Comparison Tests of Motorcycle Helmets Qualified to International Standards

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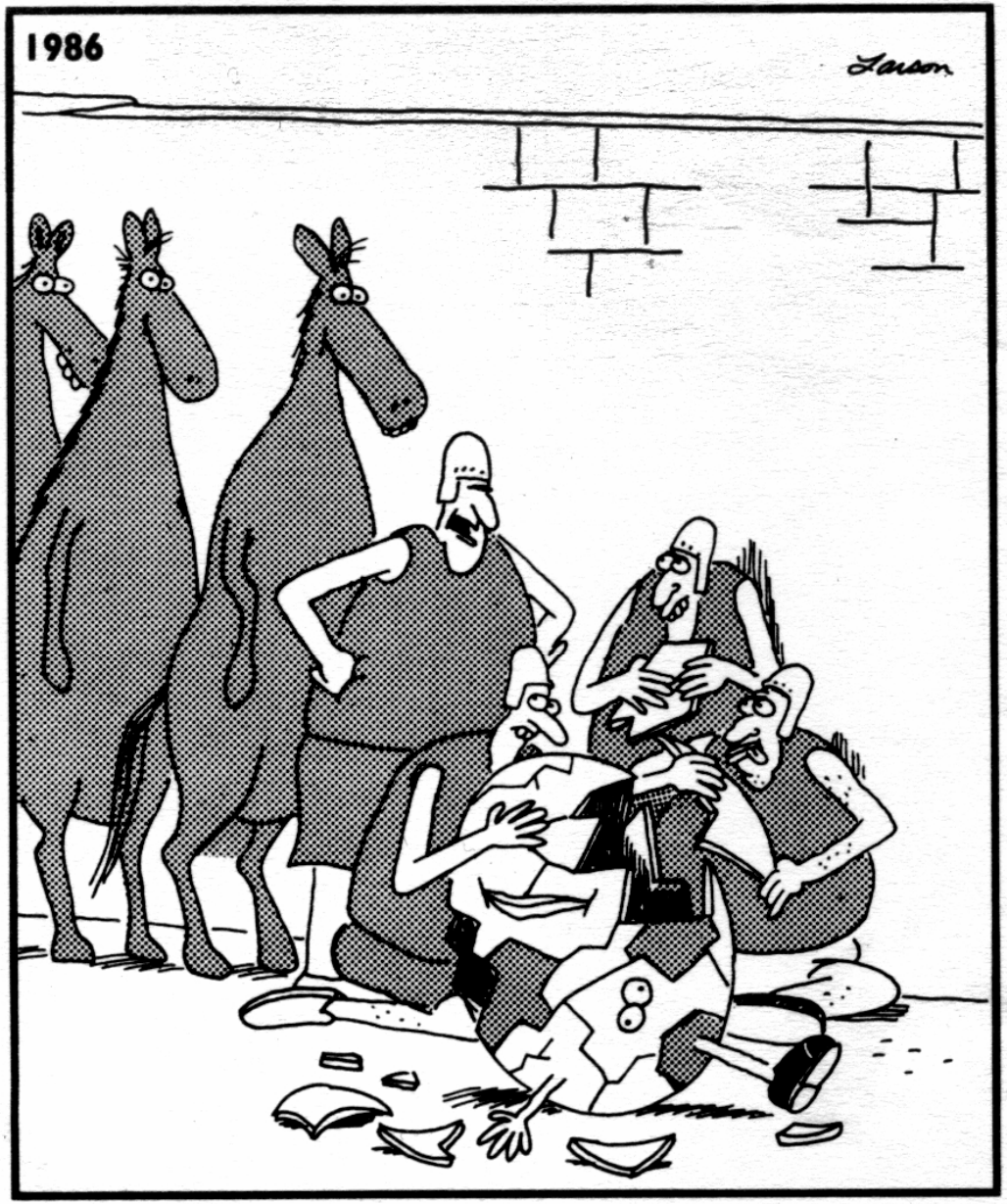


"OK, OK, you guys have had your chance—
the horses want another shot at it."

Motorcycle Helmet Standards

- FMVSS No. 218 (DOT)
  - Mandatory* for motorcycle use
  - (* but poorly enforced)
- Snell Memorial Foundation
- British Standards Institution 6658
- ECE 22.05 (European Commission)

2005 Real-World Tests

- 2 & 3 meter drop heights
- Flat pavement impact surface
- Aggressive metal edge impact
- One impact per site

Real-World Tests

- Two and three meter drop heights represent 90^{th} and 99^{th} percentile impacts

Real-World Tests

- Flat pavement impact surface--Just like the roads we crash on.
- Hurt Study found 87% of all helmet impacts to be against flat surfaces
- 71% of the impacts on pavement

Real-World Tests

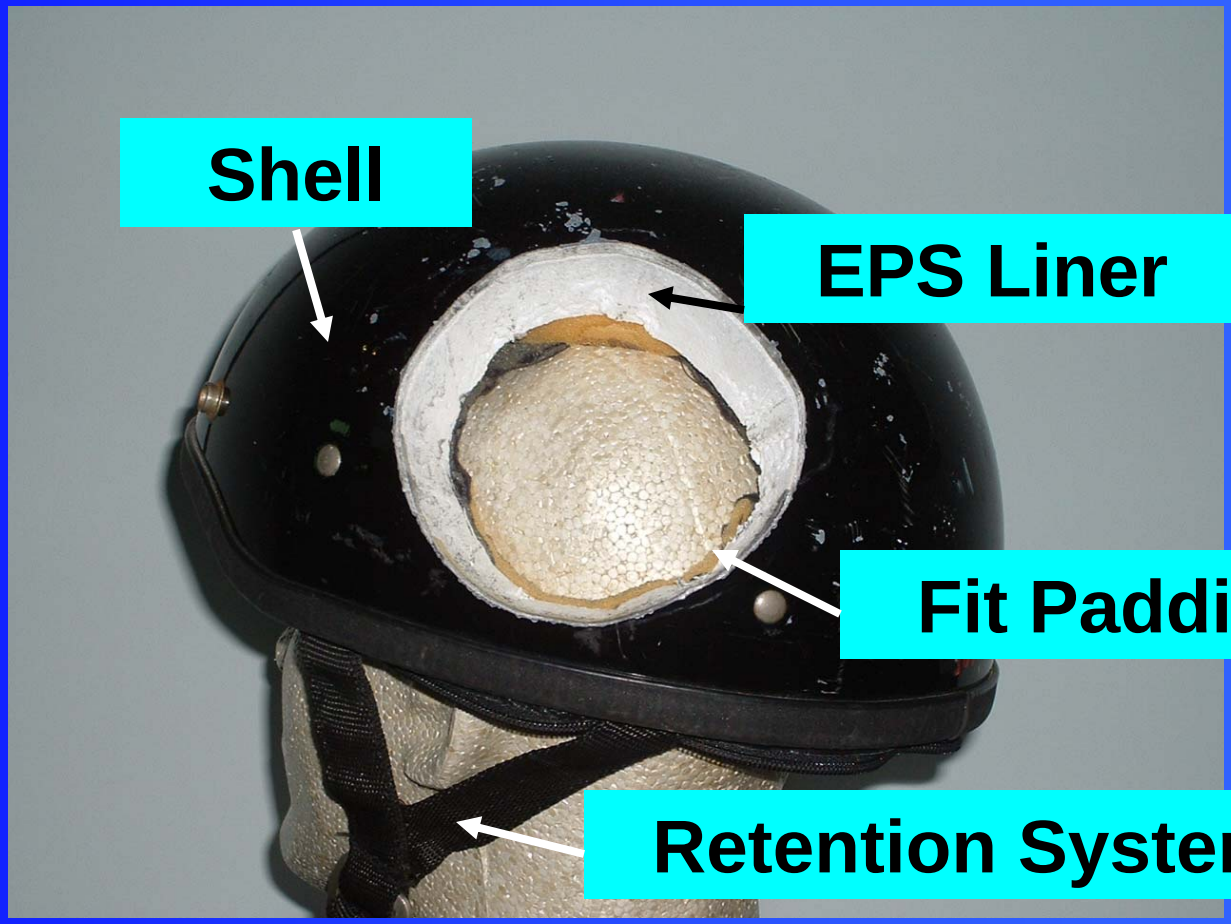
- Aggressive metal edge impact surface
- Because there are 11% things out there to hit that are not flat.

Real-World Tests

- One impact per site--Just like real crashes
- Hurt Study found 91% single critical impact
- Only 6.3% had any second impact at the same site…and at far lower energy

Monorail Test Apparatus

Helmet Components



One Part EPS Liners

Two-Part EPS Liners

Multi-Part EPS Liners

Crush-Zone EPS

1992 & 2005 Tests

Standard	1992 10 foot (3m)	2005 3 meter (9.8 ft)	% change
DOT	254g	182g	-28.3
DOT-BSI	None Tested	207g	NA
DOT-ECE	None Tested	191g	NA
DOT-Snell	252g	223g	-11.5

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Lower Acceleration is Better

- There is no “magic” line at 300g: 299g is no better than 301g
- “Future improvements are more likely to come from ***reduced acceleration limits*** than from increased impact energy requirements.” (Hurt, 1993)

Lower Acceleration is Better

- DOT's effective limit is 250g
- European ECE 22.05 limit 275g
- European COST 327 proposed standard has a limit of 180g for some impacts

Conclusion:
helmets are better now.

More Conclusions

- Full face helmets have better impact attenuation in 2005 than in 1992
- Helmets are available in the US meeting European standards & DOT
- The standards met correlates well with impact performance in realistic tests
- DOT-only performs best, followed by ECE, BSI and Snell qualified helmets

More Conclusions & Some Problems

- More riders are wearing:
  - Nothing
  - Partial coverage helmets
  - Fake helmets

Thank you for your attention !

Internet Resources

- AMA – ama-cycle.org
- Collision Dynamics- ci-dynamics.com
- DOT-NHTSA – nhtsa.dot.gov
- Dynamic Research – dynres.com
- HPRL – hprl.org
- Motorcyclist– motorcyclistonline.com
- MSF – msf-usa.org
- Snell Foundation – smf.org