



# PILOT FLIGHT EQUIPMENT BEYOND TYPHOON

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# INTRODUCTION

This presentation is an overview of the developments within the industry since the introduction of the Typhoon Aircrew clothing and explores how new developments and technologies can be incorporated into advanced designs of Aircrew clothing:

- The Aircrew Clothing developed for Typhoon : An Overview
- Technology Refresh
- New clothing design concepts and potential future innovation for Aircrew Clothing



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# **THE AIRCREW CLOTHING DEVELOPED FOR TYPHOON**

## **AN OVERVIEW**

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# WHAT SURVITEC DELIVERED

- Successful 15 year Development Program
- A unique fully modular, fully integrated solution - to maximise protection and optimise performance
- 4 nation Anthropometric Study and Sizing Methodology
- Multi mission capability from a common ensemble
- Multi layer protection



# WHAT SURVITEC DELIVERED

- Materials and Technologies considered cutting edge at time of development were introduced and provided:
  - Comfort
  - Thermal Management
  - Protection
  - Durability
- Equipment was developed which surpassed all current levels of PFE solutions, current advancements include:
  - Unmatched UV solar protection
  - Improved integrity and durability
  - Optimized cockpit integration and stringent laundering tolerance



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**DECLARATION OF DESIGN &  
PERFORMANCE TO SUPPORT  
SYSTEM “SAFE-TO-FLY”  
CERTIFICATION FOR A FULLY  
INTEGRATED PILOT FLIGHT  
EQUIPMENT OFFERING COMPLETE  
PILOT PROTECTION**

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**ANTI-G AND ALTITUDE  
PROTECTION** →

**EFFECTIVE PERSONAL  
COOLING** →

**THERMAL PROTECTION** →

**FIRE RETARDANCY** →



← **NBC PROTECTION**

← **SEA AND LAND SURVIVAL**

← **HIGH SPEED ESCAPE**

← **COMFORT AND MOBILITY**

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# **TECHNOLOGY** **REFRESH**

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# TYPHOON AEA TECHNICAL REFRESH PROPOSALS

## GOALS:

- Improved Pilot protection
- Introduction of up to date material technologies
- Reduction in Mass
- Reduction in Bulk
- Resolve any current in-service issues
- Reduce finite life cycle costs





FLIGHT JACKET

# FLIGHT JACKET

## INTRODUCTION OF BREAK OUT ZIP:

- Reduction in servicing time
- Improved deployment of bladder
- Hydrostatic Inflation Mechanism
- Sleeve material



# FLIGHT JACKET

## INTRODUCTION OF BREAK OUT ZIP:

- **Hydrostatic Inflation Mechanism**
- Fit and Forget Five year life
- Quick check status indication
- Sleeve material



# FLIGHT JACKET

## INTRODUCTION OF BREAK OUT ZIP:

- Hydrostatic Inflation Mechanism
- **Sleeve material**
  - Replacement of mesh sleeve
  - Due to wear issues
  - With a permeable material with improved wear and improved durability





**FULL COVERAGE ANIT-G TROUSER**

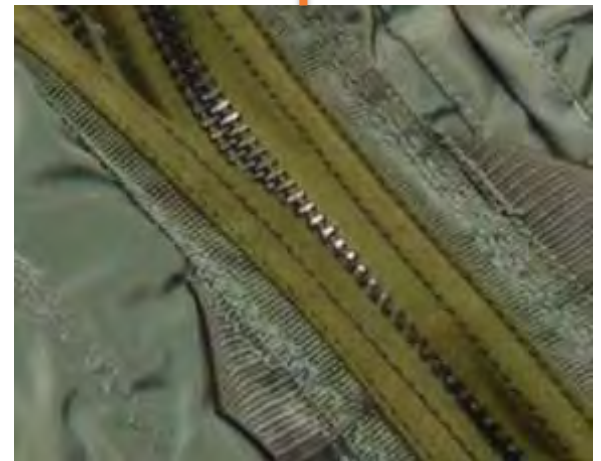
# FULL COVERAGE ANIT-G TROUSER

- **New Material technology**
- Kevlar inner material
- Permeable Aramid Cover
- Replaceable Zips
- MVP Bladder Technology



# FULL COVERAGE ANIT-G TROUSER

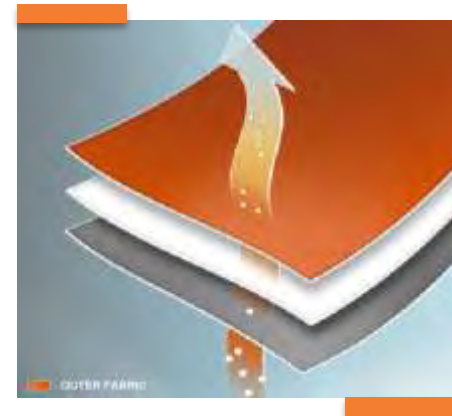
- New Material technology
- **Replaceable Zips**
  - Placed on removable carrier
  - To allow zip replacement
  - Benefit extended life cycle
- MVP Bladder Technology





# FULL COVERAGE ANIT-G TROUSER

- New Material technology
- Replaceable Zips
- **MVP Bladder Technology**
  - To allow transfer of moisture
  - Whilst retaining a fully air holding bladder



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# **IMMERSION PROTECTION GARMENTS**

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# IMMERSION PROTECTION GARMENTS

## New Sliding Fastener technology

- Improved comfort
- Flexibility
- Sewn and hot taped (No Glue)
- Removal of metal teeth (Wear issues)

Sewn and hot taped neck and wrist seals and sock attachment in place of the current method of gluing on seals and socks



# IMMERSION PROTECTION GARMENTS

- New Sliding Fastener technology
- **Sewn and hot taped neck and wrist seals and sock attachment in place of the current method of gluing on seals and socks**



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# **WINTER LAND**

# **COVERALL**

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# **SURVITEC ARE FINALIZING DEVELOPMENT OF A NEW DESIGN OF LIGHTWEIGHT COLD WEATHER CLOTHING SYSTEM SPECIFICALLY FOR AIRCREW**

## **AREAS FOR IMPROVEMENTS ARE:**

- Improved mobility – Due to ergonomic design
- Minimal bulk – due to improved material technologies
- Improved comfort and sweat management by the use of Moisture Vapour Permeable materials
- Modular garment approach to enable role fit customization

# DESIGN FEATURES: JACKET



- No seams over shoulders or across the back - reduces the potential for seam leakage and minimises restriction
- Improved mobility - particularly when reaching forward and overhead reach due to underarm tailoring and sleeve design

# DESIGN FEATURES: JACKET



Unique rain water channelling design at top forearm sleeves to keep hands dry

Clean cuff area with touch and close adjustment provision



Internal comfort collar integrated into outer waterproof collar



Waterproof collar extended and fully closed



# DESIGN FEATURES: TROUSERS



Waist adjustment to optimise fit



Insulation in lower back area



Breakthrough pockets to gain access to underlying garments



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**NEW CLOTHING DESIGN  
CONCEPTS  
AND POTENTIAL FUTURE  
INNOVATION  
FOR AIRCREW CLOTHING**

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# EXAMPLES OF ADVANCED MATERIALS AND TECHNOLOGY APPLICATIONS

## SEAMLESS GARMENT MANUFACTURE

- 3D process
- allows a garment to be manufactured in a single piece without seams.
- substantially reduces costs - eliminates cutting and sewing
- seamless technology is being rapidly developed but is in its infancy for military clothing.

## PCM (PHASE CHANGE MATERIALS) APPLICATIONS

- Incorporating Micro encapsulated PCM's
- Balances out extremes of temperature during activity and rest.
- Currently exploited in outdoor pursuit garments.
- This technology is also in space and military aerospace applications.

## BENEFITS

- Freedom of body movement
- Comfort and softness
- Wider range fit
- Reduced labour costs

## BENEFITS

- Reduces overheating and overcooling of wearer.
- Reduces 'chilling' after exertion.

# EXAMPLES OF ADVANCED MATERIALS AND TECHNOLOGY APPLICATIONS

## 'LIGHTER THAN AIR' MATERIAL

- 'A network of tubular straws provides a light weight yet high strength structure.
- 'Lighter than Air' technology includes synthetic insulation, which unlike 'Down' retains 96% of its insulating ability when wet.
- This technology has been proven by the US Military to be long lasting in field use.
- Its micro fiber structure means its extremely lightweight and highly compressible.

## BIOSTATIC OR BIOCIDAL/ANTI-MICROBIAL MATERIALS

- The incorporation of pure silver into a material (woven or non woven) which will destroy microbes/bacteria.
- Known in medical use and it is starting to be exploited in clothing applications for outdoor pursuits/exercise.
- All US Marine's socks are made from bio-static material.

## BENEFITS

- Extremely light weight
- Highly durable
- Insulates when wet
- Highly compressible to a small footprint

## BENEFITS

- Eliminating odours
- Kills microbes and reduces infection
- Aids wound recovery
- Reduces laundry requirements

# EXAMPLES OF ADVANCED MATERIALS AND TECHNOLOGY APPLICATIONS

## DEVELOPMENT OF LIQUID COOLING GARMENT

- Uniform temperature distribution and heat extraction
- micro bore tubing in a tabard style garment.
- gives the user optimum mobility.
- concentrating the cooling effects to the torso where it is most effective.
- The tube lengths are within +/- 20% of each other so to minimise the pressure drop and keep a constant temperature through-out the tubes.

## BENEFITS

- Close skin contact with liquid cooling tubes creates maximum efficiency.
- Waterproof yet breathable liner encourages a one way sweat management system.

## DEVELOPMENT OF BREATHABLE BLADDERS

- proven to have significant user advantages over standard bladders,
- multiple fabrics have been sourced to find the optimum material to use.
- multiple testing including seam strength, cycle testing, multiple subject testing and a range of environmental conditions.

## BENEFITS

- Reduces core body temperature and sweat loss
- Reduced heart rate and thermal sensation

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**QUESTIONS?**

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