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Prototyping for 16 CFR Part 1633

Wednesday March 28, 2007

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Prototype

- ***Specific Design of Mattress Set that Serves as a Model for Units to be Produced & Sold***
  - ***Model must be the same:***
    - **Materials**
    - **Components**
    - **Design**
    - **Assembly Methods**

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3 Kinds of Prototypes

Qualified Prototype(s)

Prototypes Mattress Set Design & FR Solution: Requires 3 Consecutive Successful Tests per Model

Confirmed Prototype(s)

Test Manufacturing Methods: 1 Successful Test per Model per Manufacturing Facility

For Confirmed Prototypes, Prototype Developer must be Notified of any Failures

Subordinate Prototype(s)

May not Require Testing

Linked to Qualified Prototypes by "Reasonable Criteria"

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Implementing 1633 Prototypes

Prepare the Organization

Evaluate the Product Line

Identify Candidate Suppliers

Prototyping Decision – internal or external?

Select Products

Set Qualification Prototypes & Reasonable Criteria

Build & Test Qualification Prototypes

Build & Test Confirmation Prototypes

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Prepare the Organization

- ***Sales & Marketing: Design Trade-off's***
- ***Operations:***
  - ***Types & Properties of F.R. Materials***
  - ***Product Assembly***
  - ***Management of Materials***
  - ***Management of Production Information***

<u>Important!!</u>: Identify the Organizational Leader

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Evaluating the Product Line

- ***Design for Comfort & Sales***
- ***Categories:***
  - ***Mattress Set Designs***
    - **Mattress Constructions**
      - **Tight-top**
      - **Pillow-tops**
      - **Foam Core**
    - **Comfort Layers = Fuel Loads**
    - **Foundations {High Profile, Low Profile, Wood}**

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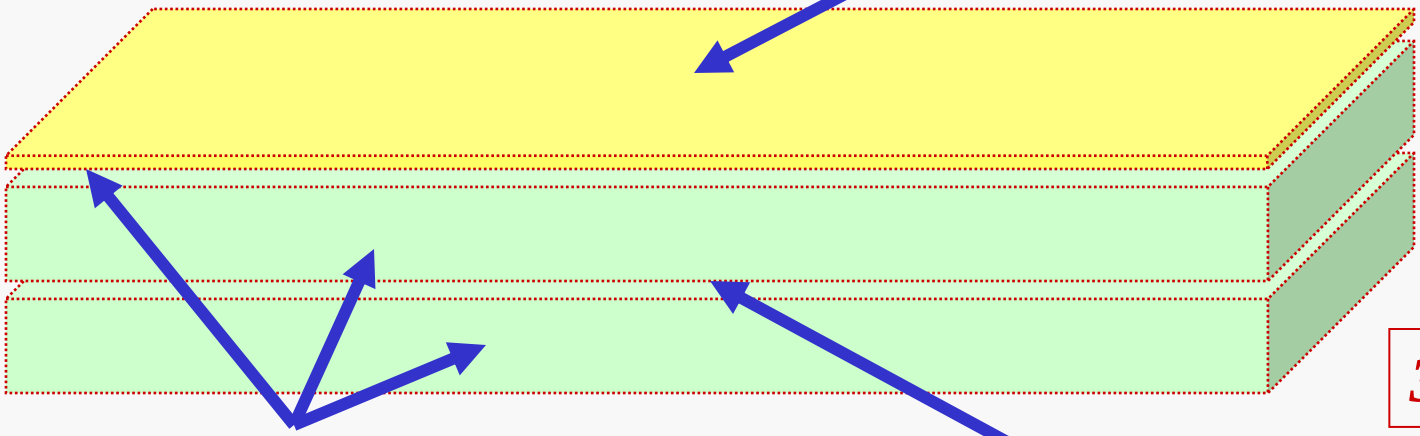
Four FR Product Applications



1 Top Panel

2 Mattress/Foundation Borders & Pillow-top Gussets

3 Underside of Mattress

4 & Products for Luxury Foam Beds !

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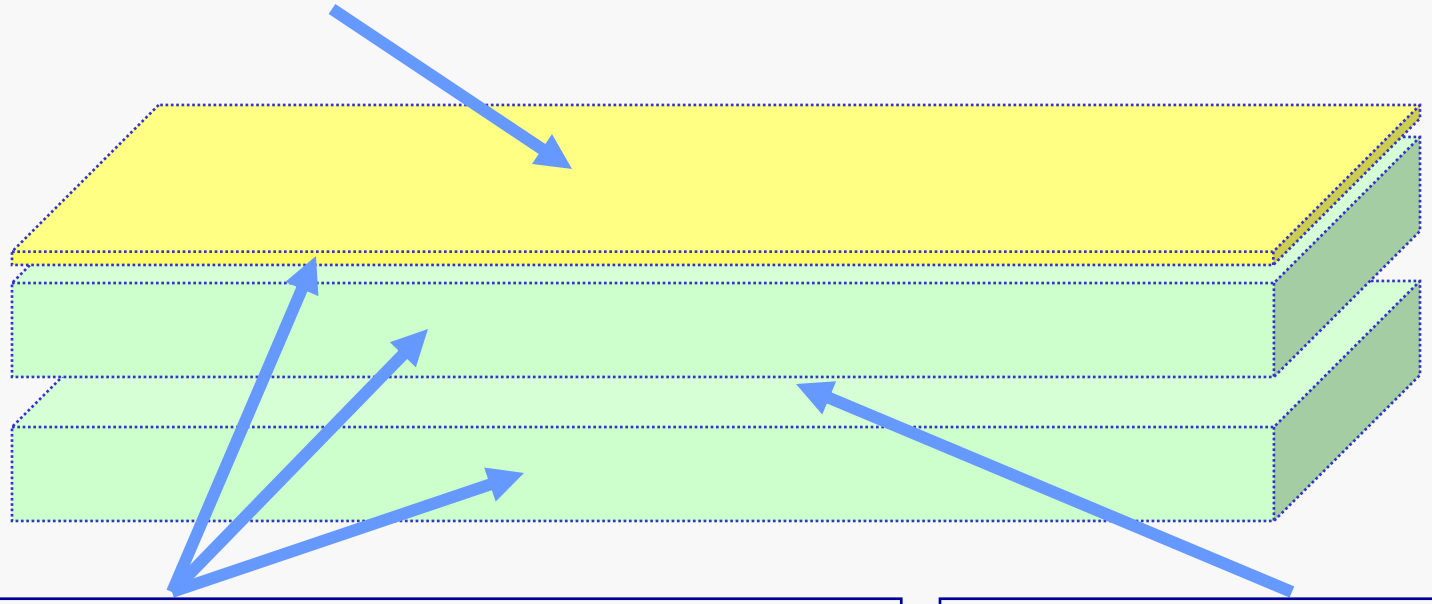
FR Product Applications

1

Top Panels: Typically High Loft Fiber or Sheet Products - Comfort Layers



2

Borders & Pillow-top Gussets
High Loft Fiber, Sheet Products, or "Composites"

3

FR Filler Cloth
(usually only mattress bottom)

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4

+ Sleeves, Tubes, & Quilted Solutions for Foam Beds

A Summary of FR Product Technologies

- ***INHERENT***
  - ***Visil***
  - ***Para-aramid (e.g. Kevlar, Twaron)***
  - ***Pan-oxidized (PANOX) Fiber***
  - ***Fiberglass***
  - ***Melamine (e.g. Basofil)***
  - ***Modacrylic***
- ***APPLIED***
  - ***Polyphosphates***
  - ***Boric Acid***
  - ***Others (cost, toxicity)***

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Identifying Suppliers

- ***Beyond the Products …***
  - ***Service Capabilities:***
    - **Locations**
    - **Salesforce – available, knowledgeable**
    - **Information Management**
  - ***Compatibility with Other Suppliers***
  - ***Quality Systems***
  - ***Strength***
  - ***Integrity***

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Prototyping Decision – internal or external?

- ***Third-party Prototyping***
  - ***Modeling of Line***
  - ***Familiar with F.R. Solutions***
  - ***Existing Portfolios of Prototypes***
    - ***<u>Significant</u>* Reduction in Amount of Testing**
    - ***<u>Quality</u>* of Prototypes ?**
  - ***Unit Construction Methods***
  - ***Quality Systems Implementation***

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Setting Prototypes & Reasonable Criteria

- ***Mattress-Foundation Combinations***
- ***Subordinate:***
  - ***Size of Model***
  - ***Ticking***
  - ***Reasonable Criteria***
- ***Test Highest Fuel Loads First***
- ***Evaluate Quality of Passing Results***
  - ***Repeatability***
  - ***Heat Release Signature***

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Building & Testing Prototypes

- ***Prototype Identification Scheme***
- ***Schedule Building Responsibly***
  - ***Sufficient Time***
    - **Receipt of Materials**
    - **Prepare to do this more than once !!**
    - **Scheduling of Laboratory Time**
- ***Carefully Supervise Construction***
- ***Be Present at Tests !***

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Implementing 1633 Solutions

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*Critical Elements of FR Bed Construction**

- ***Fully Enclose* Fuel Loads with FR Materials**
  1. ***Primary Fuel Loads:***
     1. *Foam & Fiber Fills*
     2. *Pads*
     3. *Foundation Wood*
  2. ***Place FR Barriers behind Ticking***
  3. ***Connect Barrier Edges (Tape-edge) with FR Thread***
  4. ***Close External Seams with FR Thread***
  5. ***Continental Foundation – enables Standard Filler Cloth***
  6. ***Avoid/eliminate Vents & Corded Mattress Handles***

**** These are proposed as typical for FR constructions of conventional bed sets; because some bed designs may require additional elements of protection L&P recommends that all bedding manufacturers select their FR protection based on careful testing of FR solutions***

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Summary: Keys to Successful Prototyping

- ***Prepare the Organization***
- ***Thoroughly Understand the Line***
- ***Carefully Choose Suppliers & Products***
- ***Invest Time & Resources in Prototyping***

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