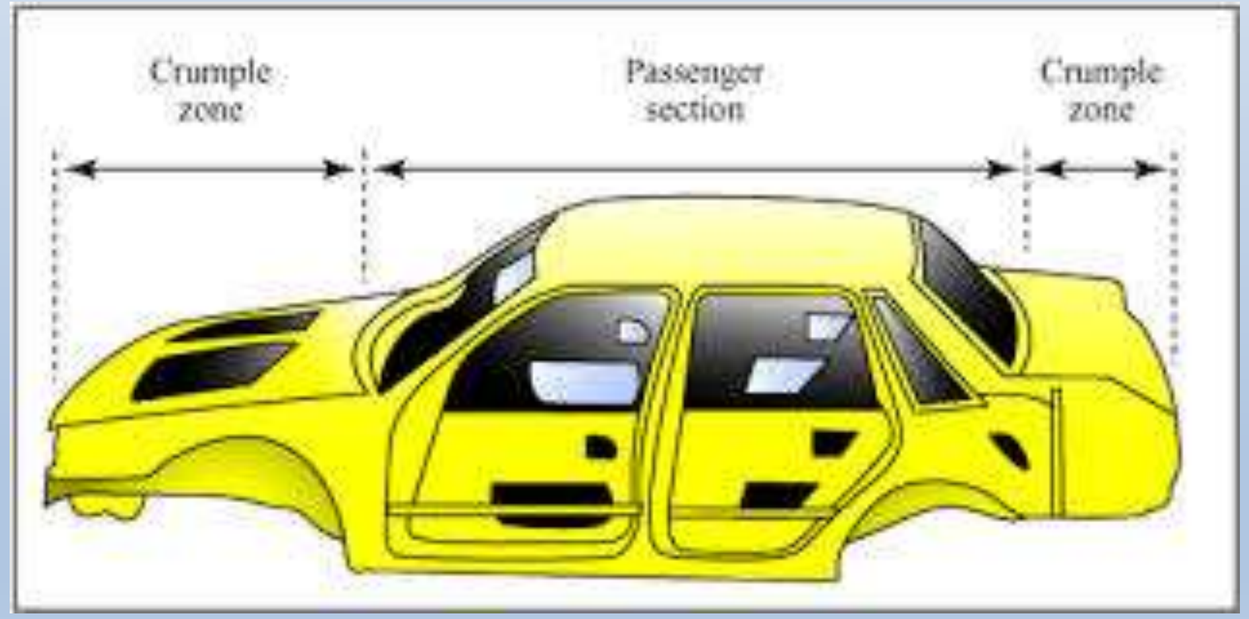
19AUE302 – AUTOMOTIVE SAFETY & INFOTRONICS

III YEAR / V SEM

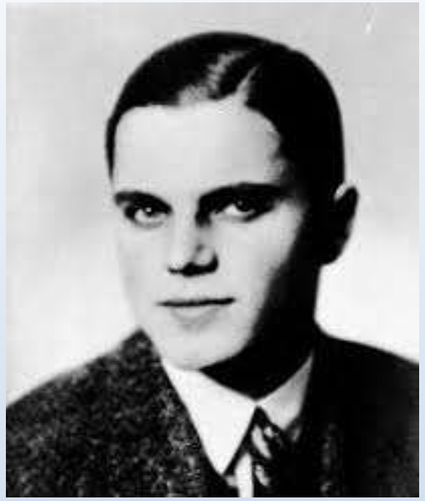
UNIT – 1 INTRODUCTION

Topic – 7 Crumple Zone

Crumple Zone

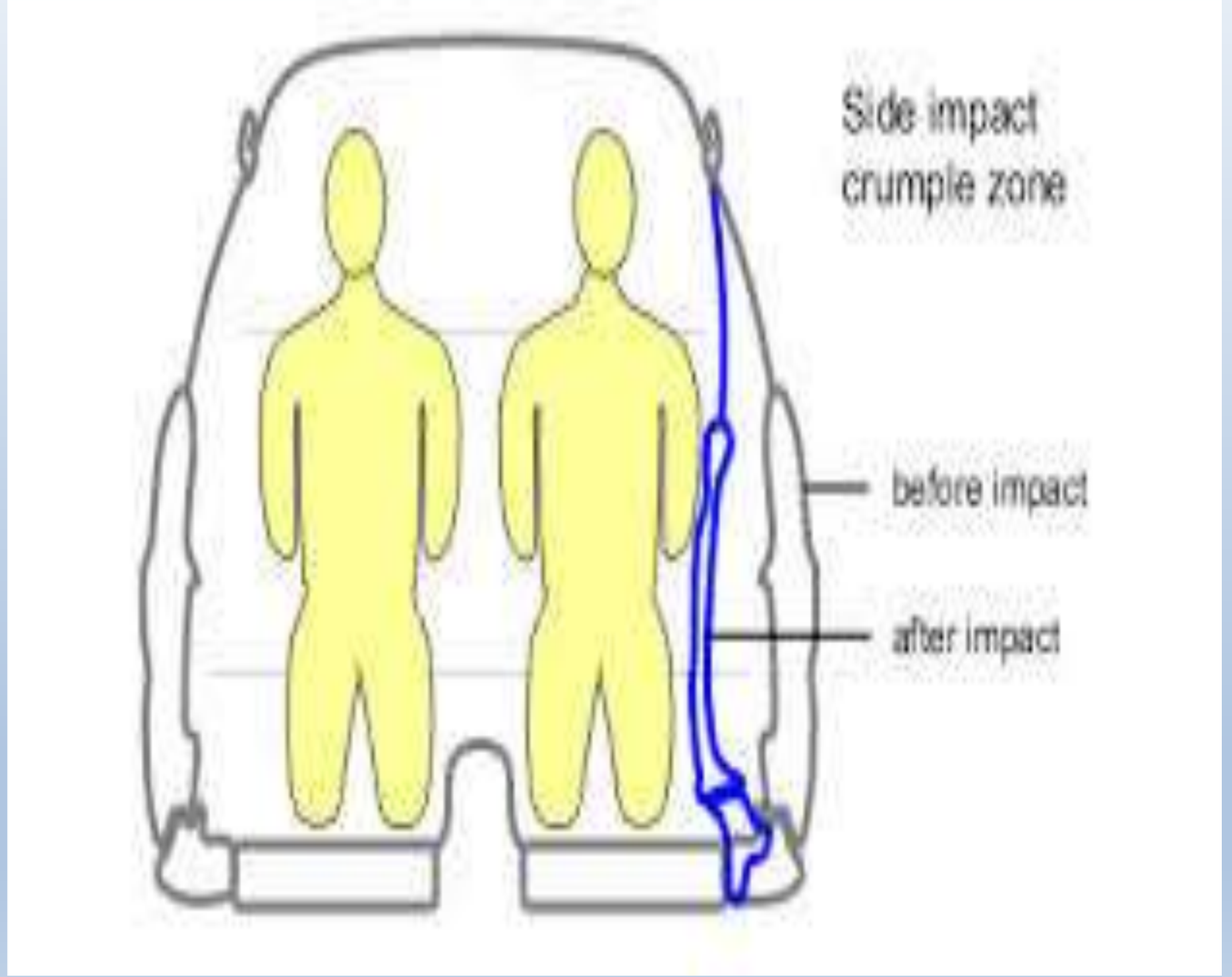


The 1959 Mercedes-Benz 220S/220SE.
The first crumple zone vehicle.



The crumple zone concept was invented and patented by the Austrian Mercedes-Benz engineer Béla Barényi originally in 1937 before he worked for Mercedes-Benz and in a more developed form in 1952

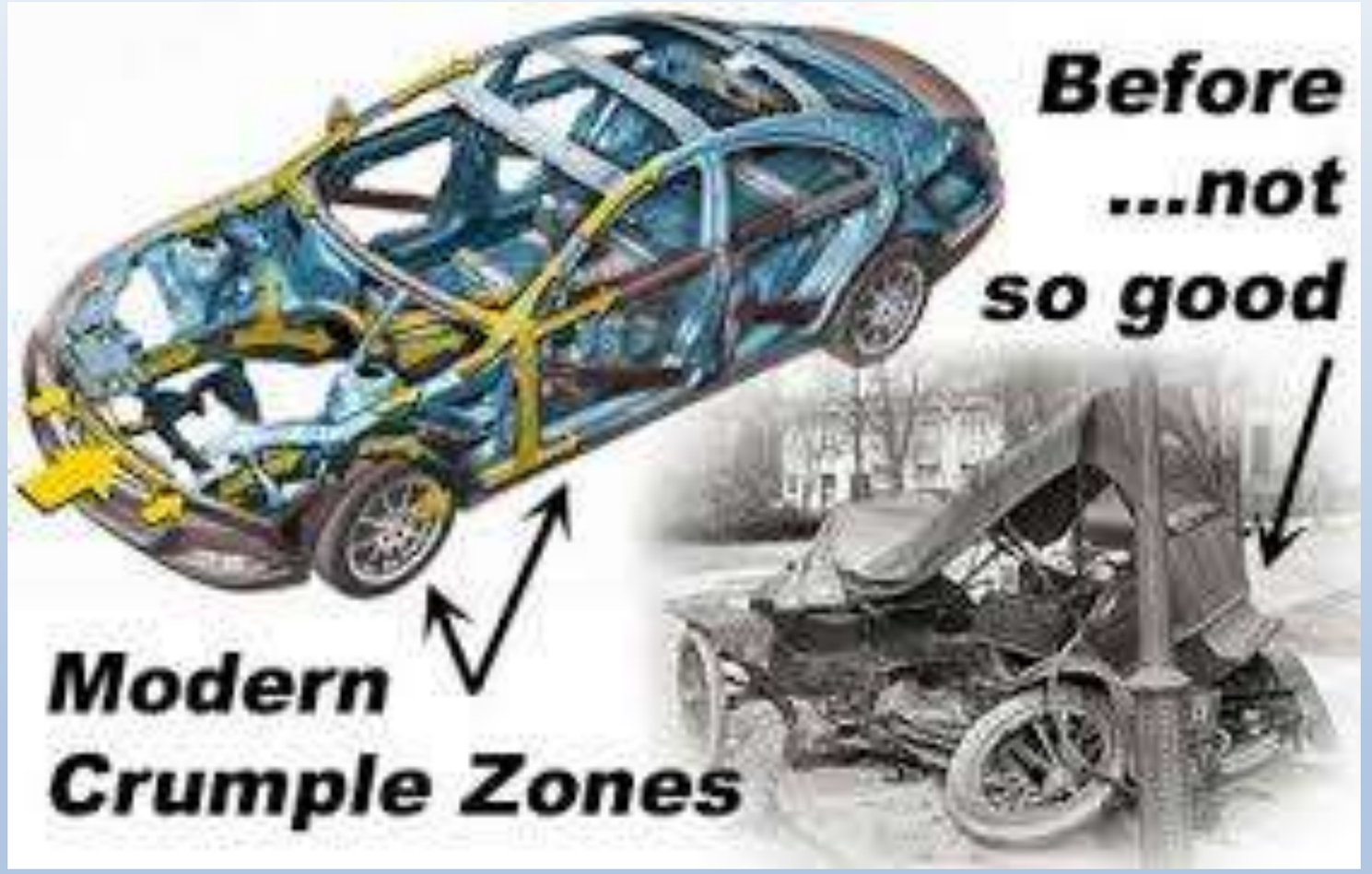
He prevailed that a safe car has to be rigid. He divided the car body into three sections: the rigid non-deforming passenger compartment and the crumple zones in the front and the rear. They are designed to absorb the energy of an impact (kinetic energy) by deformation during collision.


Side impact
crumple zone
before impact
after impact

The crumple zone is a structural feature mainly used in automobiles and recently incorporated into railcars.

Crumple zones are designed to absorb the energy from the impact during a traffic collision by controlled deformation by crumpling. This energy is much greater than is commonly realized.

Typically, crumple zones are located in the front part of the vehicle, in order to absorb the impact of a head-on collision, though they may be found on other parts of the vehicle as well. According to a British Motor Insurance Repair Research Centre study of where on the vehicle impact damage occurs: 65% were front impacts, 25% rear impacts, 5% left side, and 5% right side.

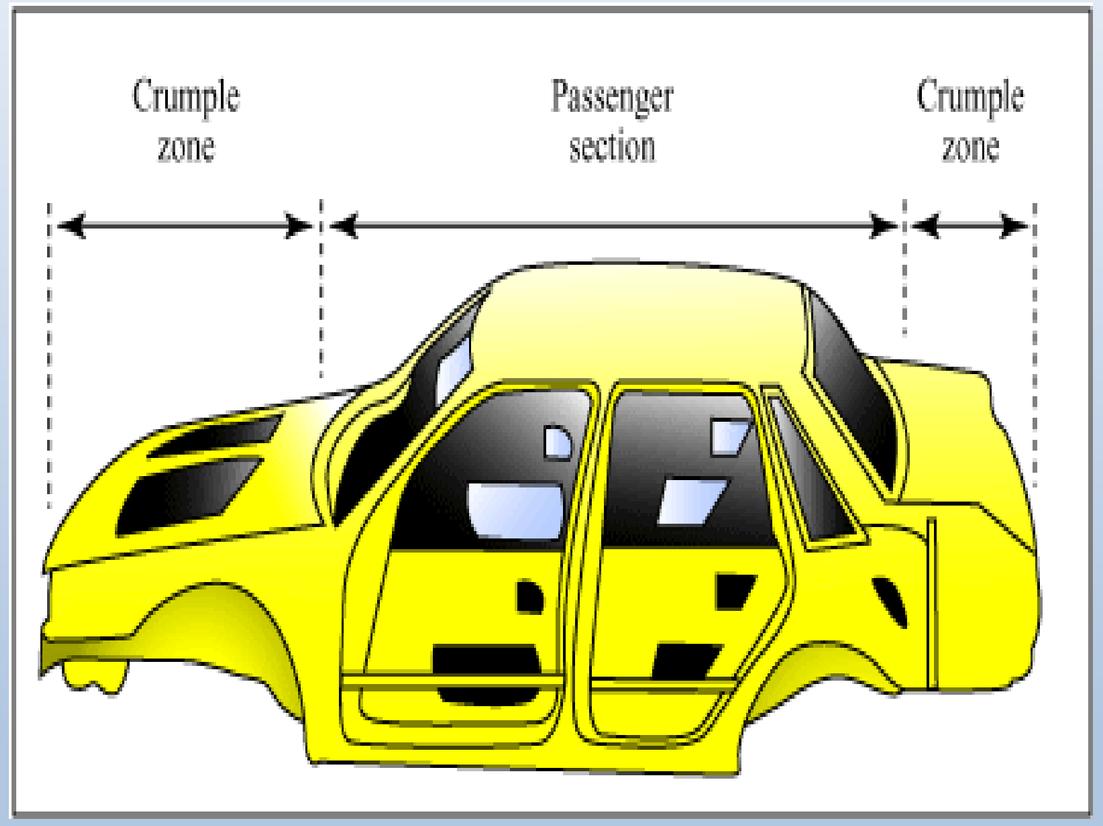

Before
...not
so good
Modern
Crumple Zones

Crumple zones work by managing crash energy, absorbing it within the outer parts of the vehicle, rather than being directly transferred to the occupants, while also preventing intrusion into or deformation of the passenger cabin.

This better protects car occupants against injury. This is achieved by controlled weakening of sacrificial outer parts of the car, while strengthening and increasing the rigidity of the inner part of the body of the car.


Rear crumple zone
Seat belt
Airbag
Front crumple zone

POTENTIAL ENERGY



- The crumple zone of an automobile is a structural feature designed to compress during an accident to absorb energy from the impact
- Typically, crumple zones are located in the front part of the vehicle, in order to absorb the impact of a head-on collision, though they may be found on other parts of the vehicle as well
- Some racing cars use aluminum or composite honeycomb to form an 'impact attenuator' for this purpose

FUNCTION OF CRUMPLE ZONE

- Crumple zones work by managing crash energy, absorbing it within the outer sections of the vehicle, rather than being directly transmitted to the occupants, while also preventing intrusion into or deformation of the passenger cabin