Textile Armour: A Layer by Layer Approach

Lisa Baker
PPG, Physical Sciences Department
IOM3 Advances in Protective Clothing
25 April 2012
Overview

- Motivation
- Background
- Project
- Results
- Application
Motivation

Soft body armour fragmentation protection

• Improve protective performance
• Reduce weight
• Increase flexibility, reduce evaporative resistance…..

‘Reducing the burden on the dismounted soldier’
How?

Locating textiles where they perform most efficiently

Reducing systems effects

How do individual layers of textile absorb energy?
How can (adverse) interference between layers be reduced?
Project

- Manufacture
- Characterise
- Order
- Test system
Textile Characterisation

- Residual velocity trials
- Digital Image Correlation
- Yarn Pull measurement
- Single yarn Impacts
- Tensile strength
Residual Velocity Trials

![Graph showing impact velocity and energy absorbed with three distinct peaks labeled 1, 2, and 3.]

Crown Copyright Dstl 2012

Dstl is part of the Ministry of Defence
Textile order

- Multi-ply ballistic trials 2 and 4 layers
- Combinations of textiles
- $V_{50}$ – Full armour system
So What?

Research
• Data
• Weave design
• Application to composite systems

Real World
• Lighter, more flexible soft armour
• Cost
• ‘This face forward’
Questions

References
