Uncertain World

Ken Rolfes

KDR Associates, Inc.

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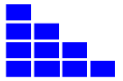

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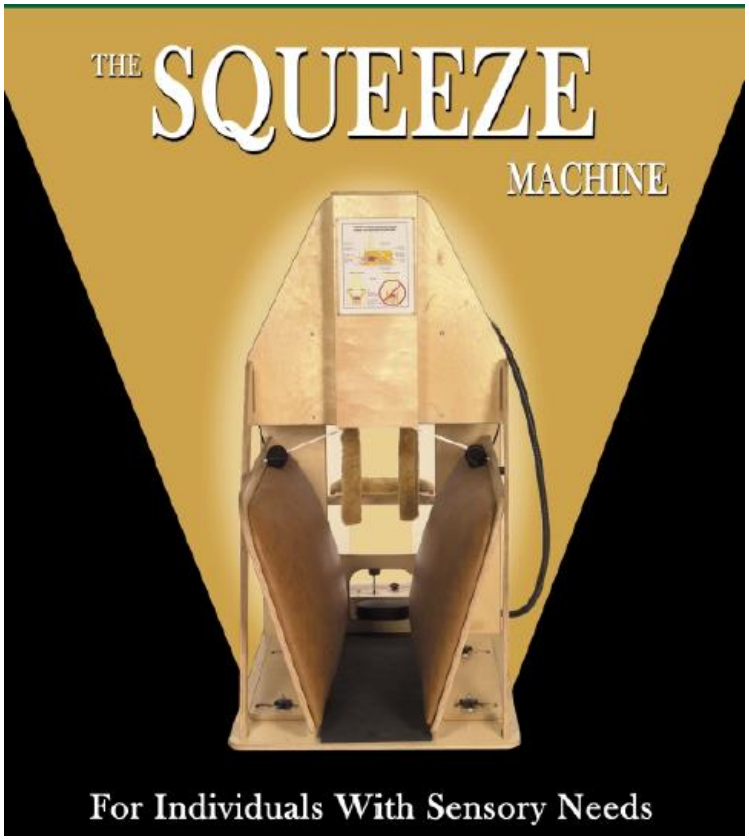
Product Development



1. Recipe
2. Desirable Product

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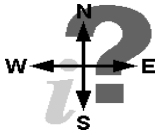
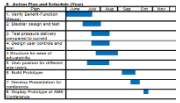
Project

1	2	3	4	5
Focus	Opportunity	Ideation	Experimentation	Execution
The challenge?	Interpretation?	What to Create?	How to test Ideas?	How to make it happen?





3P

VOC

A3

Ed Minnock Colleen Shinn, Pete Cionitti, David Sullivan, Boyd Rice, Kip Benson, Jason Culp

Margaret Creedon, Valerie Creedon, Maurice Snell

VOC
Customer Knowledge
March 2012

Not Shown: Tricia Sutton, Scott Schiave

Michael Bremer, Ken Rolfes, Jim Dyes

Back: Pete Cionitti, Charlie Fouraker, Carl Jarvis, James Bearden, Michael Bremer, Gary Daggett, Maurice Snell, K Matthew Swain, Todd Fink, David Sullivan
Middle: Michael Kennedy, Lori Bearden, Margaret Creedon, Samuel Petre, Colleen Shinn, Tricia Sutton, Valerie Creedon
Kneeling: Jason Culp, Jim Dyes, Ken Rolfes, Jason Bogusz, Ben Zheng

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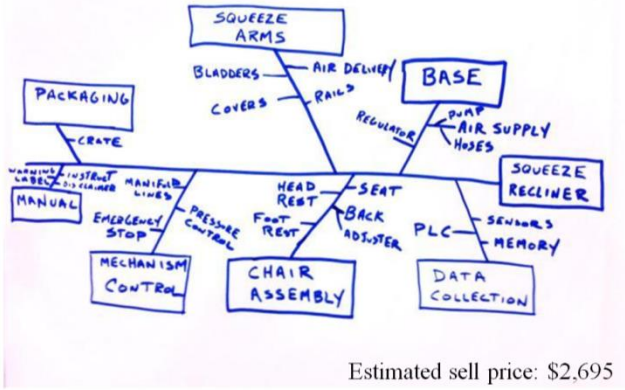
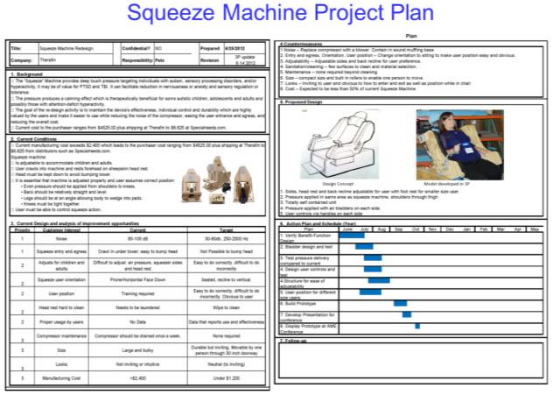
Accomplishments

- Addressed VOC identified targets.
- Developed 17 different design ideas.
- Built 3 alternate models.
- Selected one to prototype.

Outlined manufacturing process.



Scoped a rough product development plan.



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The New Design

- Showed the prototype at AME Chicago
- Next steps
  - Baseline clinical for original Squeeze Machine
  - Build additional prototypes
  - Conduct Comparative clinical comparisons

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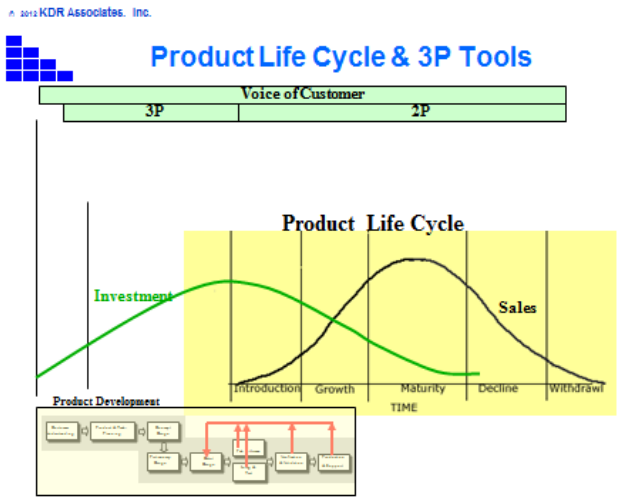
When Do You Use 3P

Whenever there is a dramatic change in the product and/or production environment….

- ***New product design***
- ***Design change(s)***
- ***New Process***
- ***Process relocation***



Facility Design & Layout

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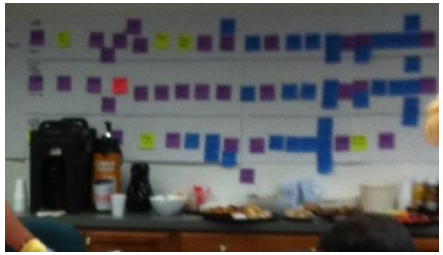
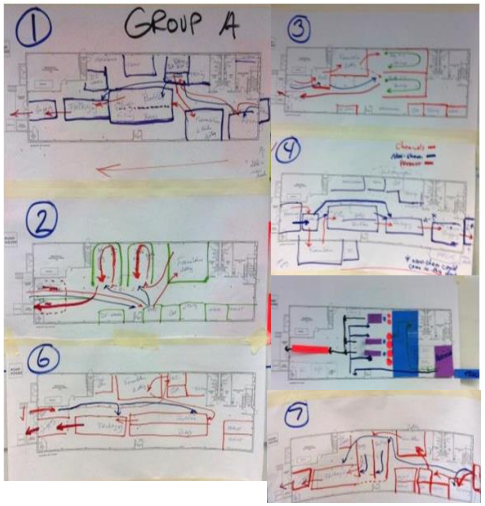
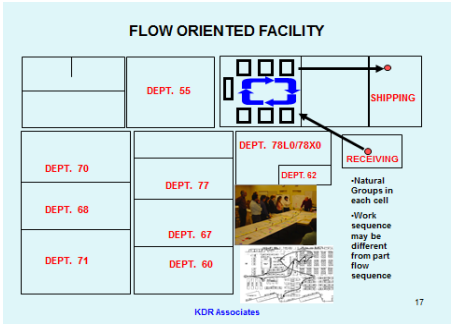
Group Processes



Create alternatives



Define Concept



Set Criteria

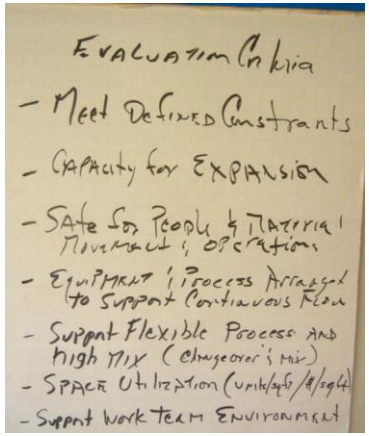
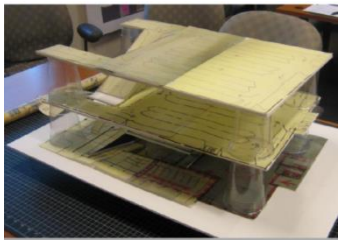
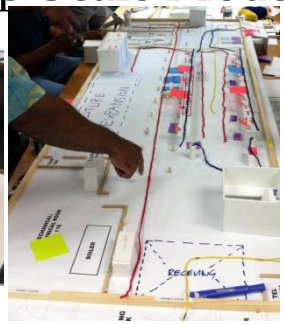


Table Top Scale Model





Select Design

Facility *..\..\Videos\Facility 3P for presentation.wmv*

New Process

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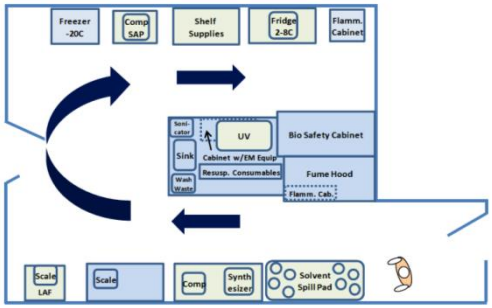
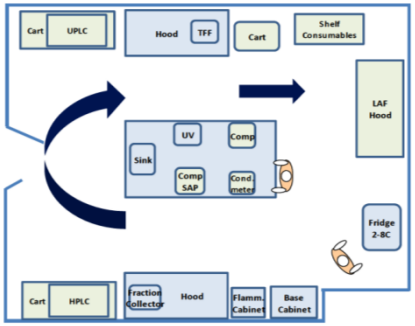
Previous Route

New Flow





3P Concept Model

Process ..\..\Videos\Production line development clip.wmv

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New Product

New product design..\..\Videos\Squeeze machine event clip.wmv

How we used 3P

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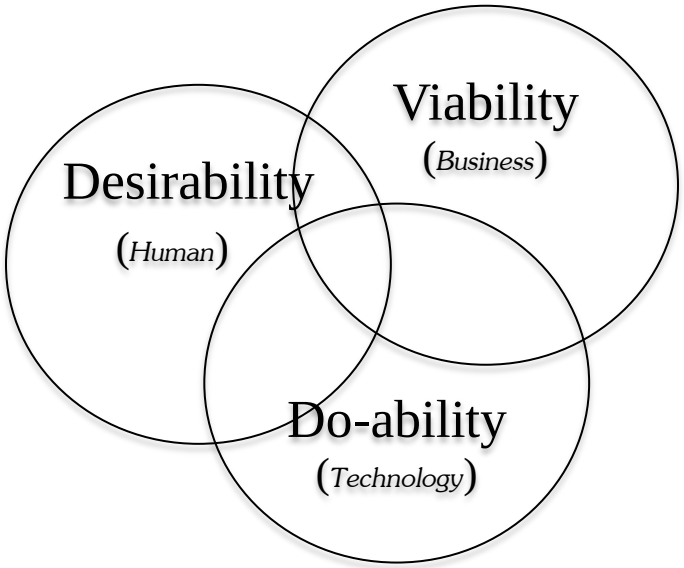
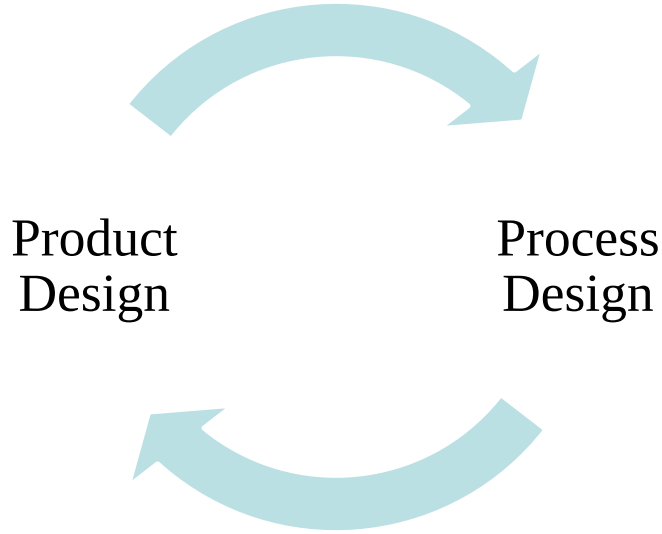
Production Preparation Process





Collaborative Environment for idea exchange and development

Process

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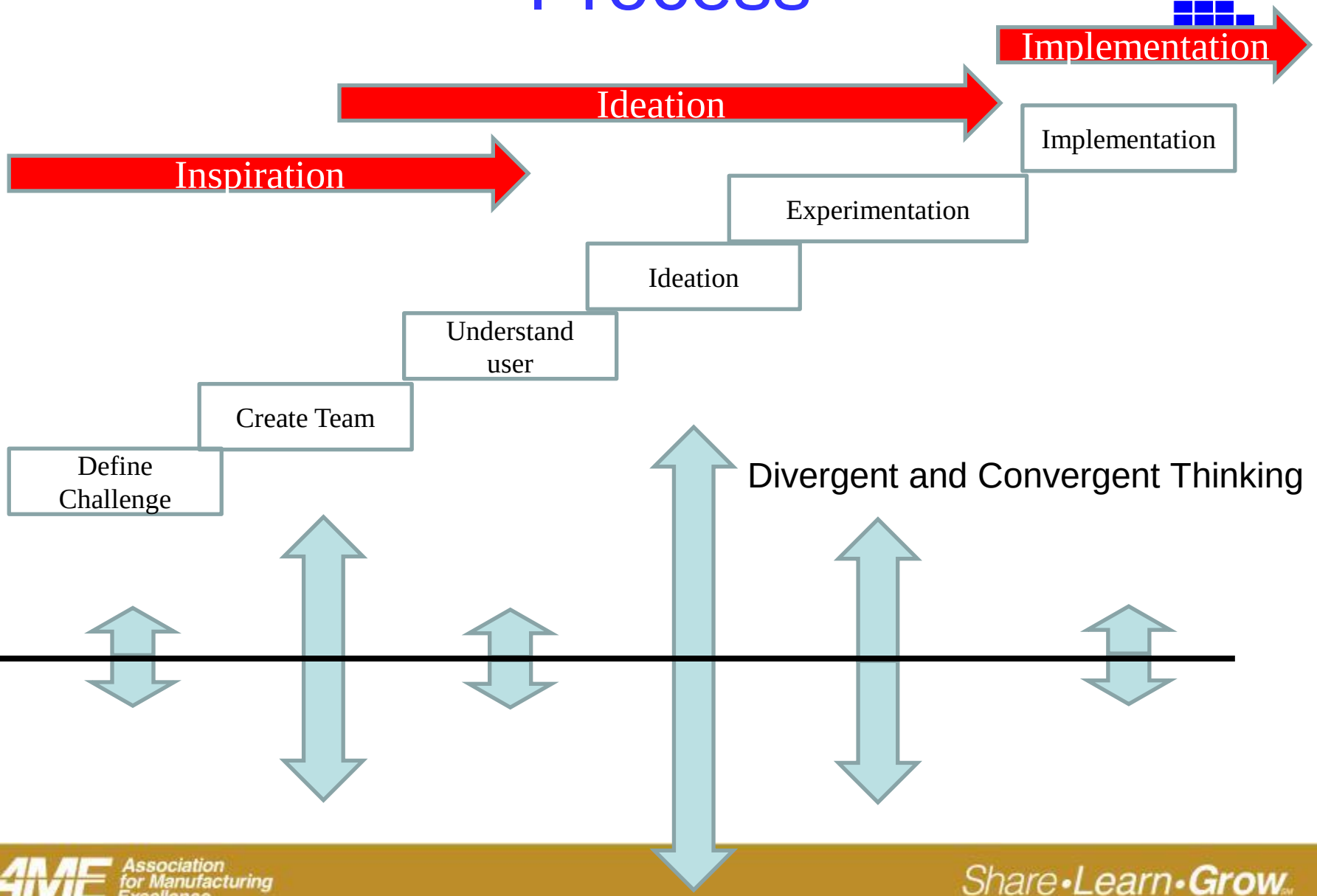

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Customer Interests

- Nothing to do with an Organization's capabilities

- It's only about the customer

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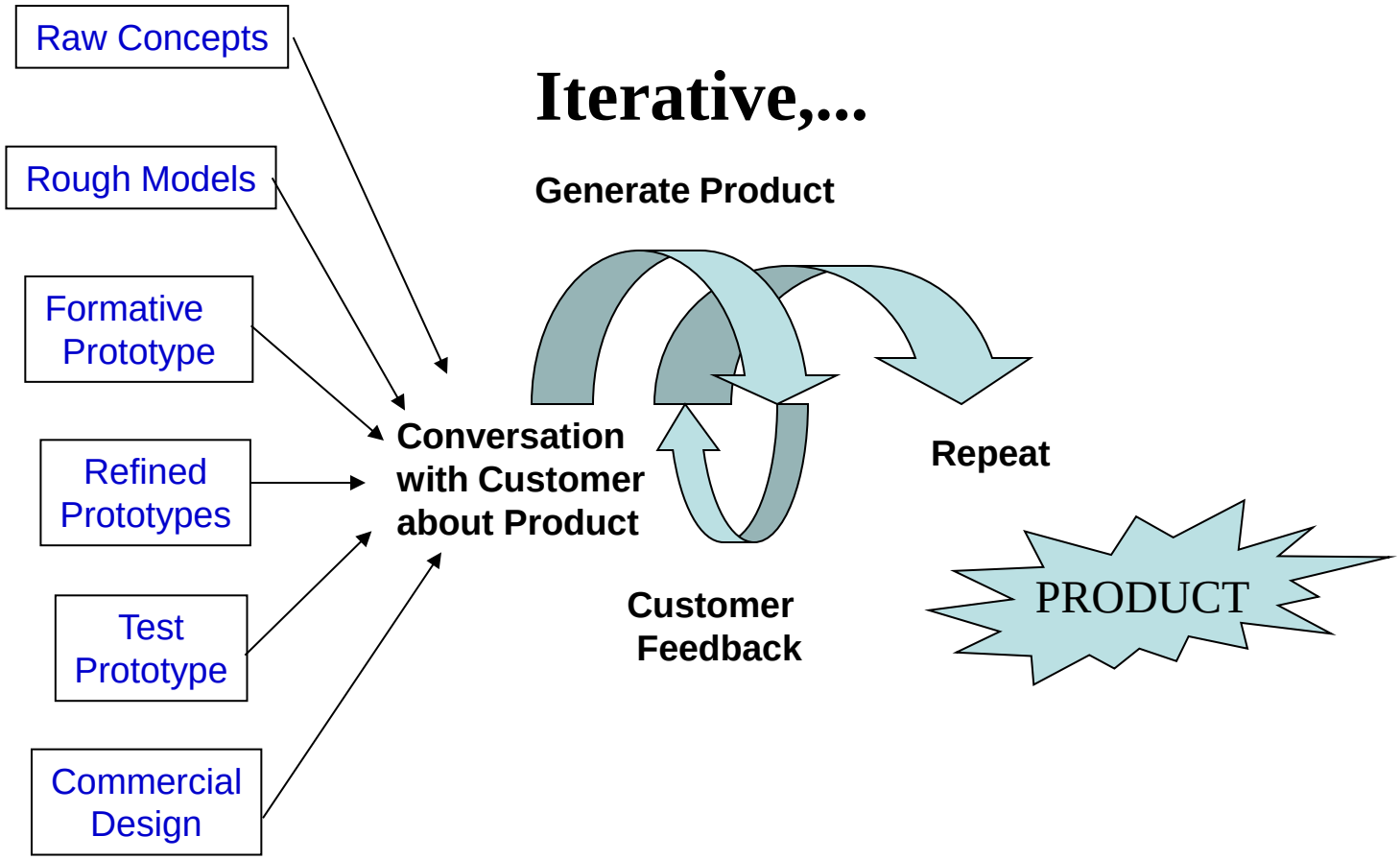
The "Voice of the Customer" is…



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Current Squeeze Machine

- Current machine, designed by Temple Grandin, works.
  - Users control initiation and duration of squeeze.
  - After a few minutes, they calm down.
- And it works.

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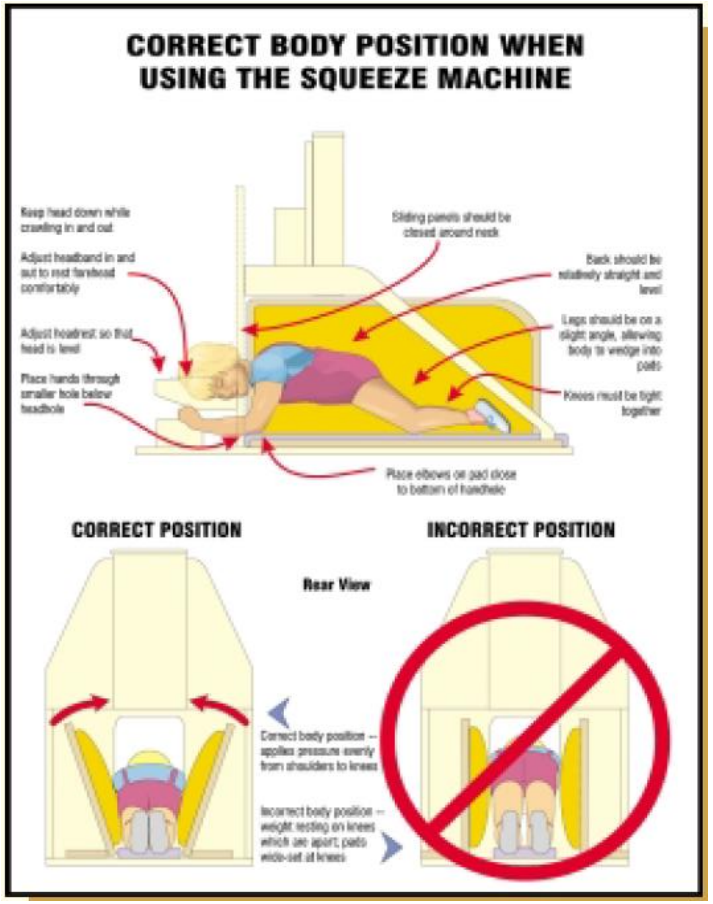
VOC Discovery & Interpretation

- Everyone took a turn in the Squeeze Machine.
- We observed others using the machine.
- Listened to Users and Clinicians.
- Identified the gaps.



User's first Impression?

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Customer Interests

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Customer Interest Category	Customer Interests	How Measured
Approachability	Position of user in machine	__Standing __Prone __Supine
	Looks fun, Inviting, Comfortable, Secure, Cozy, Openness	Likert Scale
	User Field of View while in Machine	> 90° Field of View
Data Collection	Frequency of Use	Counter
	Number of Pulls	Counter
	Length of time for Pull	Timer
	Total time in machine: (enter - exit)	Timer
Real-time Monitoring	User and/or Monitor feedback alerts	
	User position in machine	Pressure
	Rapid pulls	Count
Safety	Users with limited motor and communications skills can use (tactical controls)	Visual Force Distance
	Ease of Setup and change over	Change-over Time
Sensory	Sound	Decibels - dbs
	Smell	Olfactory
	Tactile	Surface Finish
	Color	Brightness/Hue
	Propriocipte Sense	Know where body is in space
Reliability & Durability	Product life	Cycles
	Pressure consistency	PSI + & -
	Duty cycle time	Seconds
	Average time to failure	Time and cycles
Serviceability	Average time to repair	Time
	Self service-ability	Frequency
	Outside service requirements	Downtime
	Complexity	# of Parts
User Size Variation	User weight min and max	Pounds
	User height min and max	Inches
	User dimensions: Chest Waste Hips	Inches
Hygiene	Wash-ability using common products	Cleaning product cost
	Ease of access for cleaning	time
	Anti fungal, microbe, viral materials used	swab test
	Part replacement cycle (single or multi)	# of uses
	Disposable versus non disposable	replacement cost

79 opportunities

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Squeeze Machine Customer Interests

Customer Interest Category	Customer Interests	How you Measure	Target	Current	Subsystem					
					Power	Squeezer	User Controls	Frame	Data Collection	Other
Approachability	Position of user in machine	_Standing _Prone _Supine	Seated Recline to Vertical	Prone/Horizontal Face Down		✓	✓	✓		
	Looks fun, Inviting, Comfortable, Secure, Cozy, Openness, Aesthetically pleasing	Likert Scale	Rating 5	No/rating 2		✓		✓		
Use Effective	Length of time for Pull data is available	Timer	Clinic: - Capture Data - Alert abnormality - Optional recording output for charting and tracking Home: - Optional Features - Capture Data - Alert abnormality - Recording output for charting and tracking	Not Available			✓		✓	
User ease of use	Users with limited motor and communications skills can use tactical controls) Include Pull and Turnoff switch	Visual Force Distance Actuator Timer Off Switch	Visual < 4 lbs < 1 inch T Side Timer option available for home only Remote from actuator	English ~4.5lbs ≈ 1 inch Lever with Ball No Timer Close to actuator switch			✓			
Sensory	Sound	Decibels & Frequency - dbs	< 40db, 250 to 2000 Hz	85 - 105 db,	✓					
Reliability & Durability	Product life	Cycles	Appr ox 10 years Home - 5000 cycles min Clinic - 25,000 cycles min	10 - 20 years		✓				
	Pressure consistency	PSI +/-	Stays Where set Keep current capability	Current in good do not know actual measure	✓	✓				
	Average time to failure	Time and cycles	Home - No repair necessary dur ing 10 year product life Clinic - MTBF > 3 - 5 years	~1 Years	✓	✓	✓	✓		
User Size Variation	User weight min and max	Pounds	5 yrs to adult	up to 250 pounds		✓		✓		
	User height min and max	Inches				✓		✓		
	User dimensions: Chest Waste Hips	Inches				✓		✓		

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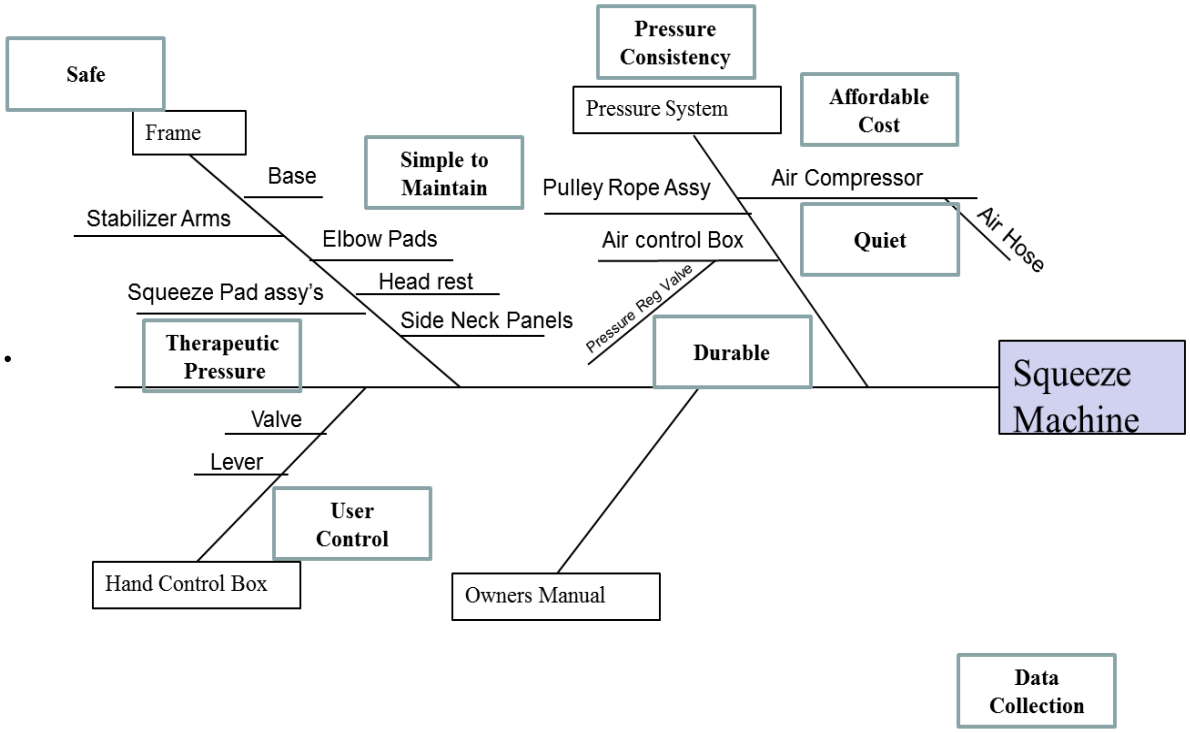
Connect Interests to Product

Use product parts diagram.

Map customer interests to product attributes, functions or subsystems.

What influences the specific interest?



Knowledge Brief - Example

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Customer interest: __Squeeze Machine Safety__

Facts:
Factual information about your target customer.

…apset so it is important to
…iance of injury getting in and
…g the machine.

Pain
State the problem your target customers have that requires solution.

Users frequently have dif…
and out of the machine and clini…
be dedicated to the user while th…
the machine. This limits the use…
availability when needed.

Behavior
Existing behavior they exhibit now because they do not have your solution.

…ntly guide user into
…tch while the user is in the
…d help the user get out.

Goals
What are the customers trying to do through the behavior that your solution will do better? How will you measure?

Make the device more int… …f…
and remove safety hazards req…
dedicated clinician vigilance.

Background statement why this is important to customer.

Conclusions from what we have learned that designers should know.

What we have learned from observing customers' experience.

What the new design should address and actions we need to take before the design work.

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A3 Squeeze Machine Project VOC

Title:	Squeeze Machine Redesign	Confidential?	NO	Prepared	3/25/2012
Company:	Therafin	Responsibility:	Pete	Revision	Original

1. Background

- The "Squeeze" Machine provides deep touch pressure targeting individuals with autism, sensory processing disorders, and/or hyperactivity; it may be of value for PTSD and TBI. It can facilitate reduction in nervousness or anxiety and sensory regulation or tolerance.
- The pressure produces a calming effect which is therapeutically beneficial for some autistic children, adolescents and adults and possibly those with attention-deficit hyperactivity.
- The goal of the re-design activity is to maintain the device's effectiveness, individual control and durability which are highly valued by the users and make it easier to use while reducing the noise of the compressor, easing the user entrance and egress, and reducing the overall cost.
- Current cost to the purchaser ranges from $4525.00 plus shipping at Therafin to $6,625 at Specialneeds.com.

2. Current Conditions

- Current manufacturing cost exceeds $2,400 which leads to the purchaser cost ranging from $4525.00 plus shipping at Therafin to $6,625 from distributors such as Specialneeds.com.

Squeeze machine:

- Is adjustable to accommodate children and adults.
- User crawls into machine and rests forehead on sheepskin head rest.
- Head must be kept down to avoid bumping tower.
- It is essential that machine is adjusted properly and user assumes correct position:
  - Even pressure should be applied from shoulders to knees.
  - Back should be relatively straight and level.
  - Legs should be at an angle allowing body to wedge into pads.
  - Knees must be tight together.
- User must be able to control squeeze action.

3. Current Design and analysis of improvement opportunities

Priority	Customer Interest	Current	Target
1	Noise	85-105 dB	30-60db, 250-2000 Hz
1	Squeeze entry and egress	Crawl in under tower, easy to bump head	Not Possible to bump head
2	Adjusts for children and adults	Difficult to adjust: air pressure, squeezer sides and head rest	Easy to do correctly, difficult to do incorrectly
2	Squeeze user orientation	Prone/Horizontal Face Down	Seated, recline to vertical.
2	User position	Training required	Easy to do correctly, difficult to do incorrectly. Obvious to user
2	Head rest hard to clean	Needs to be laundered	Wipe to clean
2	Proper usage by users	No Data	Data that reports use and effectiveness
3	Compressor maintenance	Compressor should be drained once a week.	None required
3	Size	Large and bulky	Durable but inviting. Movable by one person through 30 inch doorway
3	Locks	Not inviting or intuitive	Neutral (to inviting)
3	Manufacturing Cost	>$2,400	Under $1,200

Target Improvement areas for design team

Focus

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Design Event

Alternatives

Modeling

Testing

Demonstration

Selection

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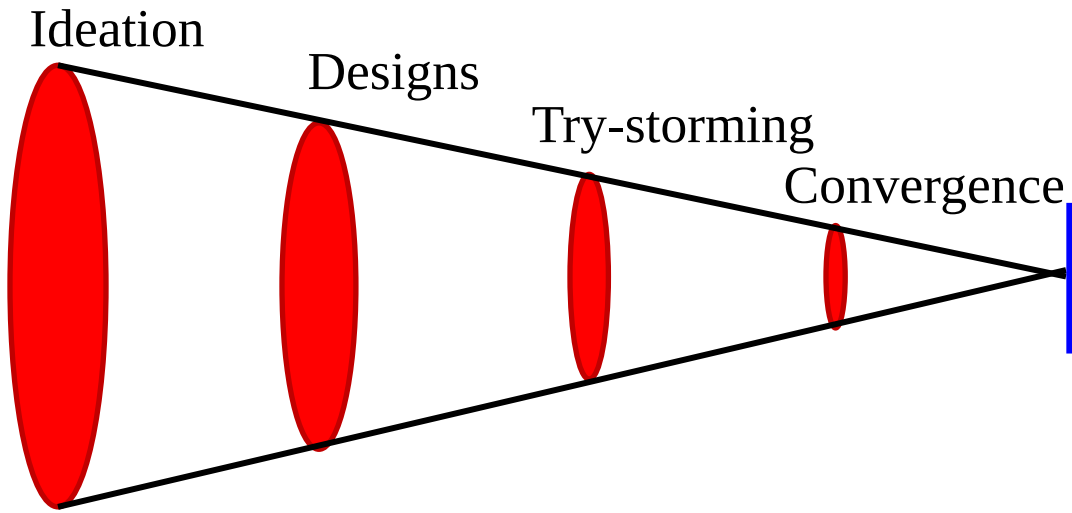
3P Event Flow

- Voice of Customer
- Bold goals
- Assemble a strong team
- Establish tight $ limits



Then Develop and Engineer details and robustness

Information → Develop Alternatives Try-Storming → Evaluation Criteria → Simulation Mock-up → Finalize Concept

Developing Design Alternatives

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Look for examples in Nature

Fill

Identify

Protect

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Natural Tools Provide Many Solutions

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17 Different Design Ideas

Key Words
Diagrams
Examples from Nature

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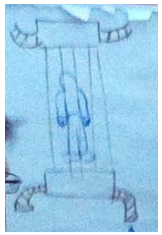
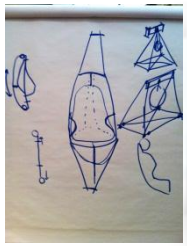
Built 3 Alternative Models

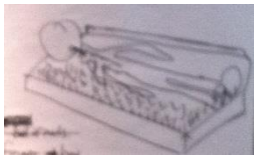


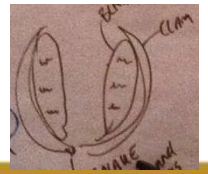











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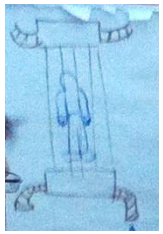
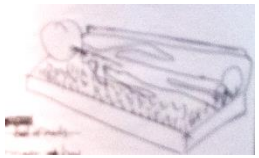
Selected One To Prototype

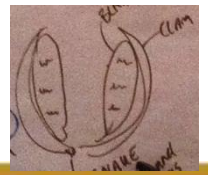










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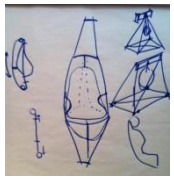
Design Cycle of Learning

Design Concepts

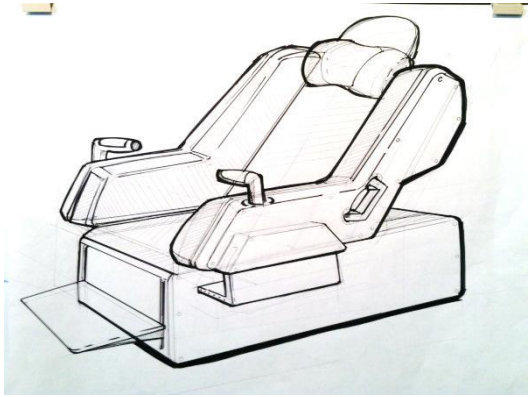


Conduct Tests

Build Model

Demonstration

Proposed Product



3P Squeeze Machine Project Plan

Title:	Squeeze Machine Redesign	**Confidential?**	NO	**Prepared**	**6/25/2012**
Company:	Therafin	**Responsibility:**	**Pete**	**Revision**	3P update 6 14 2012

1. Background

- The "Squeeze" Machine provides deep touch pressure targeting individuals with autism, sensory processing disorders, and/or hyperactivity; it may be of value for PTSD and TBI. It can facilitate reduction in nervousness or anxiety and sensory regulation or tolerance.
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3	Size	Large and bulky	Durable but inviting. Movable by one person through 30 inch doorway
3	Looks	Not inviting or intuitive	Neutral (to inviting)
3	Manufacturing Cost	>$2,400	Under $1,200

Plan

4 Countermeasures

1. Noise – Replace compressor with a blower. Contain in sound muffling base.
2. Entry and egress, Orientation, User position – Change orientation to sitting to make user position easy and obvious.
3. Adjustability – Adjustable sides and back recline for user preference.
4. Sanitation/cleaning – few surfaces to clean and material selection.
5. Maintenance – none required beyond cleaning.
6. Size – compact size and built in rollers to enable one person to move.
7. Looks – Inviting to user and obvious to how to enter and exit as well as position while in chair.
8. Cost – Expected to be less than 50% of current Squeeze Machine.

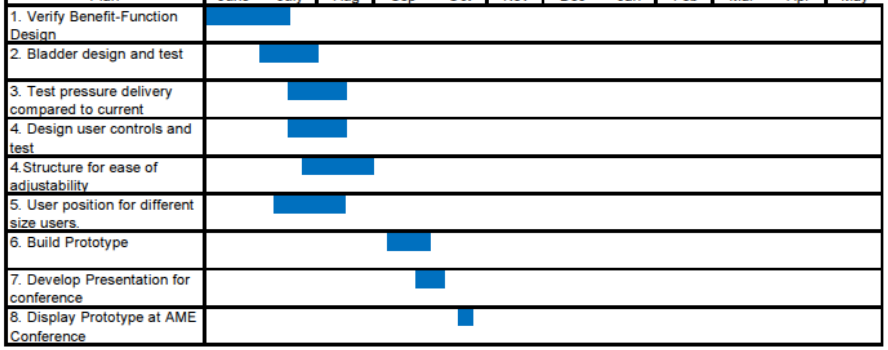
5. Proposed Design

Design Concept

Model developed in 3P

1. Sides, head rest and back recline adjustable for user with foot rest for smaller size user.
2. Pressure applied in same area as squeeze machine, shoulders through thigh
3. Totally self contained unit
4. Pressure applied with air bladders on each side.
5. User controls via handles on each side

6. Action Plan and Schedule (Year)



7. Follow-up

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Prototype Design

Learning

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- Invite everyone in the quest for new ideas.
- Involve customers in the process of generating ideas.
- Environment and structure to support involvement.
- Focus on the needs that customers don't express.
- Benchmark idea-creation methods.

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