

Pole side impact

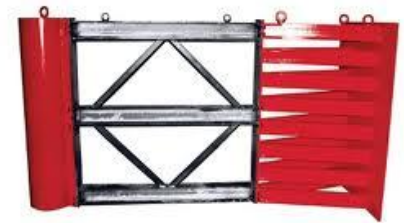
Cost / Benefit study, French data

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Objectives

- Evaluate the cost / benefit of vehicle technical evolution
- Regarding side impact
 - Injury changes in barrier side impact
 - Injury changes in pole side impact



Data base used

- BAAC data base (ONISR)
 - French National data 2009
 - Police forces data collection
 - M1 and N1 passenger vehicles
 - Fatalities and serious injuries distribution



M1 vehicles	Fatalities: pole side impacts	Fatalities: barrier side impacts	Fatalities: all side impacts
ONISR year 2009	167	307	474

Serious injuries: pole side impacts	Serious injuries: barrier side impacts	Serious injuries: all side impacts
312	1301	1613

N1 vehicles	Fatalities: pole side impacts	Fatalities: barrier side impacts	Fatalities: all side impacts
ONISR année 2009	11	14	25

Serious injuries: pole side impacts	Serious injuries: barrier side impacts	Serious injuries: all side impacts
6	95	101

French Fleet

- M1 French fleet (year 2009)
 - 30.85 Millions
- N1 French fleet (year 2009)
 - 5.75 Millions
- Ratio (fatalities + severe injuries) vs fleet



Gravity (Fatalities + severe injuries) per million vehicle	Pole side impacts	Barrier side impacts	All side impacts
M1	16	52	68
N1	3	19	22

French fleet renewal

- Takes about **14 years in France** to renew completely M1 and N1 car fleet
- Used to calculate cost / benefit evolution (progressive increase of new M1 and N1 designed cars into the fleet)

French social cost

- Positive effect on Fatalities and Serious injuries reduction
 - For year 2009 in France
 - 1.2 M€ per Fatality
 - 0.132 M€ per Serious injured people
- Negative effect of weight increase on fuel consumption and CO₂ emissions
 - EEVC WG13 and WG21 Subgroup, Report: Analysis to estimate likely benefits and costs for the EU of modifying Regulation 95
 - Not taken into account for the cost/benefit calculation



Technical evolutions

Technical requirement

No pole side impact requirement

ECE 95 and EuroNCAP 13 points (2008 protocol)

FMVSS 214 (PSI 75°, 32kph)

Technical cost and additional weight for M1 and N1 vehicles

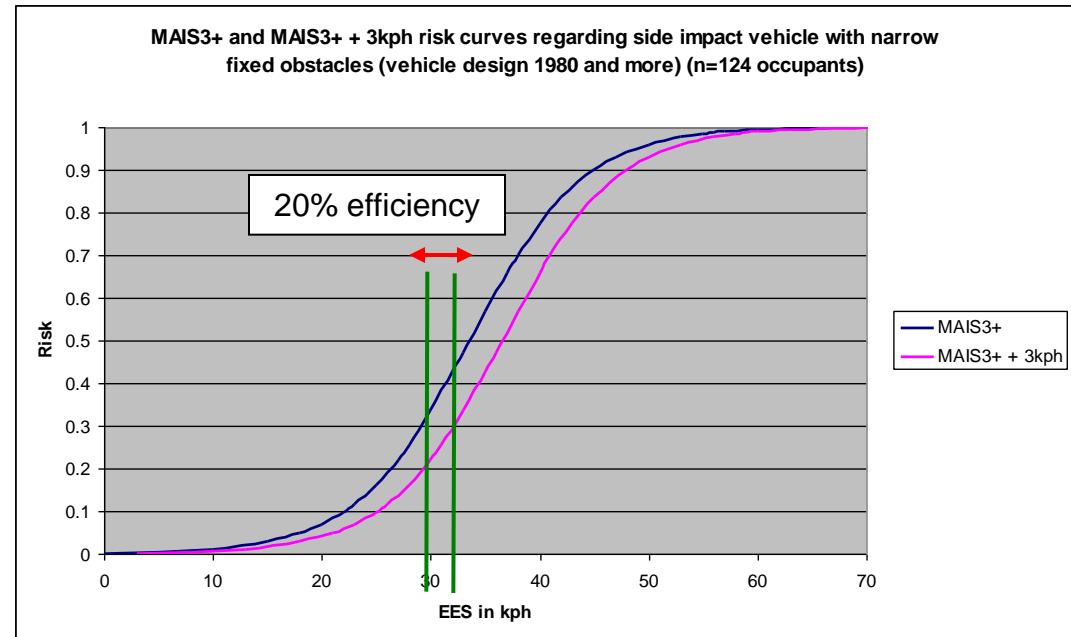
- Upgrade of vehicle to meet proposed regulatory option requirements -> Pole test Baseline (Euro NCAP 13 points)
 - Additional cost
 - Source EEVC studies: 290€ to 348€ / vehicle
 - Additional weight : 13 to 20kg
- Upgrade of vehicle to pole side impact 75° / 32 kph
 - Additional cost
 - Source NHTSA 2004 studies: 84€ to 223€ / vehicle
 - Source France: 50€ to 60€ / vehicle
 - Additional weight : 7 to 15kg
- Total cost used for calculation: 340€ to 408€ / vehicle
- Total weight: 20 to 35kg

Potential reduction of Fatalities and Serious injuries

- Benefit evaluation of
 - New side impact safety systems on cars: Curtain Airbags
 - Structural changes: car stiffness, side body and doors
- Gain with new side impact safety systems and car stiffness -> **34% potentiel efficiency** (source: LAB studies)

Potential reduction of Fatalities and Serious injuries

- Benefit evaluation regarding pole side impact implied by the new requirements on pole side impact (32kph – 75°) of
 - Modified restraint system: optimised airbags,...
 - Structural changes: increased reinforcement,...
- Regarding the figure moving from 29kph to 32kph pole side impact will bring a maximum of **20% potential efficiency** on fatalities and serious injuries.



M1 Results

M1 Potential reduction of Fatalities and Serious injuries

Total		
Severe injuries	Fatalities	Gain (M€)
4150	1326	2139

Technical cost per vehicle (euros)		French fleet	Technical cost for all the French fleet (MEuros)	
Minimal cost	Maximum cost	Million vehicles	Minimal cost	Maximum cost
340	408	30.85	10,489	12,587

- After 14 years French fleet renewal
 - Severe injury benefits: 4 150 involved people
 - Fatality benefits: 1 326 involved people
 - Social benefit: 2 139 M€
 - Technical cost: between 10 489 M€ and 12 587 M€

M1 Cost/Benefit calculation

Cost / benefit ratio		Balanced cost / benefit ratio
Mini	Maxi	En Euros
4.9	5.9	69

- After 14 years French fleet renewal
 - Cost / benefit ratio: **between 4.9 and 5.9** (>1 not good)
- Technical cost balance: **69 Euros per vehicle**

N1 Results

N1 Potential reduction of Fatalities and Serious injuries

Total		
Severe injuries	Fatalities	Gain (M€)
241	73	119

Technical cost per vehicle (euros)		French fleet	Technical cost for all the French fleet (MEuros)	
Minimal cost	Maximum cost	Million vehicles	Minimal cost	Maximum cost
340	408	5.75	1,955	2,346

- After 14 years French fleet renewal
 - Severe injury benefits: 241 involved people
 - Fatality benefits: 73 involved people
 - Societal benefit: 119 M€
 - Technical cost: between 1 955 M€ and 2 346 M€

N1 Cost/Benefit calculation

Cost / benefit ratio		Balanced cost / benefit ratio
Mini	Maxi	En Euros
16.4	19.6	21

- After 14 years French fleet renewal
 - Cost / benefit ratio: **between 16.4 and 19.6** (>1 not good)
- Technical cost balance: **21 Euros per vehicle**

Potential reduction of Fatalities and Serious injuries with vehicle ESC equipped

- Benefit evaluation of ESC (regulation)
 - Pole side impact avoidance -> **34% potentiel efficiency** (source: EEVC)
- Benefit evaluation regarding pole side impact implied by the new requirements on pole side impact (32kph – 75°)
 - -> **20% potential efficiency**

M1 (with ESC) Results

M1 Potential reduction of Fatalities and Serious injuries

Total		
Severe injuries	Fatalities	Gain (M€)
4007	1249	2028

Technical cost per vehicle (euros)		French fleet	Technical cost for all the French fleet (MEuros)	
Minimal cost	Maximum cost	Million vehicles	Minimal cost	Maximum cost
340	408	30.85	10,489	12,587

- After 14 years French fleet renewal
 - Severe injury benefits: 4 007 involved people
 - Fatality benefits: 1 249 involved people
 - Social benefit: 2 028 M€
 - Technical cost: between 10 489 M€ and 12 587 M€

M1 Cost/Benefit calculation

Cost / benefit ratio		Balanced cost / benefit ratio
Mini	Maxi	En Euros
5.2	6.2	66

- After 14 years French fleet renewal
 - Cost / benefit ratio: **between 5.2 and 6.2** (>1 not good)
- Technical cost balance: **66 Euros per vehicle**

N1 (with ESC) Results

N1 Potential reduction of Fatalities and Serious injuries

Total		
Severe injuries	Fatalities	Gain (M€)
238	68	113

Technical cost per vehicle (euros)		French fleet	Technical cost for all the French fleet (MEuros)	
Minimal cost	Maximum cost	Million vehicles	Minimal cost	Maximum cost
340	408	5.75	1,955	2,346

- After 14 years French fleet renewal
 - Severe injury benefits: 238 involved people
 - Fatality benefits: 68 involved people
 - Social benefit: 113 M€
 - Technical cost: between 1 955 M€ and 2 346 M€

N1 Cost/Benefit calculation

Cost / benefit ratio		Balanced cost / benefit ratio
Mini	Maxi	En Euros
17.3	20.8	20

- After 14 years French fleet renewal
 - Cost / benefit ratio: **between 17.3 and 20.8** (>1 not good)
- Technical cost balance: **20 Euros per vehicle**

Synthesis

Not ESC equipped

Cost / benefit ratio		Balanced cost / benefit ratio
Mini	Maxi	En Euros

M1 vehicles	4.9	5.9	69
N1 vehicles	16.4	19.6	21

ESC equipped

Cost / benefit ratio		Balanced cost / benefit ratio
Mini	Maxi	En Euros

M1 vehicles - ESC equipped	5.2	6.2	66
N1 vehicles - ESC equipped	17.3	20.8	20

Conclusion

- Results give a technical extra cost per vehicle 4 to 6 time higher than fatalities and serious injuries benefits for M1 and 16 to 20 time higher for N1.
- Human benefit versus technical cost balance is about 66 Euros per M1 vehicle and 20 Euros per N1 vehicle.
- Not economically interesting to push such a test as regulation.
- Nevertheless, the decrease of fatalities and serious injuries is not unimportant.



Questions?

Thank you
for your attention