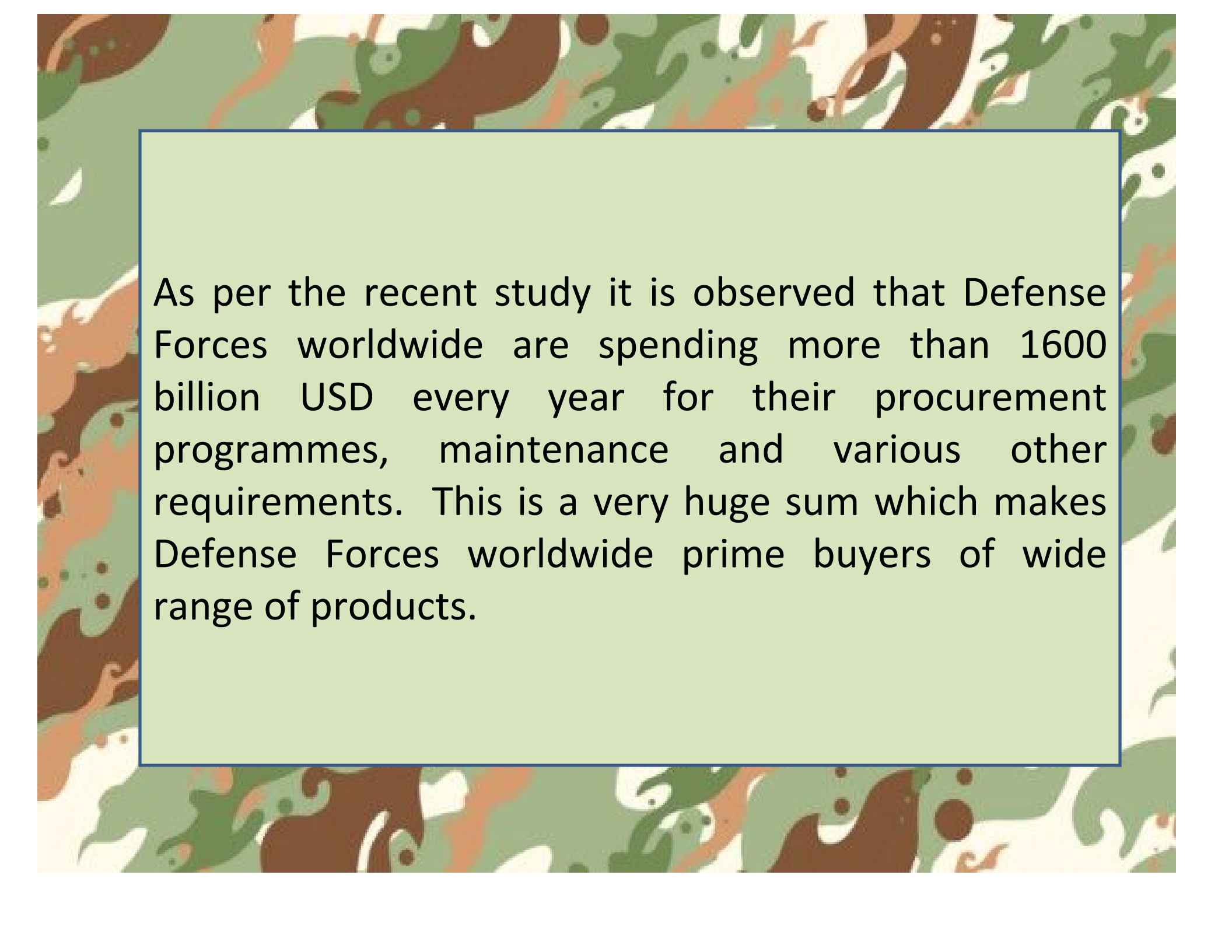

The background of the slide is a camouflage pattern in shades of green, brown, and tan. A light green rectangular box with a thin blue border is centered on the slide, containing the title and presenter information.

Defense Textile & Camouflage Fabrics

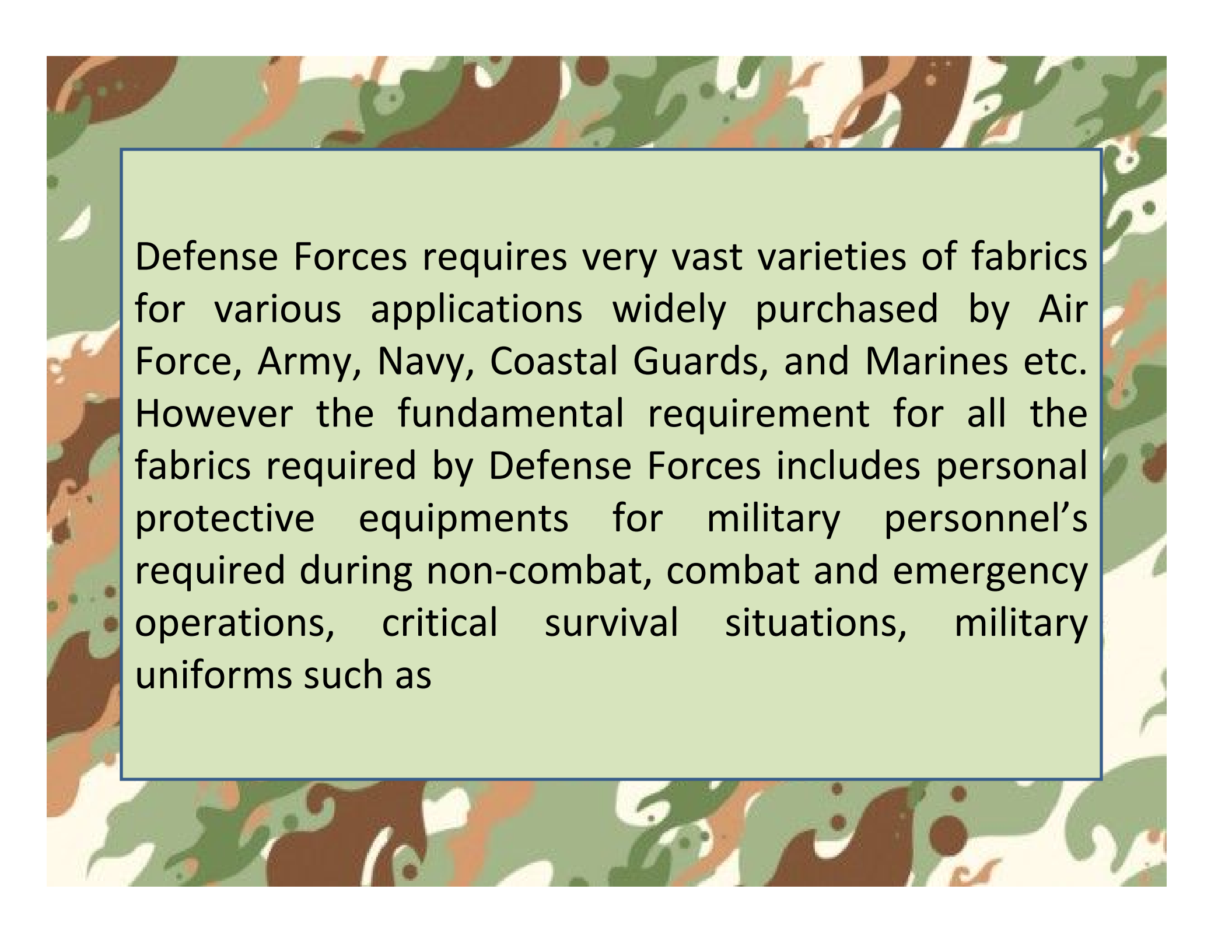
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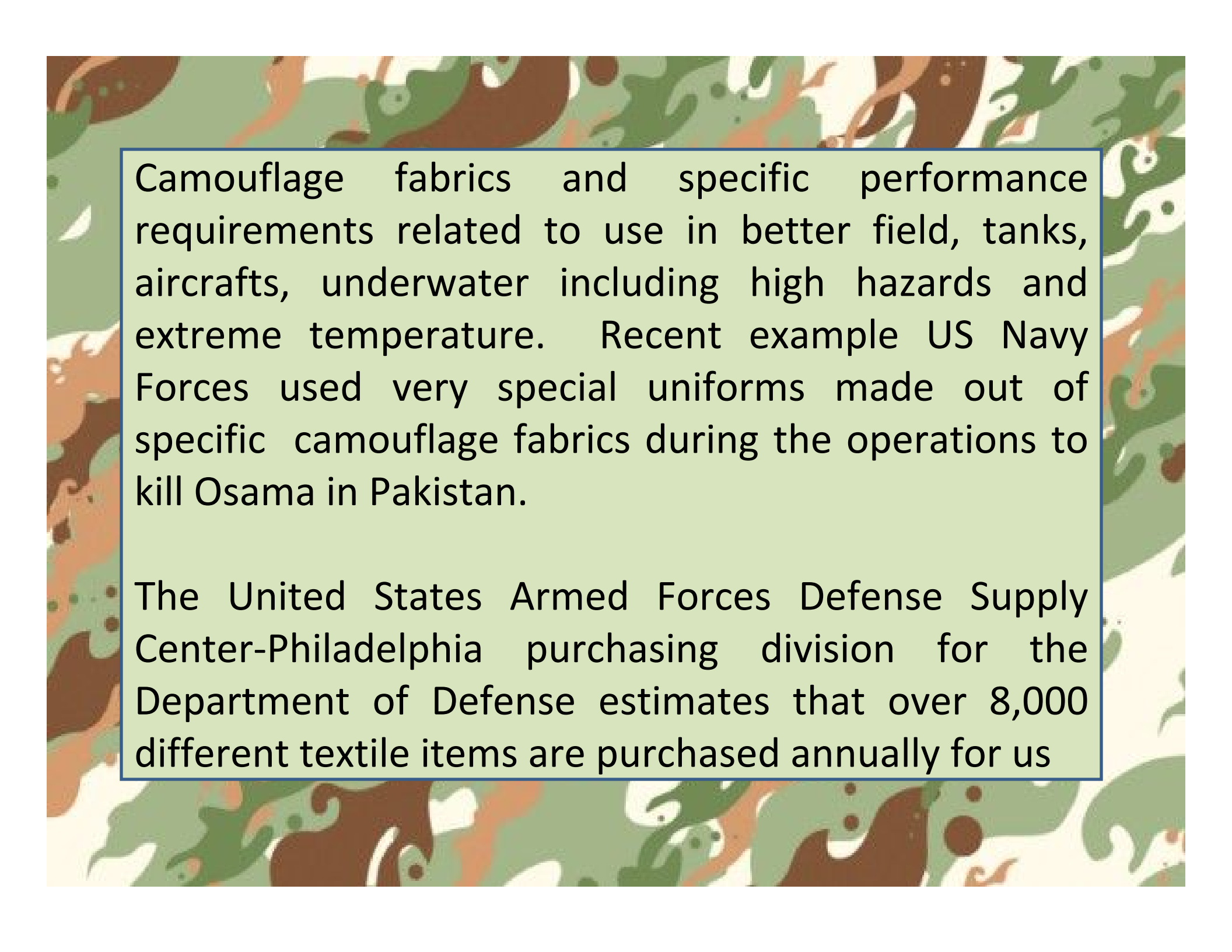
As per the recent study it is observed that Defense Forces worldwide are spending more than 1600 billion USD every year for their procurement programmes, maintenance and various other requirements. This is a very huge sum which makes Defense Forces worldwide prime buyers of wide range of products.



Textile for Defense Forces is a very small part of overall budget of above mentioned figures of 1600 billion USD. Estimates are textile for defense forces may have approx. 3% to 5% share of above mentioned figures which makes it more than 50 billion USD. It is very difficult to ascertain exact figures as information is not freely available and various defense forces are very secretive about parting their figures. Similarly manufactures are also not providing exact figures because of their non-disclosure agreements.

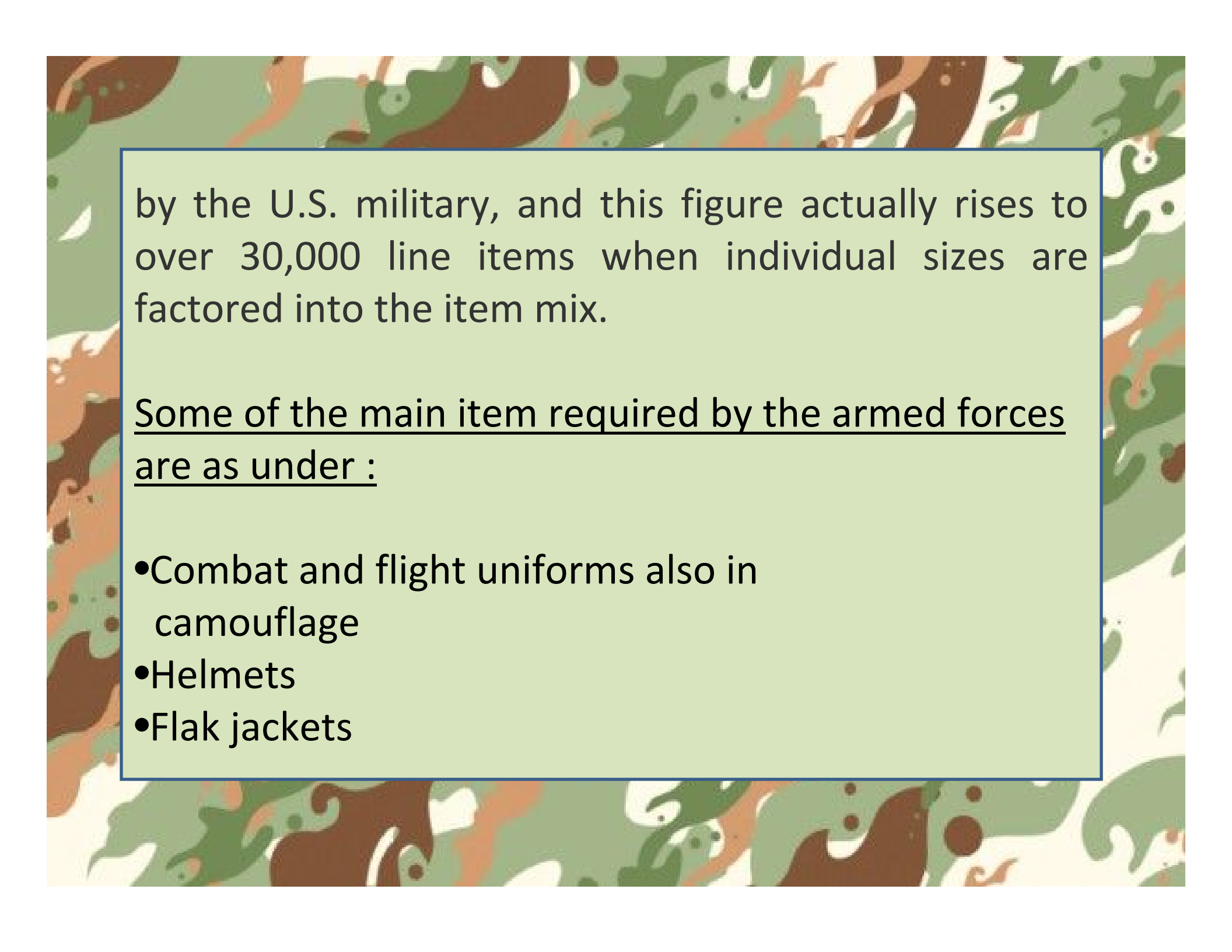


Defense Forces requires very vast varieties of fabrics for various applications widely purchased by Air Force, Army, Navy, Coastal Guards, and Marines etc. However the fundamental requirement for all the fabrics required by Defense Forces includes personal protective equipments for military personnel's required during non-combat, combat and emergency operations, critical survival situations, military uniforms such as



Camouflage fabrics and specific performance requirements related to use in better field, tanks, aircrafts, underwater including high hazards and extreme temperature. Recent example US Navy Forces used very special uniforms made out of specific camouflage fabrics during the operations to kill Osama in Pakistan.

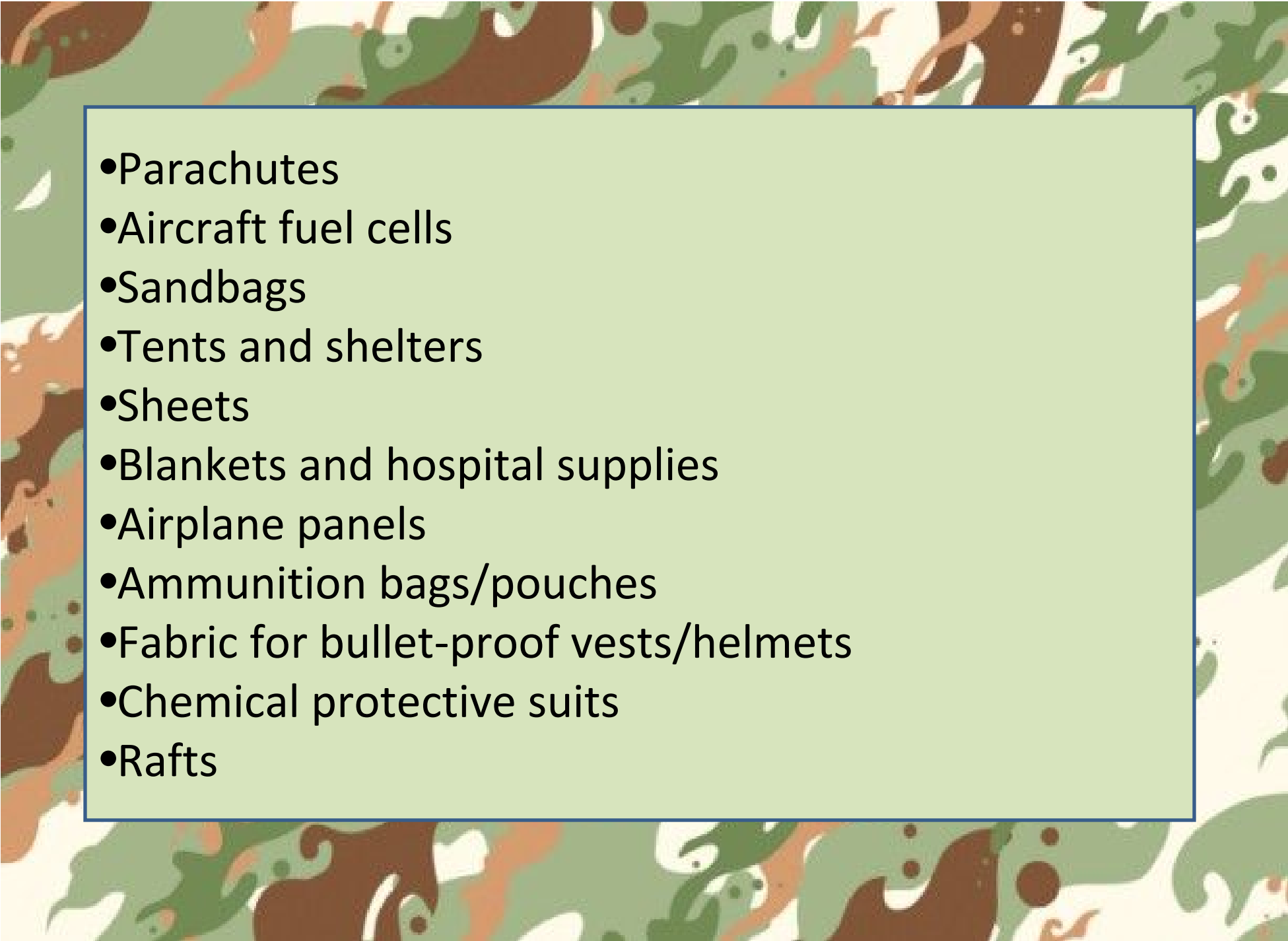
The United States Armed Forces Defense Supply Center-Philadelphia purchasing division for the Department of Defense estimates that over 8,000 different textile items are purchased annually for us

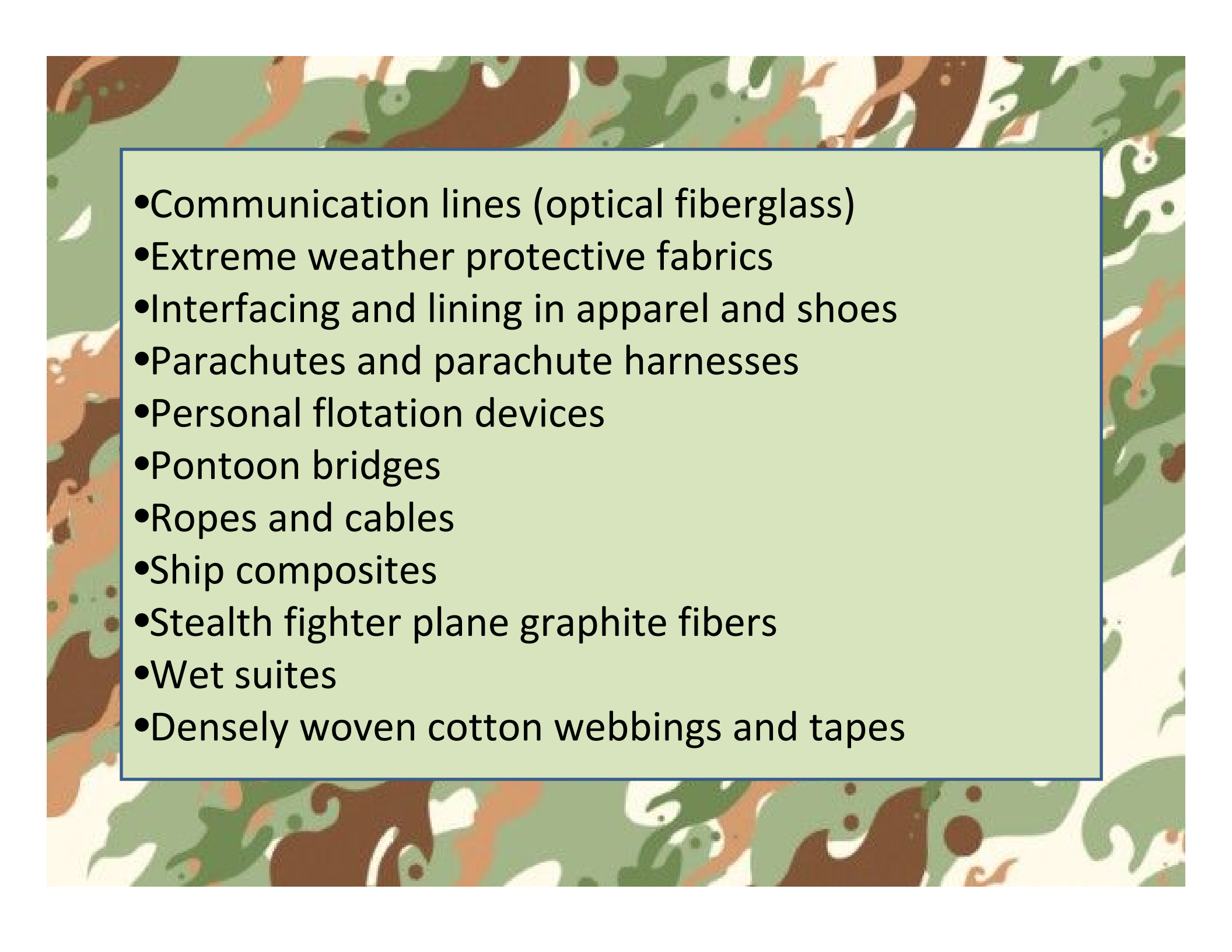


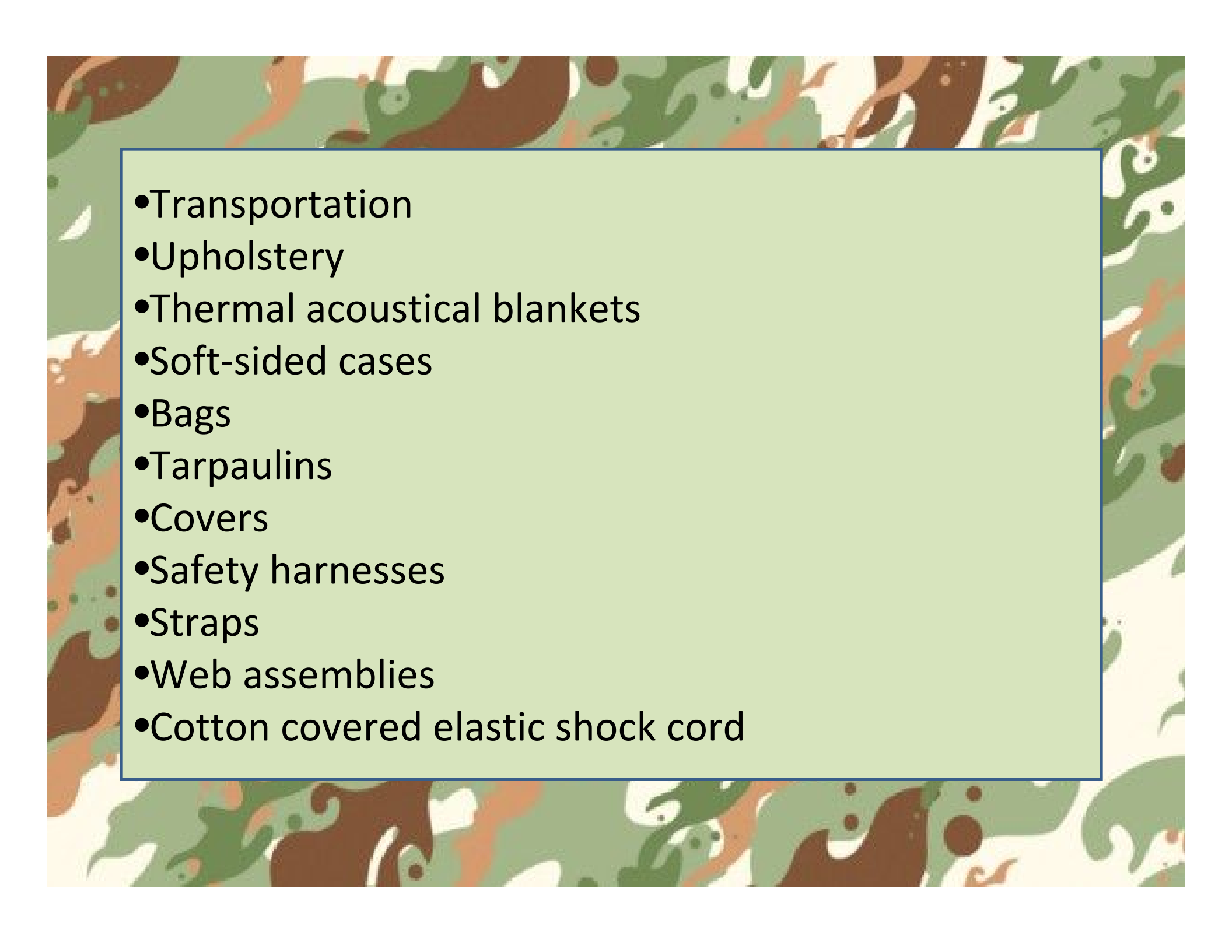
by the U.S. military, and this figure actually rises to over 30,000 line items when individual sizes are factored into the item mix.

Some of the main items required by the armed forces are as under :

- Combat and flight uniforms also in camouflage
- Helmets
- Flak jackets

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- Parachutes
 - Aircraft fuel cells
 - Sandbags
 - Tents and shelters
 - Sheets
 - Blankets and hospital supplies
 - Airplane panels
 - Ammunition bags/pouches
 - Fabric for bullet-proof vests/helmets
 - Chemical protective suits
 - Rafts

- 
- Communication lines (optical fiberglass)
 - Extreme weather protective fabrics
 - Interfacing and lining in apparel and shoes
 - Parachutes and parachute harnesses
 - Personal flotation devices
 - Pontoon bridges
 - Ropes and cables
 - Ship composites
 - Stealth fighter plane graphite fibers
 - Wet suites
 - Densely woven cotton webbings and tapes

- 
- Transportation
 - Upholstery
 - Thermal acoustical blankets
 - Soft-sided cases
 - Bags
 - Tarpaulins
 - Covers
 - Safety harnesses
 - Straps
 - Web assemblies
 - Cotton covered elastic shock cord



The Primary area for Protection

The primary area for protection for all conditions main includes ballistic, chemicals, biological, reductions through noises and visual devices, flame fire, thermal insects and micro organism. In addition to this the gear must have properties for high resistance to sun water replants' durability, high abrasion, and resistance, tear resistance and should have good air permeability.



Certain fabrics are developed as per the operation requirements, certain fabrics are developed which are resistive to petroleum products and lubricants.

Development of these fabrics will required very high research and capabilities and very high level of challenges, professional ability and completing the task in time to meet the challenge and operation requirements.

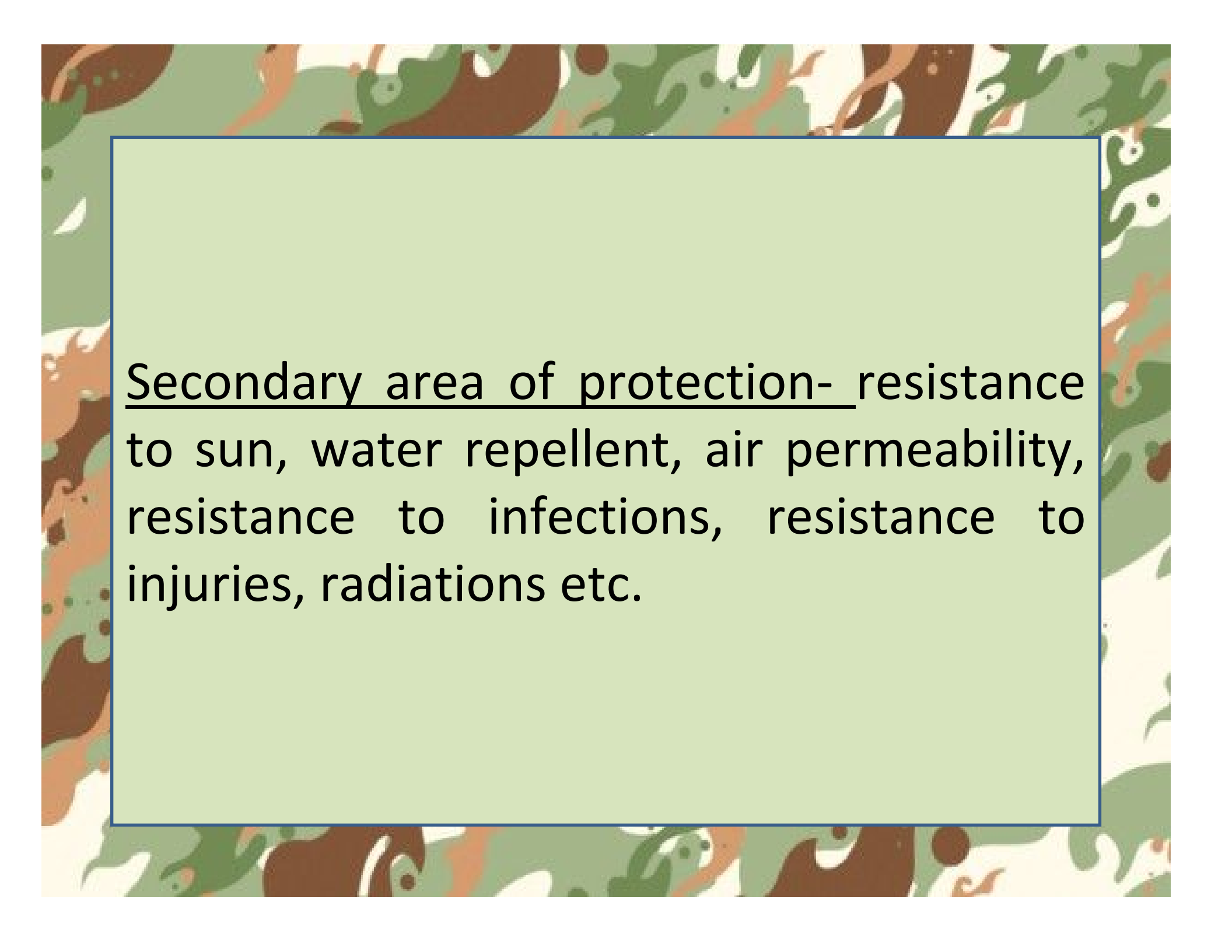
This requires different mine set and highly capable professional skills. One has to take into consideration, types of fibers, technical design and its finesses etc into consideration.

Main Fibers' used for Defense Textiles :

- ❖ Teflon Fiber
- ❖ Polyester Fiber
- ❖ Nylon 6,6
- ❖ Kevlar

Major protections can be classified in following categories :

Biological, Chemical, Thermal, Ballistics,
environmental, flame, fire, insects and micro
organism.




Secondary area of protection- resistance to sun, water repellent, air permeability, resistance to infections, resistance to injuries, radiations etc.

Camouflage Fabrics

Introduction of Camouflage Fabrics

The color Red was the uniform color adopted by the first permanent regiment of the British Army, the Yeoman of the Guard, the Beefeaters, during the ruling of Henry VIII. In 1645 this color was adopted when the first permanent army was raised. Red was used in order to hide blood stains. Rather, every army adopted certain colors as their



national colors. French soldiers tended to wear blue; Russians wore green; British wore red.

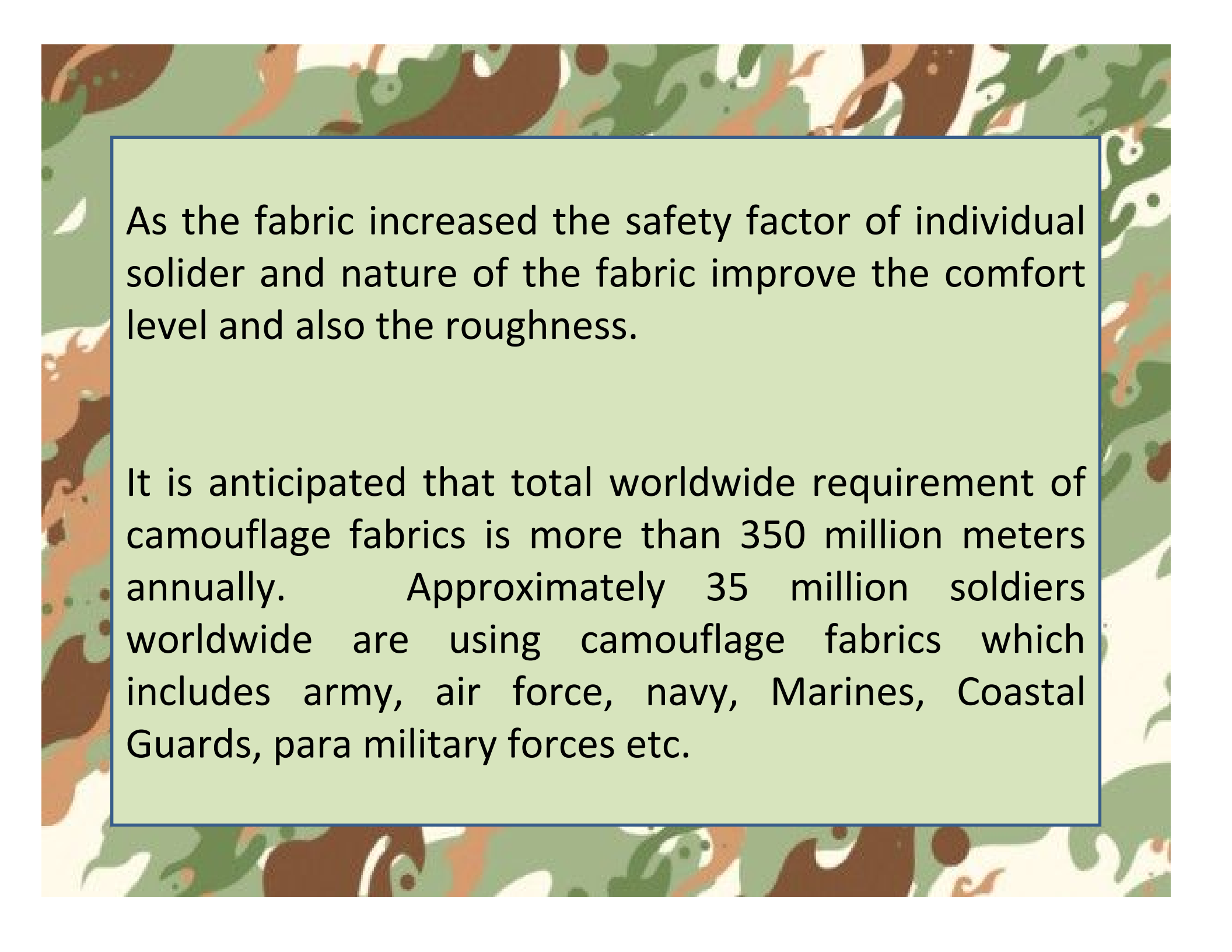
It was not until the late 1800s that a Khaki uniform was issued, the British Army finally realizing that drab colored uniforms provided better camouflage. Once again, tactics continued to lag behind during First World War convinced authorities that there was a requirement to seek cover and remain hidden as



opposed to standing up in battle formations.

Camouflage Fabrics have been existed for more than 75 years and has become very popular since 1990 after the operations desert storm in Middle East by US Forces with NATO Alliances.

Today most the armed forces including army, navy, air force and Para military forces are using camouflage fabrics.

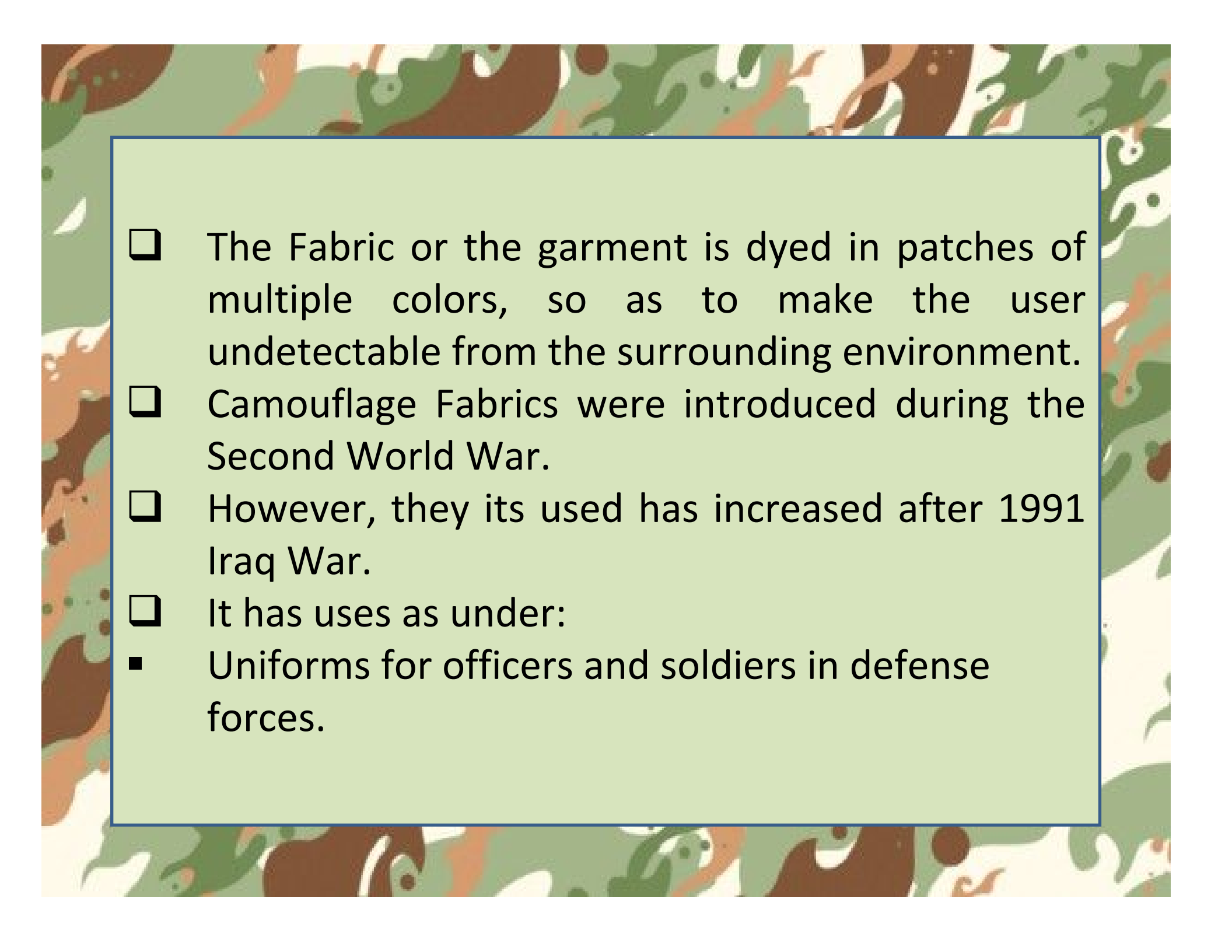



As the fabric increased the safety factor of individual soldier and nature of the fabric improve the comfort level and also the roughness.

It is anticipated that total worldwide requirement of camouflage fabrics is more than 350 million meters annually. Approximately 35 million soldiers worldwide are using camouflage fabrics which includes army, air force, navy, Marines, Coastal Guards, para military forces etc.

What is Camouflage and Camouflage Fabric?

- ❑ Camouflage Fabric is utilized for concealing personnel or equipment from enemies.
- ❑ Camouflage Fabric gives a unique effect to the personnel or equipment by making them appear as a part of the natural surroundings.
- ❑ It can also be used for concealing arms and ammunition by disguise or protective coloring.

- 
- ❑ The Fabric or the garment is dyed in patches of multiple colors, so as to make the user undetectable from the surrounding environment.
 - ❑ Camouflage Fabrics were introduced during the Second World War.
 - ❑ However, they its used has increased after 1991 Iraq War.
 - ❑ It has uses as under:
 - Uniforms for officers and soldiers in defense forces.

- 
- Making armored vehicles and other equipments untraceable.
 - Covering airplanes, guns and boats.
 - Creating deceptions.
 - Tents for living and storage purposes.

Various types of Camouflage Fabrics:

- Apparel Grade,
- Canvas Grade,
- Protective and
- Chemically treated (such as Anti Fungal, Anti Bacterial etc.).

The background of the slide is a camouflage pattern with shades of green, brown, and tan. A light green rectangular box with a blue border is centered on the slide, containing the title and a list of advantages.

Advantages - Camouflage Fabrics ***Apparel Use***

- Soldiers feel safe with Camouflage fabrics as detection become difficult.
- Since chemically treated for various purpose it provides safety.
- Low Maintenance cost
- Long life
- Disposable Camouflage fabrics are also being introduced, particularly in the Middle East where the washing cost is very high.

Demand of Camouflage Fabrics

- A survey was conducted by an International agency during 2007-2008.
- 165 countries including all major consumers such as USA, Russia, China, Saudi Arabia were included.
- Based on the survey it is concluded that annual consumption of Camouflage Fabrics is approximately 350 million meters and is growing @ 10% per year.

Major manufacturers of Camouflage Fabrics are:


- South Korea,
- China,
- Brazil,
- Mexico,
- Indonesia,
- Turkey etc.
- Camouflage Fabrics is very sensitive products and armed forces are very concern and sensitive while deciding their suppliers and its location like many of them do not prefer to buy countries like Mexico.

Marketing

- Camouflage Fabric marketing takes time as all the defense forces have their own methods of establishing compliances & due diligence on suppliers and their locations which cannot be compromised.
- Appointments are also not walk through and It requires contact building using all possible channels.
- However, once accepted they do not change suppliers unless and until they have strong reasons such as political situation etc.

Advantages -India

- Domestic availability of raw materials such as Polyester, Cotton etc.
- Availability of skilled, technical manpower
- Reliable delivery commitment
- Technical training and education facility locally available.
- High standards of technical education
- Availability of large businesses with resources to create huge capacity plants.
- Thorough and in-depth understanding of International Business requirements
- Sense of Commitments extremely strong.

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- The background of the slide is a camouflage pattern in shades of green, brown, and tan. A light green rectangular box with a thin blue border is centered on the slide, containing the text.
- Since India is not manufacturing Camouflage fabrics in large numbers. There is a big opportunities for Indian Companies.
 - However, Camouflage is in short supply but if larger capacities are created or available, the business will grow conclusively.
 - There is a process which felicitates confidence trust and relationship building.
 - Mistakes are unacceptable and cannot be compromised due to the nature, importance and utility of this kind of product.

Technical Requirements

- One of the most important requirements of these fabrics is that they should be variation free.
- Variation cannot be tolerated therefore most of the manufacturers are buying large single lots of polyester, buying cotton from one field.
- Certain number of spindles are allocated for spinning and accordingly the looms are allocated. Finally processing takes place which gives great results.

Prices

Current prices of Camouflage fabrics are ranging from 3.50 USD per meter to 5.50 USD per meter depending upon the construction and delivery time of the fabrics.

Price will also depend on following factors:

1. Weight of the fabrics,
2. Design
3. Complexity of utility
4. End use
5. Finish – Anti Fungal, Anti Bacterial, etc.

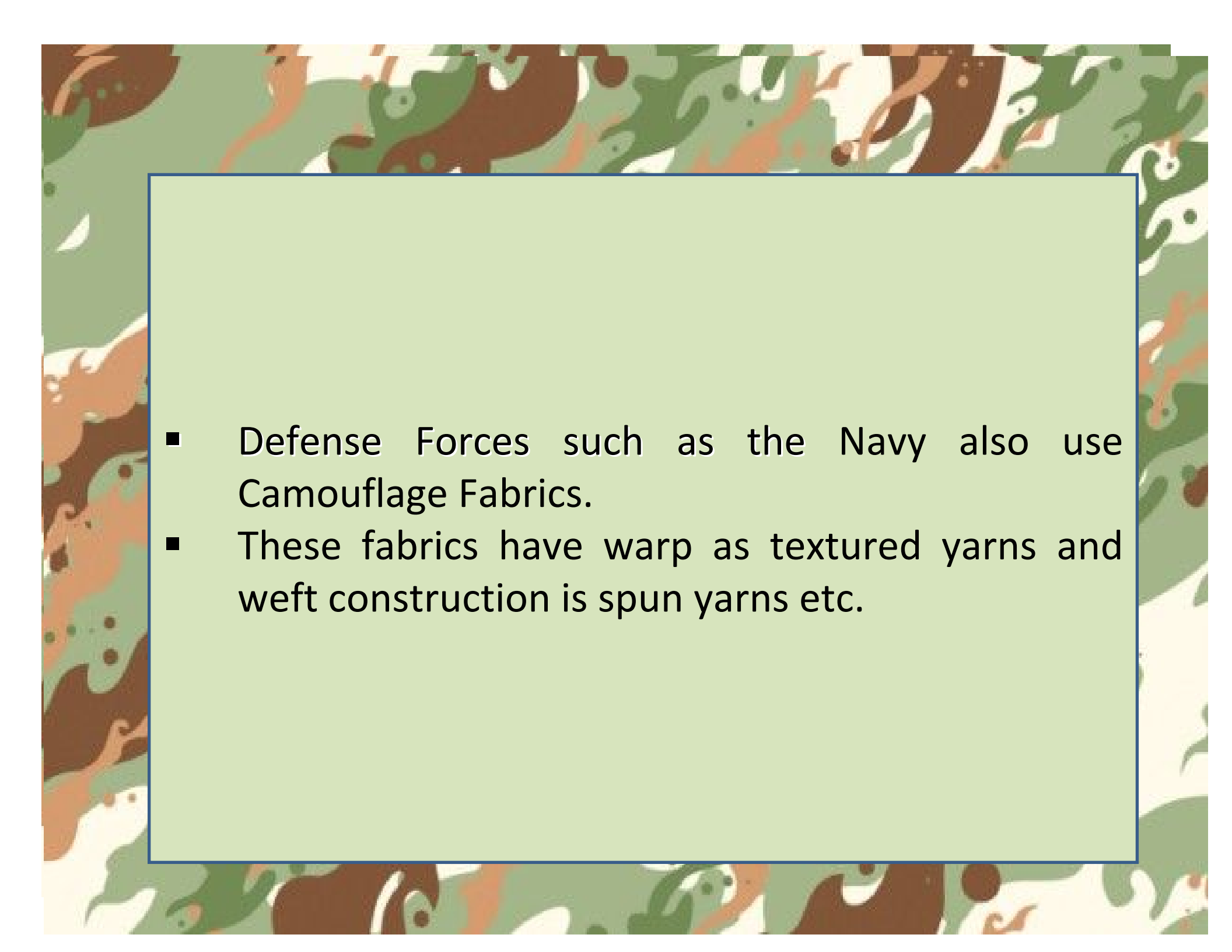
Value Addition

- Camouflage fabrics provide very good value addition.
- Since these products involve big contracts, payments are ensured.
- Various risks such as currency variation etc are very well covered.
- Any abnormal increase in the price of raw materials is also covered.

Specifications

Apparel Use

- Blends are polyester 65% and cotton 35%.
- Middle East the polyester is 35% and cotton 65%.
- Count ranges can be 2/20s, 2/32s, 2/40s and some times 2/60s also.
- Camouflage fabrics used in Middle East also has specifications 2/80s, 100% polyester in warp and 20s carded and 20s combed in weft. This particular fabric used in borders and deserts where dust is very high.

- 
- Defense Forces such as the Navy also use Camouflage Fabrics.
 - These fabrics have warp as textured yarns and weft construction is spun yarns etc.

Armored Vehicles coverage and heavy use

- Wrap is textures polyester heavy denier and the weft is spun yarn.
- Aircraft coverage Camouflage fabrics armored of 100% textures polyester yarn fabrics.
- Camouflage fabric is used for covering guns etc are made of very heavy cotton yarn such as 2/10 and heavily treated.

Civilian applications

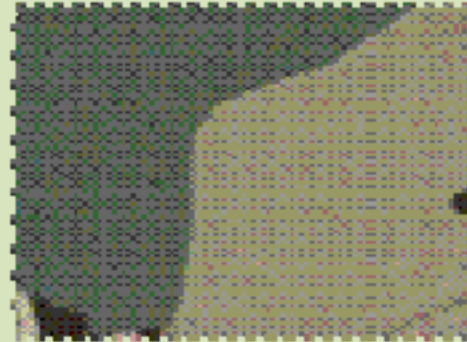
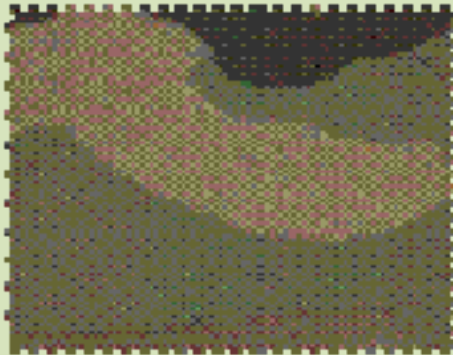
Camouflage fabrics are becoming very popular for furnishing fabrics and civilian applications such as heavy jackets, cargo pants and shorts.

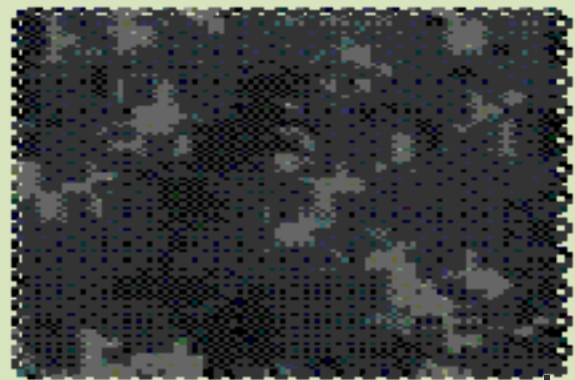
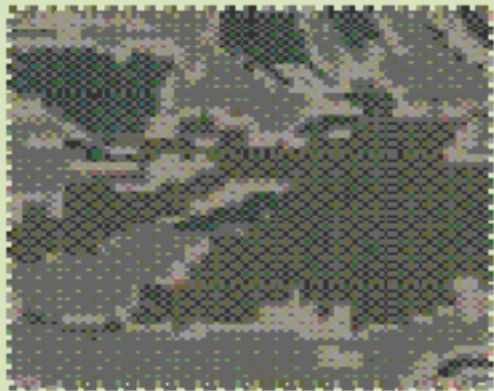
The value addition is very high as the prices are USD 10/15 per yards.

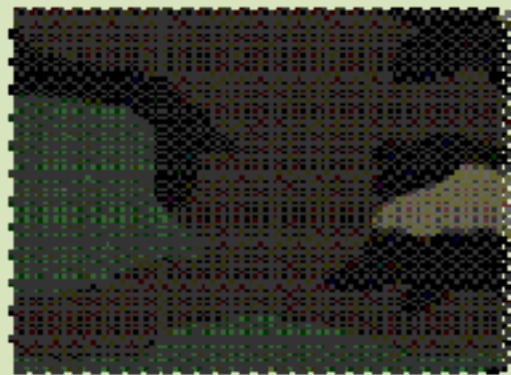
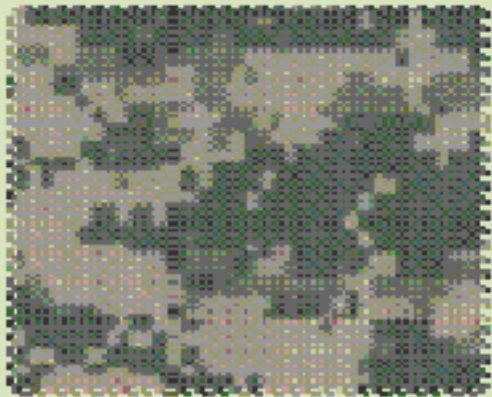
• Designs are different

Fabrics Specs are different

CAMOUFLAGE PATTERNS







Thank you for your attention.

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