

Innovation as the strategy's cornerstone

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Innovation within the strategic framework



- Value chain approach as an innovative way of strategic development and positioning in the chain
- Break through technology

Strategic themes

- Safety & Protection
- Space & Aerospace
- Sport & Leisure
- Infrastructure & Environment



Strategic connection: safety & protection
Technological connection

TenCate Advanced Textiles group

Innovative products:

- Personal protection (work wear)
 - Millenia®, fireproof and extremely heat-resistant light weight material for firefighters
 - TecaSafe®, multi-risk material
- Outdoor segment
 - Fire-resistant outdoor material
 - Environmentally friendly outdoor material

New technologies

- Process automation focused on cost reduction
- Utilization of new technologies, such as digital finishing, nanotechnology and plasma technology.



TenCate Advanced Composites

New products

- Thermoplastic composites (Cetex)
 - Leading in thermoplastics for Airbus, Cirrus, Boeing (future)
 - 10% share in composite structures of the Airbus A 380
- Thermo sets
 - Radomes and space programs,
 - Utilization in Mars Pathfinder, Mars Reconnaissance Orbiter, etc.
- Armour: modernization programs
 - New solutions for personal protection
 - Vehicle programs



New technologies / applications

- UD-tape technology
- Various industrial applications and sports
 - Demanding materials (light weight, strong, flexible)

Aerospace – 2006 and beyond



A400M



**Cirrus – Carbon
spar jet**



B787



Embraer



F35 - JSF



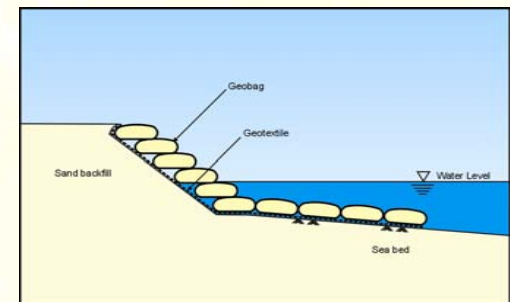
UAV



A350

TenCate Geosynthetics

- New products and applications
 - For the environmental market and waste control
 - Geotube® utilized as filter for dewatering of (industrial) silt
 - Products such as Geocontainer® and Aquanet® (fish farming)
- Mostly innovative solutions
 - (Housing) construction, agri-business
 - Products focused on legislation, specifications etc.
 - Geotextiles equipped with pressure and motion sensors



Geotube®



CONTAINMENT



DEWATERING



CONSOLIDATION

TenCate Grass

- TenCate is technology-based leader in new developments
 - Fibers for various artificial turf applications
 - Sports: American Football, soccer, hockey, tennis, golf, landscaping
- Market leader
 - Strong in the market's top segment (performance)
 - Knowledge of the complete system
 - Strong R&D together with Institute for Sport & Leisure (UT), TNO etc.
- New technology / components
 - Outdoor backing
 - Infill (thermoplastics in stead of rubber)
 - Sub-base for shock absorption, drainage



Challenges for functional materials (1)



- Combination of comfort and the best protection / increase in functionalities
 - Higher standards (fire-resistance, safety)
 - Nano-treatment
 - New polymers (bio-polymers, photoelectrical polymers)
 - Integration with e.g. electronics en pharmaceuticals
- Wider utilization of composites
 - Various sports applications
 - Automotive / transport
 - Medical (prostheses / systems)
 - Wind energy

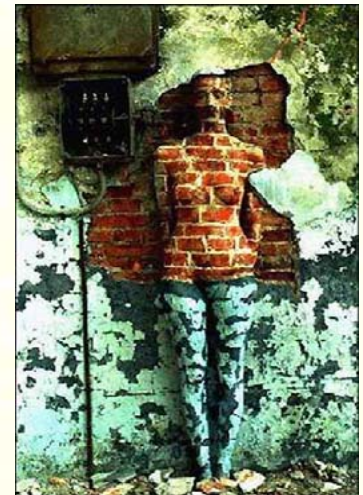
Challenges for functional materials (2)



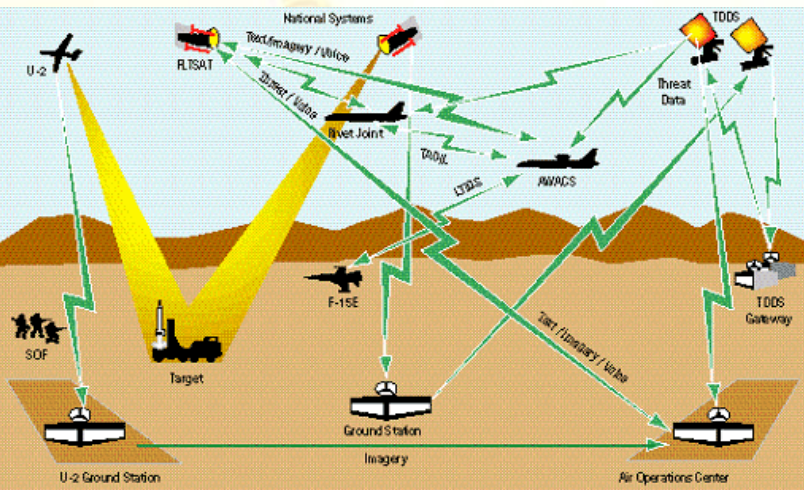
- Great potential for Geosynthetics in water management and waste control
- Artificial Turf: exceeds nature
 - Acceleration of the process of acceptance
 - Increasing standards (safety, durability, environmental aspects etc.)
 - Multi-functionality
- Technological innovations (Digitex, plasma technology etc.)
 - Renewal of the entire industry
 - New applications and markets

TenCate Technology Roadmap (1)

- TenCate Advanced Textiles
 - Digital finishing
 - Protection for fire fighters
 - ✓ Guardian Angel (Eastern-Netherlands Project)
 - ✓ Fire Modernization Program (European Project)
 - Soldier Modernization Program (Scorpion suit)
 - ✓ Monitoring vital body functions
 - ✓ Network connections with satellites, UAVs and robot vehicles
 - Complete anti ballistic protection
 - ✓ BC-protection
 - ✓ Sensorial
 - ✓ Interactive camouflage
 - ✓ Tracking / tracing, identification
 - ✓ Light weight



Safety, human performance and materials/systems



- Sensorics
- Ballistic Helmet
- Bulletproof vest
- Isolated Waterbag
- Thermal Gloves
- Composites Gun
- Cameleon Camouflage
- Thermal Shoes

TenCate Technology Roadmap (2)

➤ Smart Textiles

- ✓ Conducting systems in textile
- ✓ Power supply (solar fibers, fuel cells)
- ✓ Data transmission: connection technology and wireless
- ✓ Sensors (data recorders)
- ✓ Data processing en log function
- ✓ Displays
- ✓ Actuators en active response
- ✓ Self cleaning materials



Sensorshirt

TenCate Technology Roadmap (3)

- TenCate Advanced Composites
 - Personal protection (in totality)
 - Flexible nano-armour (TenCate, TNO and Min. of Defense)
 - 'Self Healers' thermoplastics
- TenCate Grass
 - Bio-polymers (12 partners led by steering group)
 - ✓ Disposables (human related)
 - ✓ Fiber-reinforced structures
 - ✓ Filtration
 - ✓ Geosynthetics
 - ✓ Program artificial turf systems



Facing the challenges

- (Regional) innovation platform
- Cooperation knowledge institutions (UT, UTD, TNO, DPI, CU, UL)
- Material Valley:
 - Physical collaboration between industry and science
 - Synergetic fundamental and applied research
 - Testing for feasibility and reproducibility
- European project: “Digitex” (digital finishing); TenCate leads consortium of approx. 25 European partners
- TenCate: chairmanship of European Technology Platform for Textiles

Regional fixation

- Connection to Twente Innovation route
- Materials & Mechatronics cluster is supported by the concept High Tech Facilities Twente
- In federational relation linked to 'Field Labs'
- Technology and product concepts are being translated to proof of concept and process design
- Linked to test, measure and accounting facilities through broad band connection
- Spin off to small and medium sized enterprises

TenCate and open innovation

- Open processes (chain knowledge integration) often leads to technological breakthroughs and accelerated market acceptance
- Symbiosis between product ideas and knowledge of materials leads to new functionalities
- European framework programs: SocraTurf, Leapfrog, Digitex, FMP & SMP, NLP
- Cooperation with UT, knowledge institutions, TUD, Academic Medical Center Radboud, TNO
- Cooperation with businesses like Akzo Nobel, Philips, DSM, Teijin, Colbond, Diolen etc.

Developing together

- Combination of desired urbanistic development (municipality Hellendoorn) with TenCate plans
- TenCate strives for a High Tech Materials Park and the development of a knowledge center for the divisions
 - TenCate Protective & Outdoor Fabrics
 - TenCate Aerospace Composites
 - TenCate Grass
- Compete with the rest of the world
 - Collaboration with governments / facilitating policy
 - Foreign locations strongly competing with The Netherlands



TENCATE

materials that make a difference