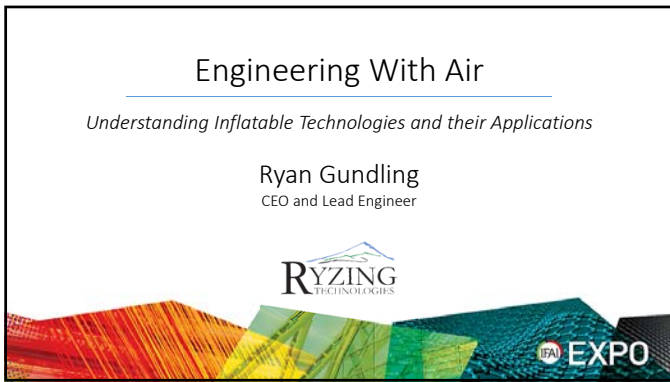
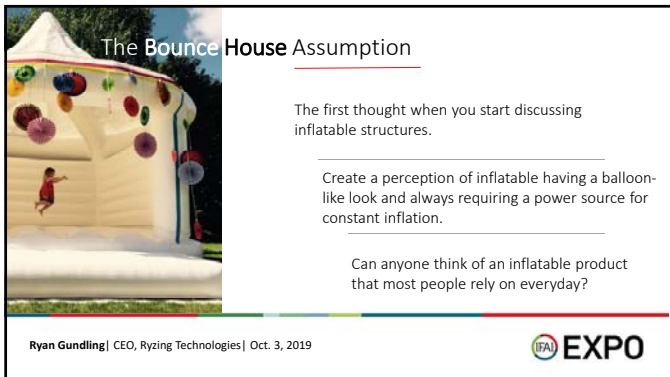




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3

The Car Tire




Car tires are high-performing, high-pressure inflatables that people assume will never lose air pressure

With advancements in textiles there are new applications for high performing inflatable products.


I might have an application, where do I start?

Ryan Gundling | CEO, Ryzing Technologies | Oct. 3, 2019



4

What you will Learn







Ability to identify different types of inflatable structures


Knowledge of the different technologies

Are they safe and what to consider

Understanding of the engineering process







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Airframe Inflatables




Pressurized beams are used to create support structure for shelter skin to be tensioned over.

Inflatable beams can range from less than an inch to over three feet in diameter and pressurized from 2 to 120 psi


Common applications are military basecamp tents, whitewater rafts, and first responder tents

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Airframe Inflatables - Technologies




Braided Airbeam – High pressure, customizable section properties and shape, and seamless


3D Woven Airbeam – Medium Pressure, customizable shape, and seamless



Low Pressure Seamed Airbeam – Use commonly available coated fabric, utilize large diameter to meet structural requirements




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Air-Supported Domes




Entire shelter skin is pressurized with a constant flow of air.


Air-supported domes can range from a few hundred sq. ft. to over 350,000 sq. ft.

Structures are pressurized slightly over the ambient atmospheric pressure ~0.037 psi.

Membrane Only – Smaller spans and low pressure
 Membrane and Cable – Larger span and handle higher pressure




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Aircell Structures




Entire wall is pressurized and can hand high loads with low pressure.

Typically require an air system to maintain pressure.


RF or heat-welded PVC-coated fabrics are often used in the construction of these inflatables.



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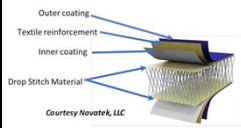


Drop stitch Inflatables

Method to create an inflated flat surface


Increased popularity from inflatable Paddleboard

Commonly range from 2" to 18" thick with operating pressure of 6 to 20 psi.



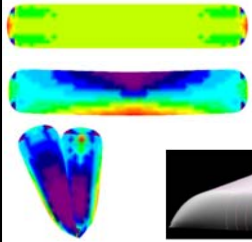
Courtesy Navatek, LLC

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Failure Modes




Over tensioned fibers – result in catastrophic failure

Wrinkle Failure – Loss of tension in fibers – Beam is still stable but ability to resist load is compromised

Buckle Failure – Enough fibers have lost tension to create instability in the beam

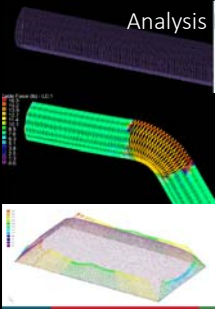



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Analysis Methods




Hand Calculation blending traditional structural calculation, textile units, and pressure calculation. Calculation verified with load/deflection and burst testing.

Use of specialty textile FEA software to model, pressurize and apply loads

Exploring options to better model dynamic inflatable structures

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Creative Applications for Inflatables


High-performance inflatables are being used in a variety of industries to solve unique problems.

Space Exploration, Military, Robotics, Recreation, Exoskeletons, Prosthetics, Fabric Architecture

Lightweight, packable, compliant, and flexible while providing rigid, functional products.





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Thank You



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See you next year!



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100 Years of Textile Innovation



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