Unclassified

20226-Improving Bullet Pull

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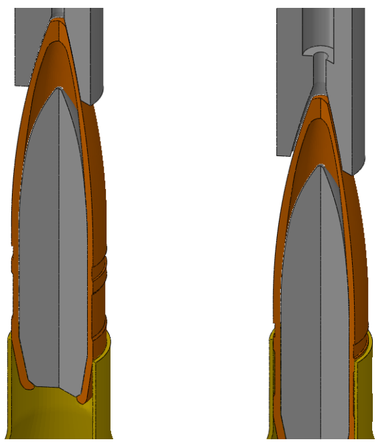
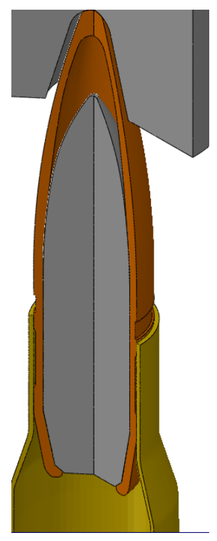
22 Finite Element Analysis (FEA) Simulations were used to develop a hypothesis for the cause of lower than allowable Bullet Pull forces



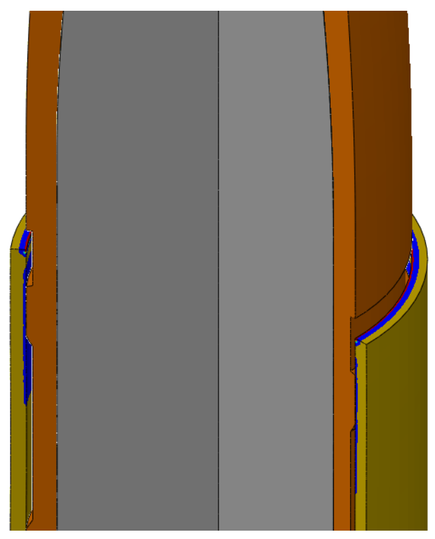
1 Bullet Insert

A single Bullet Insert simulation provides the initial state for 3 levels of "overlap" (case overhanging cannelure) in Bullet Seating. Case/bullet material models match the anneal and/or cold work state of the manufactured components

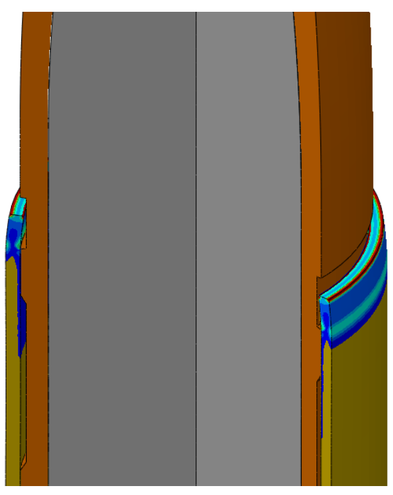
Each of the 3 levels of Bullet Seating are initial states for an additional 3 levels of Case Crimping that produce the 3 levels of "engagement" (case material crimped inside cannelure) for subsequent Bullet Pull. Color contours indicate accumulating plastic strain in the case as the bullet is inserted, seated, crimped, and pulled.



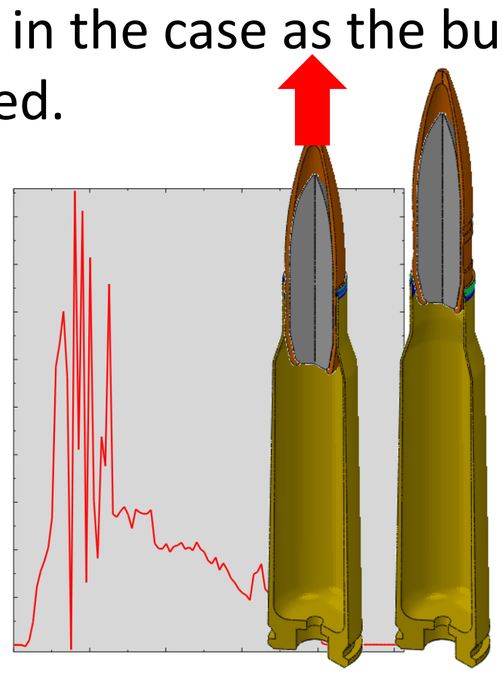
2-4 Bullet Seat



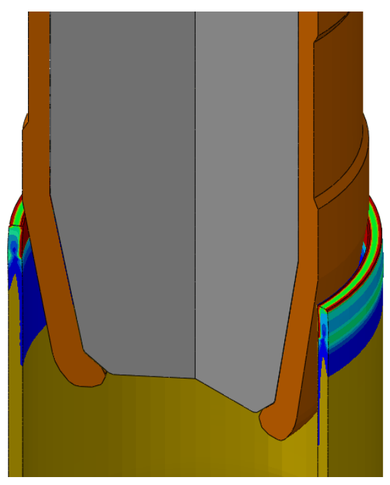
Seated Bullet



5-13 Crimped Case

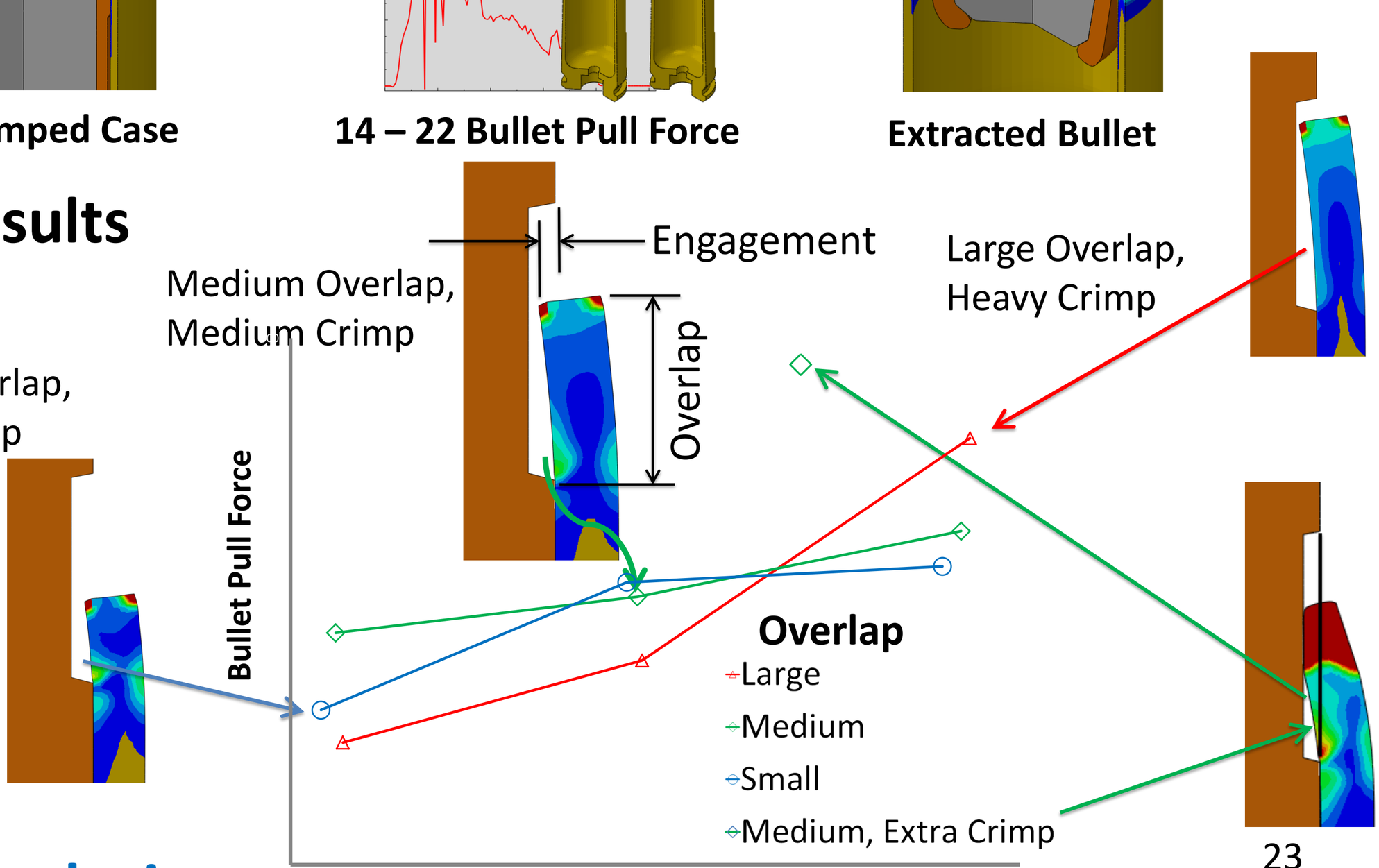


14 – 22 Bullet Pull Force



Extracted Bullet

FEA Results



FEA Conclusions

- Established the physics of the root cause of low Bullet Pull
- Instructed the use of physical measurements from troubled cartridge lots
- Guided the setup of physical experimentation to prove root cause
- Bullet Pull increases with Engagement—change process to increase minimum engagement via crimp displacement and force procedures; restrict maximum cannelure diameter
- Long Overlap with insufficient crimp has the lowest Bullet Pull—establish upper limit on Overlap via component/assembly tolerance changes