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 90th and 99th 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

- Shell
- EPS Liner
- Fit Padding
- Retention System
One Part EPS Liners
Two-Part EPS Liners
Multi-Part EPS Liners
Crush-Zone EPS
### 1992 & 2005 Tests

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<th>2005 3 meter (9.8 ft)</th>
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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