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Learnings from a Five-Year Partnership With One of the World's Largest Providers of Oil & Gas Products and Services to the Energy Industry

Chapter 1
Value Engineering

Value Engineering yields Tremendous Cost Savings for a Traditional Engineer-to-Order Company

RESULTS AT A GLANCE

$11 Million
Reduction in costs

25%
Average cost reduction across 17 product families

Sustainment
Developed a stand-alone organization of facilitators and support

The Situation

A $2B division of a global provider of oil field services with 7 product and service lines was experiencing a sharp market downturn. The downturn was squeezing margins driving the need for cost management. Any given year, the company sold over 40k part numbers. Half of the part numbers were ordered only once while every part number required extensive product development efforts.

Argo's Actions

In the first phase of our partnership, Argo deployed its proprietary approach to Value Engineering within a pilot set of products to test the merits of the methodology. In this pilot program, Argo led 20 product re-design initiatives with client teams. Argo facilitated these workshops while training and developing client personnel. Due to the success of the pilot, the client created an entirely new organizational structure to carry on this effort and support the next phases of the Value Management strategy.

Why VE?

- Direct Material accounts for 70% of COGS (Cost of Goods Sold) for manufactured products
- VE focuses on the system to deliver the maximum amount and performance of functions at the lowest overall cost, setting it apart from other cost reduction methodologies such as component oriented cost reduction techniques
- VE is the most effective tool to minimize overall cost of ownership from a customer perspective

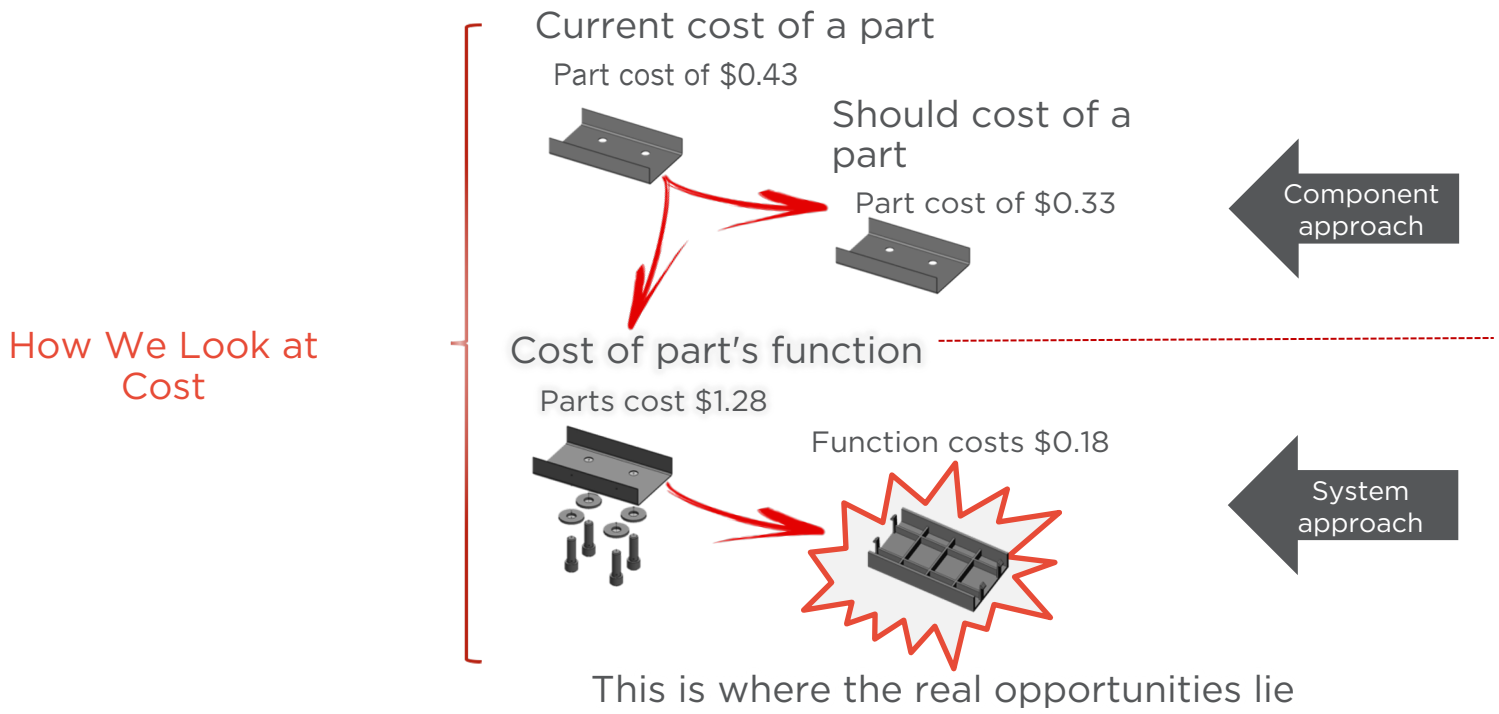
Value Engineering as a value creation lever

Value Engineering (VE) is an intensive, interdisciplinary problem-solving methodology that analyzes product designs and focuses on improving the value of the functions that are required. *Value* is defined as the ratio of function to cost. Typical approaches focus on cost reduction while preserving minimum function. ARGO uses a unique systematic set of proven techniques to work with clients in redesign of products and processes to maximize the overall function to cost relationship. The Argo approach concentrates on three areas:

1. Product design
2. Manufacturing process including Design for Manufacturing/Assembly (DFM/A)
3. Procurement & sourcing

Value Engineering vs. Design to Cost (DTC) or other cost reduction programs

Traditional DTC programs focus on components, whereas the VE methodology focuses on the functions performed verses the cost relationship at a system level



Our Value Engineering Approach

Definition:	Product Selection and understanding of portfolio, business, and market needs
Preparation:	All necessary data are defined, team is selected and invited, competitors' products are selected, Voice Of the Customer is requested and suppliers are identified.
Workshop:	The team works together full time. From function identification through design proposal calculations
Deployment:	The implementation plan is defined with project manager assigned and Visual Management developed
Consolidate:	Sketches and necessary designs are made and RFQ sent out. New Costed BOM is built up. Project Team comes together to freeze concept and create Program Of Demand
Sustainment:	Deployment plan updated with consolidation information and plan execution and results tracked and monitored for proper execution

Sources of ideas from which the teams generate product design alternatives:

- Voice of the customer
- Engineering effort & processes
- Supplier ideas, supply chain, sourcing
- Benchmark
- Function analysis, design challenges
- Performance teardown

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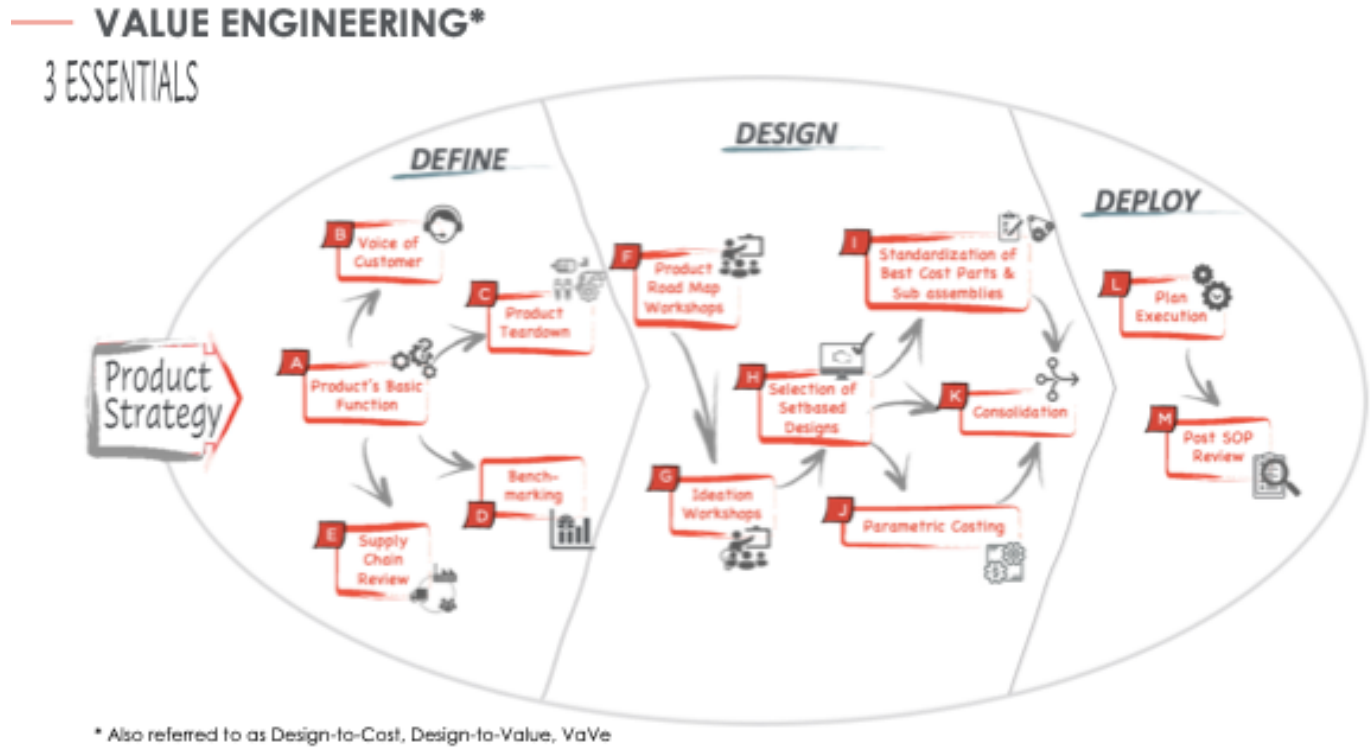
The Steps in VE Initiatives

Together with the client, we decided to embark on a "VE-light" approach: a rigorously structured but shortened approach to help the client redesign their products and processes through intense concurrent engineering and multifunctional teamwork. Our holistic methodology drives success from a 3-step approach: Define, Design, Deploy.



* Also referred to as Design-to-Cost, Design-to-Value, VaVe

VALUE ENGINEERING. 3 ESSENTIALS

Product Strategy

Product Strategy Product / Solution total lifecycle strategy is defined, incl. components

Define

A Product's Basic Function

A. Product's Basic Functions
Product's / Solution's Basic Functions are used to generate Concept Designs for now and the future (incl. long term vision). Also analyzed are product variants, options and take rates in order to understand opportunities for modular designs or platforms.

B Voice of Customer

B. Voice of Customer, Market and Competitive Environment
Product / Solution Value Proposition will be defined based on a thorough market and competitive environment analysis. Purchase drivers will be defined correlated to actual and past sales (heat maps), market share evolution, competition offering, trends and regulations.

C Product Teardown

C. Products under study Teardown
Products under study / reference projects are physically or virtually torn down using parts or sub-assemblies, typically provided by the assembly plants, drawings or warehouses. Functions performed are identified and qualified (e.g. one time, safety, appearance, basic,...). Function costs are established.

D Bench-marking

D. Benchmarking
Products under study / reference projects are benchmarked against comparable competitors' products / solutions per market and/or region: Direct Competitor, High and Low End. Product's system basic functions design are benchmarked internally and against parallel industries. Additional competitors are also virtually benchmarked using data available online.

E Supply Chain Review

E. Supply Chain Review
Global Supply Chain footprint, internal and external, is mapped including sales network and density. Make versus Buy strategies are integrated, as well as LTA, MSA, etc. contracts with key or strategic suppliers.

Design

F Product Road Map Workshops

F. Product Roadmap Workshops
Design concepts are generated based on previously identified Product's / Solution's Basic Functions, on Megatrends, on upcoming regulations and after sales data (spare & wear parts, repairs,...). Offering and other variations are integrated in the financial roadmap.

G Ideation Workshops

G. Ideation Workshops for design concepts', sub-systems', modules', platforms' Functions
Multiple Design Concepts and Design Change Proposals are created to fulfill "wanted" functions ie. 'What the customer is willing to pay for'. Functions brainstormed are based on either existing comparable products or detailed concepts. Crowd Based Innovation may be used.

H Selection of Setbased Designs

H. Evaluation of Design Concept and Design Change Proposals (DCP). Selection of set based designs
The use of multiple sources generates hundreds of ideas that after a feasibility check can either be grouped in a set or need to be kept separate since they are mutually exclusive from others. All sets or DCPs are technically and financially evaluated according to a formal process.

I Standardization of Best Cost Parts & Sub assemblies

I. Standardization – Platforms – modules – interchangeable sets of parts
It is crucial to understand the product portfolio, the market segmentation and 'go-to-market' strategy to establish platforms, common interfaces, and common, backwards compatible parts.

J Parametric Costing

J. Parametric Costing
Software is used to identify optimal cost for functions from a design perspective, piece cost is studied to determine cost drivers, then "should-cost" is determined against cost libraries.

K Consolidation

K. Consolidation
Estimated cost for proposed Design Sets are replaced with solid offers based on supplier quotations Engineering or from Operations. Carry-over or carry-back are validated. Costed BOMs / reference costs are rebuilt with new information and expected benefits are formalized.

Deploy

L Plan Execution

L. Execution
Start with an implementation Master Plan based on validated assumptions. An execution rhythm and cadence is established, based on best-practice physical or virtual Visual Management Boards, incl. a risk mitigation structure

M Post SOP Review

M. Post SOP
Hand over is made after ramp up to stable production, at defined O.E.E. and with minimum WIP. Skills matrices are up to date. Engineering references are updated, and project quotations re-evaluated

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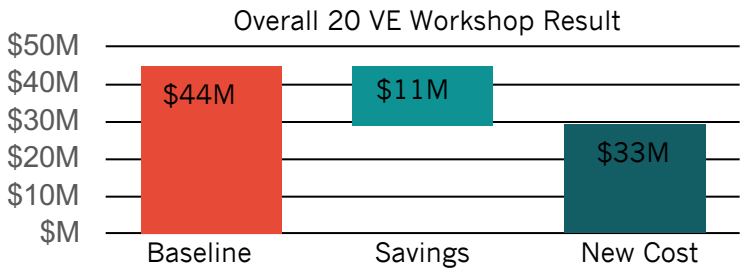
Value Engineering Workshop as part of the VE Projects

Each 4-day workshop involved training each team on the methodology including the history and purpose for the process. The organization's top leadership was intimately involved by setting the business context for the effort and providing words of encouragement.

Overall 20 VE Workshop Result

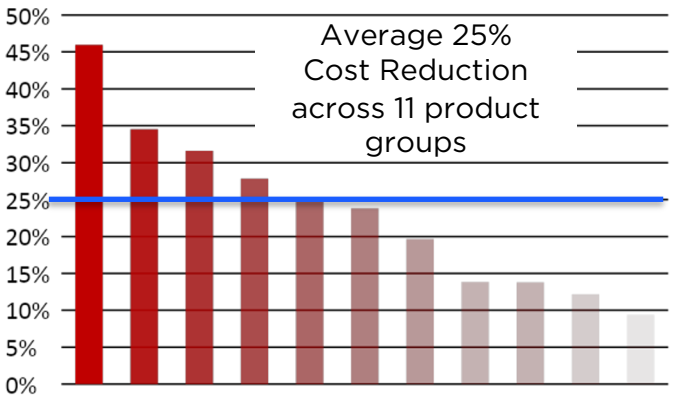


Workshop Makeup

- 20 VE workshops focused on a variety of products
- Cross functional team participation
- Identified savings opportunities from engineering design, manufacturing process, assembly process and procurement

Design Analysis

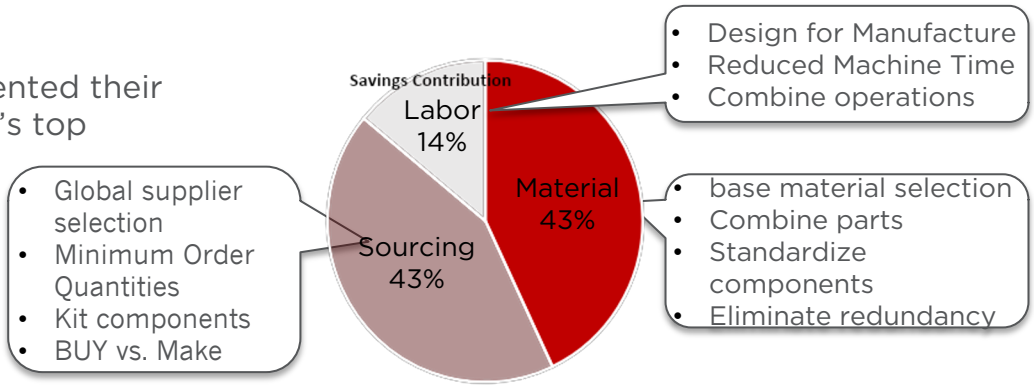
- Functions of every single component were identified, and costs estimated.
- Material choices, shapes, finish, tolerances, production routings, interfaces, etc. were challenged.
- High cost functions were brainstormed for alternate design ideas, classified and ranked by opportunity to reduce cost.



Workshop Report Out

Each team prepared and presented their findings to to the organization's top management, including:

- Workshop Savings table
- Costed BOM
- Cost/Function Worksheet
- Cumulative Savings table



Sustainment - Training and Personnel development for client

Detailed training was provided for 3 Managers, 8 customer sales Engineers and several VE leads – to serve as ongoing facilitators of the process. The training was repeated as new members joined the team, until the client facilitators were able to provide all training and take ownership for the entire program.

A Manufacturing Process Review Example

The manufacturing process required an internal diameter of 4.5 inch on a lathe then be moved to a burnishing machine to hone a 32 finish. The team was able to find new tooling manufacturers that could achieve the 32 finish on the lathe, saving $114 per unit.

About the Authors

GREG ESPER, P.E. is Director of Product Innovation and Value Management at Argo. He has responsibility to deliver sustainable results with clients through team engagement. Greg has more than 35 years of experience in Mechanical Product and Manufacturing Engineering and Management and has spent 17 years advising and assisting global clients with Lean New Product Development and Manufacturing Excellence. g.esper@argoconsulting.com

DANTAR OOSTERWAL, Senior Vice President & Partner, is Argo's Lean Innovation & Product Development Practice Leader. He is highly regarded as a global thought-leader in Lean Innovation & Product Development systems. d.Oosterwal@argoconsulting.com

ANDREAS DÖRKEN, Senior Vice President & Partner, is Argo's Head of Operations Europe and Co-Head of the Product Innovation & Value Management practice. He has over 25 years of experience working in industrial firms and consulting. a.doerken@argoconsulting.com

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Argo Consulting | 312.988.9220 |
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