

Innovation in Manufacturing



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Agenda

- **Objective - Spark innovative thoughts, and discuss how to make it happen**
 - Obvious versus options
- **Take away...**
 - Idea
 - Innovation area
 - Innovation type
 - Purpose
 - Target market
 - Key Requirements
 - Principle or model to use
 - Use story
 - Risks
 - Execution steps

Innovation Process

- Find opportunity
- Concept solutions
- Select preferred
- Test solution
- Get to market
- Evaluate

Innovation Area Options

- Product development
- Process
- Business process
 - Service
 - Marketing
- Business design
- System (not discussed today)
- Organization (not discussed today)

Innovation Types

- Incremental
- Discontinuous
- Architectural
- System
- Radical
- Disruptive

New Product Categories

- New to world
- New to company
- Additions to existing product lines
- Improvements to existing products
- Repositioning
- Cost reductions

Target market

Triz - Principles

■ Forty principles involved in patented concepts

- Segmentation, removal, local quality, asymmetry, merging
- Universality, nesting, anti-weight, preliminary counteraction, preliminary action
- Mitigate before use, equipotentiality, other way around, sphericity, dynamics
- Partial or excessive actions, new dimension, mechanical vibration, periodic action, continuity of useful action

Triz – Principles (cont.)

■ Continued

- High speed, turning harm to good, feedback, intermediary object, self service
- Optical copies, short life, mechanical replacement, pneumatics and hydraulics, membranes
- Porous materials, color changes, homogeneity, discarding and regenerating, change physical state
- Phase transitions, heat expansion, enrich, inert, composite materials

Triz - Parameters

■ 39 Engineering parameters

- Weight of moving object, weight of non-moving object, length of moving object, of non-moving object
- Area of moving object, non-moving object, volume of moving object, non-moving object
- Speed, force, tension (pressure), shape, stability of object, strength, durability of moving object, of non-moving object
- Temperature, brightness, energy spent to moving object, non moving object

Triz – Parameters (cont.)

■ Continued

- Power, waste of energy, waste of substance, loss of information, waste of time
- Amount of substance, reliability, accuracy of measurement, accuracy of manufacturing
- Harmful factors acting on object, harmful side effects, manufacturability
- Convenience of use, repairability, adaptability, complexity of device, complexity of control, level of automation, productivity

Process Innovation

- Fixturing and tools
- Determine settings
- Challenge equipment throughput
- Sensor feedback
- New technology
- New materials
- Plant layout

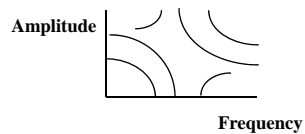
Plus Triz ideas, like the design area

Injection Molding – Situation

- **Goal:** Predicting where to operate would be great! It was unclear if the requirements were even possible. Need to rebuild trust with customer and move forward.
- **Response/ measurement:** leakage (weld quality) and appearance
- **Approach:** Executed first DOE at vendor recommended ranges

Injection Molding – Results

- Phase 1 DOE: Found “bad” and “ok” areas; could predict better area!
- Phase 2 DOE: We proved operation in new area with confidence by centering new test at previously predicted operation area.
- Result: While original prediction was ok, a better point of operation was determined (shown in red). Process adjusted to this new point. Solution continues to work after 7 years.



* Predicted operation area

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Business Process Outline/ Ideas

- Engineering Change Order
- Cost estimating
- Marketing
- Training
- Recruitment/ retention
- Call center
- Tech support
- Returns
- IT tools
- Web

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Business Process Parameters

- Add step
- Remove step
- Combine or separate steps
- Automate existing step
- Change sequence of steps
- Change timing of steps
- Change layout of form or screen
- Provide training
- Change instructions or policies

These are essential elements that when selected in sets of 2-3 items, will constitute a business process improvement. Some improvements may be obvious, but other situations may benefit from a novel approach.

Business Process Principles, cont.

- Change responsibilities
 - Includes addition or removal of participant
- Combine or disconnect processes
- Organization
 - Process coordinator versus distributed
- Perform reviews
 - As a meeting or individually (email or 1-1)
- Consider metrics for process
- Provide more resources for process (including funding)
- Consider regulations/ laws associated with process
- Content specific items
 - NPD, ECO, Interviewing, benefits, service center, sales, marketing, purchasing

Business Process Innovation

- **Example for prototype purchasing**
- **Situation:** Iterative R&D parts, purchasing lead times and quotes, vendor set up/ materials
- **Action:** Create a blanket order with typical order sizes and expected “minor changes”
 - Major changes could be renegotiated
- **Results:** Vendor ready to respond (material, programming, etc). Purchasing maintained control. R&D could release prints at 4 pm and have parts the next morning!

Direct Marketing Email Test

- **Goal:** New channel for office supplies to be developed. Working on online purchases and email contact.
- **Response:** Response rate, typical was 1% (0.2% important)
- **Approach:** Use bold changes so sample size can be smaller (32 run). Incorporate 3 market segments in the study.
 - Time since last purchase, web link to catalog, background color, message style, partner promotions, added sidebar buttons, “special offer”, discount, free gift, # of products pictured, valued customer emphasis, cross sell message, subject line
- **Results:** In one week, the company was able to find 4 main effects and an aliased interaction. Guessing at the most likely source, insight was found for future marketing efforts. New campaign jumped to 1.54%, higher than predicted. Further testing raised it to 3-5% consistently. Expanded to other areas – catalog, retail stores, and regional advertising.

Business Model Innovation

- **“The Profit Zone” examples**
 - The “Triz” for Business Models
- **Know where you fit and use it**
- **Reinvent yourself every 3-5 years**

Business Models

- **Customer solutions***
- **Product pyramid**
- **Multicomponent**
- **Switchboard**
- **Time**
- **Blockbuster**
- **Profit multiplier**

* Areas for PSI

“The Profit Zone”

Business Models (2)

- Entrepreneurial
- Specialization*
- Installed base
- De facto Standard
- Brand
- Specialty product
- Local leadership*

Business Models (3)

- Transaction scale
- Value Chain Position
- Cycle
- After sale
- New Product
- Relative market share
- Experience Curve*
- Low Cost Business Design

Filled in

■ Take away...

- **Idea:** Use Youtube to promote business
- **Innovation area:** Business process
- **Innovation type:** incremental, new to company
- **Purpose:** Increase connection with potential clients as expert
- **Target market:** New Product Development
- **Key Requirements:** Requirements, speed and risk reduction
- **Principle or model to use:** Added step, content specific idea
- **Use story:** to be found by VPs of operation, via web. Help them understand me, my approach and my value.
- **Risks:** be current, hit trends
- **Execution steps:** topics, record, post

Conclusion

- **Innovation does not always mean game changing products to customers**
- **Filling out the “innovation” tool can help consider what you are dealing with**

Questions

- **If you have questions or thoughts, feel free to share them with us**
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 - They are all archived on our publications page