

PSA PEUGEOT CITROËN



Direction Technique et Industrielle

User aspects of “Probabilistic approach”

Dr. Kai Frederik ZASTROW,
PSA Peugeot Citroën,
Vehicle Safety Regulations

PSA Peugeot Citroën consequence classes

<i>Level</i>	<i>Definition</i>	<i>Comments</i>
1	Unsatisfactory or dysfunction of a vehicle function	General vehicle performances remains available. The driver can use its vehicle. No necessary maintenance.
2	Loss of a vehicle function	Undesired phenomena appear. The vehicle is still usable by the driver but a maintenance operation is quickly needed.
3	Vehicle not available for the driver	Impossible to start any journey Impossible to end the journey due to loss of any major vehicle function or non-respect of the regulation (risk of fine) Impossible to park the vehicle (risk of inviolability)
4	Risk of any injury for human	May involve a crash or any human injury

⇒ Any human injury is completely unacceptable: probability of failure = 10^{-9} .
Following events have to be avoided:

- ⇒ Injury due to components projection because of pressure effect (cylinder burst)
- ⇒ Risk of fire or explosion.
- ⇒ Injury due to high pressure jet

User aspects

Deterministic approach vs Probabilistic approach:

- Current deterministic approach: safety margins coupled with high requirements (5000 cycles with safety factor 3) with small number of samples (2 for burst test).
- Probabilistic approach: higher number of tested samples with lower safety margins.

Choice between both approaches based on end-user goals:

- Safety must be ensured
- Reduced cost of mass produced cylinders with appropriate design
- Consideration of approval cost