

## Results obtained during wall breaching research

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### BACKGROUND

During hostage release operations the need exists to breach a single or double brick (masonry) wall. The need prescribes a charge that produces minimum flying debris on the inside of the building and a safety distance as small as possible to protect the operator on the charge side of the building.

Test walls (double and single brick walls) 3 m wide by 2 m height were used for testing different charges and their effects due to the different charges. The loop charge was found to be the most promising solution for the problem.

AUTODYN was used to simulate the charges on the masonry walls to compare with the real results.

### OBJECTIVE

The project objective was to:

- Change the configuration of the loop charge to improve the penetration of the masonry walls
- To understand the physics of what is happening inside the wall directly after the detonation and the application of this knowledge in the improvement of the charge
- Measure the shock/stress waves in the masonry material and then in the wall as a whole
- Develop and manufacture a simulated wall for evaluation to save time and money during training and research
- Compare test results with simulations conducted on AUTODYN.

### RESULTS

Scientists experimented with commercial charges in the form of lump charges. The effect was excessive as bricks (debris) were sprayed all over behind the wall. Cordtex 10 and Cordtex 40 were then positioned on a pressed wood board with the charge in a loop configuration. The charge performed well on a double brick wall as the bricks were dumped directly behind the wall. Flying debris is still a problem on the single brick wall. Because of cracks appearing in the damaged walls, the configuration was again changed, firstly to control the size of the penetrated hole and secondly to understand the effect of a non-continuous wall. Effects were recorded on high speed cameras and video cameras. Cracks at the end of the wall could be explained with the use of AUTODYN, but many experimental results could not be reproduced. No optimisation such as tamping, stand-off or different type of explosive was implemented.

### CONCLUSIONS

Loop charges using Cordtex 40 present a solution that seems to work well for double brick walls. More experimentation will be needed to maximise the effect of the charges on the walls and to broaden the knowledge of the physics of shock and stress waves. The thickness and characteristics of walls are not usually known in an operation. The effect of the charges on real buildings is still unknown. The flying debris as experienced on single walls must still be contained.



Figure 1. Damage to double brick wall (3 m x 2 m)



Figure 2. Damage to single brick wall



Figure 3. Charge positioned against the brick wall

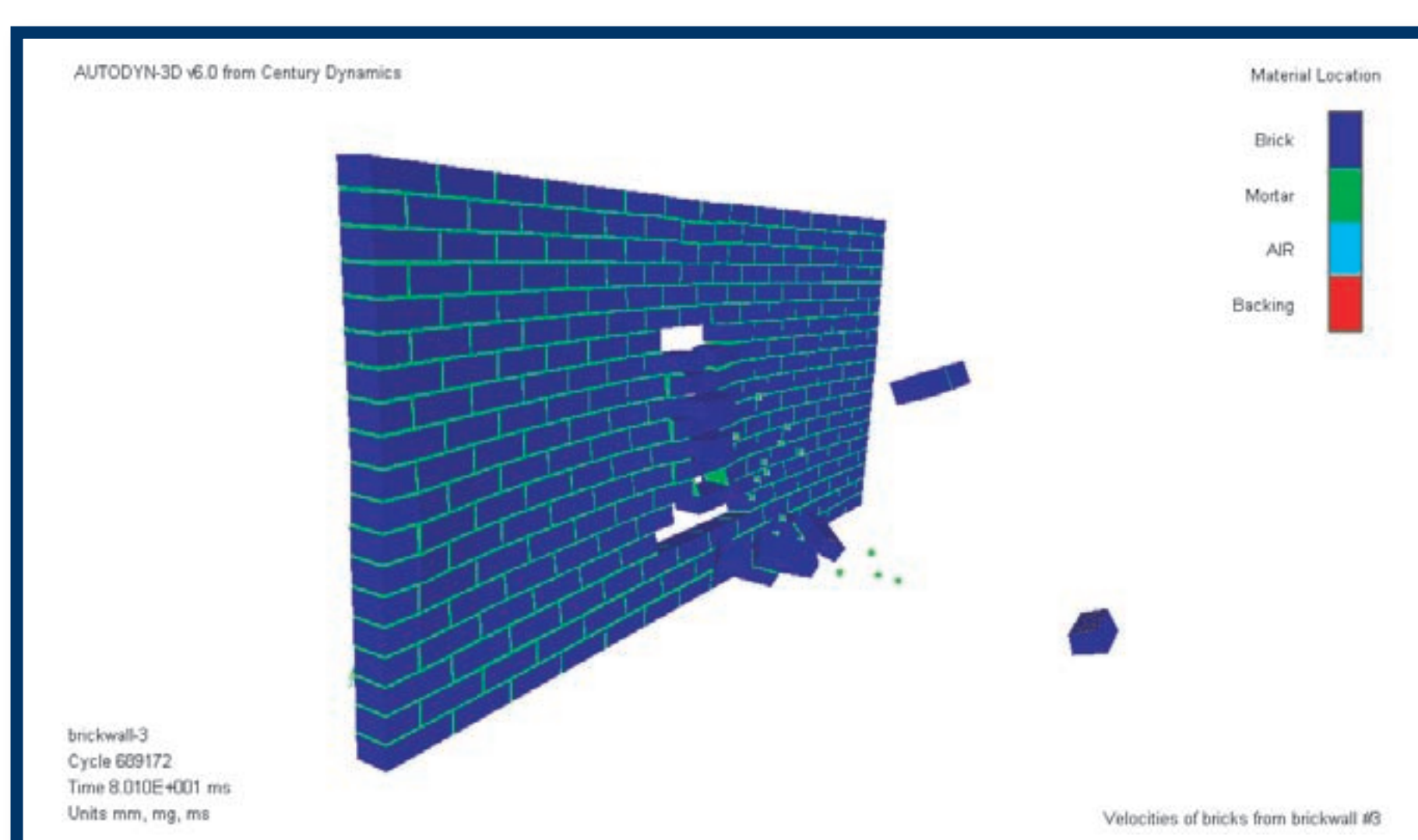
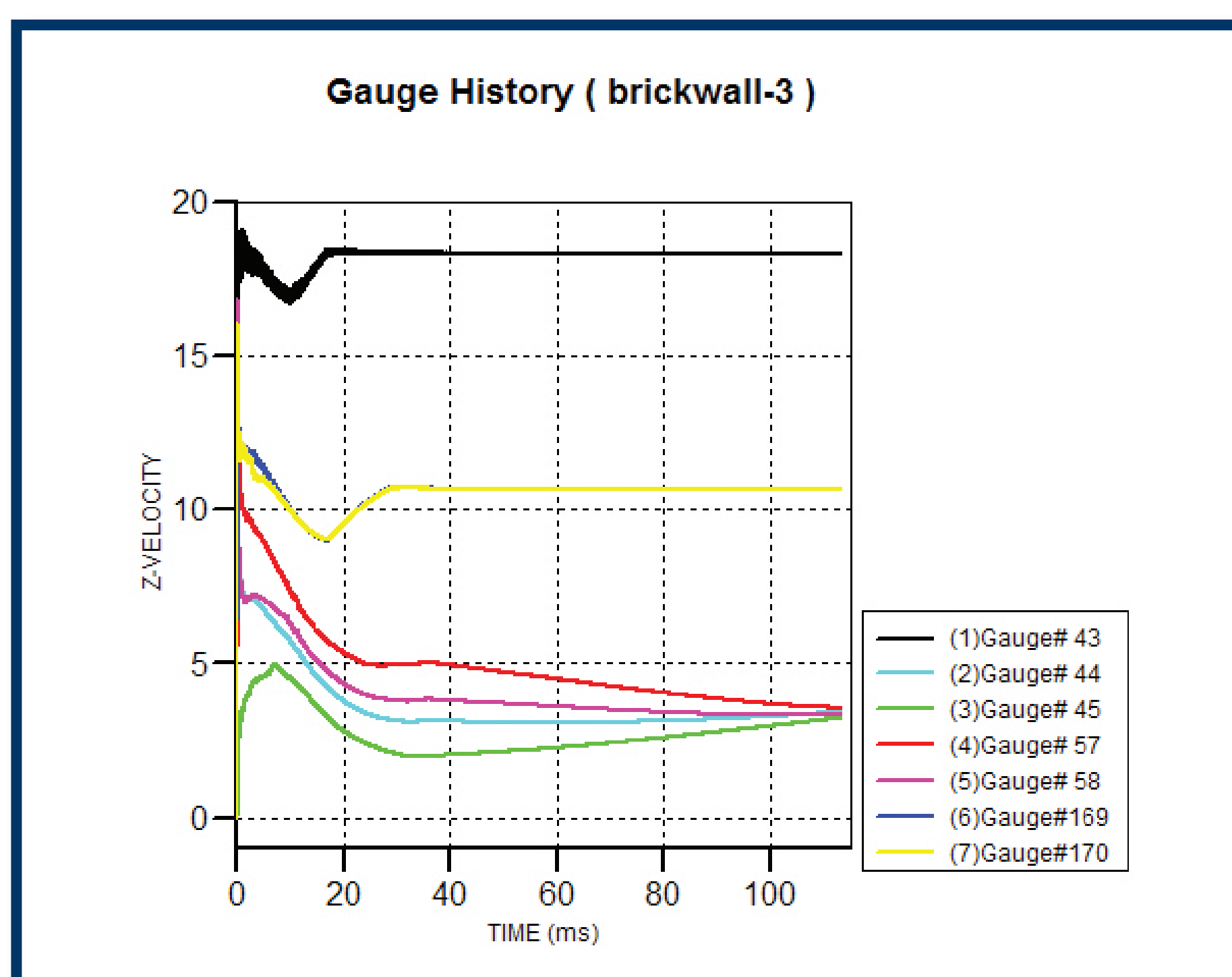


Figure 4. Simulation of breaching a single brick wall



Graph 1: Velocity Prediction in AUTODYN

*Saving lives in hostage release operations can be a daunting task for operators. CSIR researchers probe ways on how to breach walls to set free hostages, unscathed, from their captors.*

