Blast testing debrief

Blast 1
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200 gram 50/50% PETN/TNT
Pick prod #1
Back hand clean, maybe do not need rear hand shield
Front hand rubber glove split down the side
Rear handle bent, most likely based on hitting the wall in the mine
Prod is bent somewhat but is fully connected
Hand shield is damaged in multiple places on the outside
Inside is clean, Kevlar leaking out near bottom, stitching and seams coming apart a little bit
Shield is sliding is down on handle

MIT clipper #1
Metal anvil free part is missing
Arm support cuff is folded over and dinged up on the back edge, possible due to wall hit
Hinge bolt is gone, this one was a through hole, not threaded, so blade was released
Vegetation holder is mostly gone, torn off
Mushroom head on pull rod held and pull rod head, so blade was retained
Fixed blade is bent back 90 degrees or so, pull tore through part of main tube
Tape over back end of tube blew out, suggesting blast ducting
Fixed handle is almost torn off completely, unclear if this is a result of blast ducting or wall hit
Spring stayed in place
Hinge bolt stayed in place
The pull rod pin stayed in place, but is somewhat exposed, perhaps overlap with pin and wall could be better
Blast shield is completely gone, nylon exterior ripped open, Kevlar came out, need to stitch through outer shell
Hand was shredded, no more piano playing

German clipper
Main tube bent, may be due to wall hit as well as direct blast coupling
Lost the serrated vegetation retainer, bolts stayed but heads are missing, threaded bolts tend to stay in their holes
Piece of plastic at the head mount disappeared
Kink in the tube at the rear adjustment slot
Retaining clip on the handles was lost, may be due to wall hit
Handles were bent over some, may be due to wall hit
Main tube leading edge is somewhat damaged
Tube is dirty inside
Clipper generally did well

Blast 2
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240 grams
Pick prod #2
Much like the first, but bent more
Some seam ripping at the bottom edge
Some stitching coming apart on the back face
Rear hand is OK
Front hand is missing two pieces of rubber, quarter sized and JFK half dollar sized, rubber is missing, this parts of the hand were not behind the blast shield and might have been hit

Visor
Anti fog clip came off and was lost
Roll bar was pushed up to the top of the visor just over the edge and stopped
Visor is pitted and scratching
Pretty dirty
Fog deflector is marked up somewhat, but is fully intact

Vest
Velcro opened up
Numerous small holes in the outer fabric layer
Apparently no holes in the black fabric on the shield layer inside
One plastic clip broke apart

Head
Some dissolving of foam and flat nose are from solvent spray and from shipping
Lots of pitting on the neck
Pink foam in the neck hole is damaged
Pink foam is cracked in many places, possibly from rapid expansion

Blast ducting tests
1 Control - open tube
Tape blown out and round disk is gone
Half tube bent somewhat

2 drilled holes
Tape blown out and round disk is gone
Did not bend at all

3 cut and pressed vents
Tape blown out and round disk is gone
Bent at all of the slits, were pointed up or might have torn in half

MIT Clipper #2
Polycarbonate is completely gone
Rivet holding it on is gone too
Threaded hole on fixed blade is cracked to outside edge but held
Spring vegetation holder is attached but straightened out, flying in the wind
Clipper head bent up 90 degrees
Nut is loose but retained (polycarbonate was missing)
Duct reducing shield on front of tube stayed
Tape over back end of main tube is blown out, tape was masking tape
Free handle smashed into the back end of the main tube and was bent and creased somewhat
Back handle separated, welds on gussets ripped off, handle pushes up tearing the bottom of the weld first
Spring came out, probably because parts separated, spring might be used as a secondary attachment
Hand has 4 holes or tears on the back, these may have been where the hand was not covered by the shield
Some char on hand near the blast ducting
Shield came off completely, but was probably there protecting the hand, might not have been bolted through the plastic
Shield took many hits and was very dirty even though it separated
Plastic from the shield came out and was gone
Velcro tore right off
Blast 4
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50 grams

MIT Clipper #3
Head is bent up 90 degrees
Polycarbonate anvil and rivet are gone
Vegetation holding spring is completely gone, looks like a bad weld, could be a real QC issue
Bolts hold, rivets do not, welds mostly do if done right
Ducting tape is mostly intact and is in place, cut along half of the edge, possible from sucking back in
Stuff blown out maybe give flaps so all tape was sucked and cut
Plastic is missing from the hand guard
Hand is intact
No blast ducting marks
Frames intact but is somewhat twisted

Remaining 6 duct tests
All tape blew out again, including one mostly covered, not clear that ducting was the problem or the low pressure wave pulled them off

Other notes:
Next time, if we do these small charge sizes, we can do them outside the mine
Figure out what bolts are, they came from Fred's shop
Try a bent tube to see if the blast can be ducted around a bend
Try filling the tube with material