NTS Value Engineering & Cost Roadmapping

Accelerating your business

First-tier systems supplier of (opto) mechatronic systems and mechanical modules
Who we are

- NTS is your partner for
  - development, assembly & manufacturing

High Complexity Products
Low Volume Manufacturing
High mix of product diversity

- Headquartered in Eindhoven, the Netherlands
- More than 70 years of experience in the manufacturing industry
- More than 1,500 employees
- More than €210 million turnover
Where we are
NTS Competences

- Mechatronic Systems
- Optical Systems
- Stages & handlers
- Printing Systems
- Transport Tooling
- One Off Equipment
Development & Engineering

Delivering cost effective System Engineering solutions that drive competitive edge of our customers
NTS Development & Engineering - Core competences & USPs

- System engineering
  - Mechanical/mechatronical
- Industrialisation, Value Engineering & DfX
- Engineering Specialisations, e.g.
  - Optics
  - Digital printing
  - Columns, stages & handlers

- Linked to NTS prototyping & production

- Locations:
  - Hengelo, Eindhoven, Doetinchem, Nijmegen, Wijchen
What we notice – the need for Value Engineering & DfX

- Industry trends:
  - The playing field is global
  - Highest performance & quality levels required
  - Product lifecycles are shortening
  - Continuous cost price pressure
  - OEMs focus on innovation and R&D
  - Manufacturing skills hard to maintain at OEMs
  - Value Engineering and DfX partners required
Cost roadmaps, Value Engineering & DfX

- Lifecycle Management
- Concept Engineering
- Logistics
- Value Engineering
- Supply Chain Management
- Prototyping
- Industrialization
- Design for Manufacturability

Development & Engineering
Component Manufacturing
Systems Assembly
Towards shared Cost Roadmaps

Conceptual design → Preliminary design → Detailed design → Prototype production / prepare for series → Release for volume → Series

Design iterations / Manufacturing input by NTS

First price estimate → Costs monitoring / Price updates

ECs from customer CoG input & implementation

CoG roadmap
DNA

- **Typical DfX scenario**
  - Production expert spots opportunities to reduce manufacturing/assembly costs
  - Production expert highlights lower cost solutions, derived from experience
    - "I would never drill the holes like that because …"
    - “I would expect different material, like …”
  - Designer team refines / reconsiders specs and design
  - Result:
    - spec relaxation and
    - new design with cheaper **manufacturing/assembly options** is chosen

- **General approach**
  - Involve DfX/manufacturing persons as early as possible (concept phase)
  - Use knowledge of supply chain, make them part of the solution in a win-win mode
  - Use Value Engineering instruments (workshops, functional analysis) to focus search for cost drivers and manufacturing anomalies
  - Careful build-up of manufacturing & assembly experience
Value Engineering can be complex, requires multiple disciplines and integral approach

Requirements decomposition

Idea generation

Idea assessment, selection and bucketing
Alternative suppliers
Alternative materials
Alternative production methods
Alternative designs and spec relaxation
Costing, RoI estimates
ECs and funding them

CNC programming and production engineering
Redesign and validation
Proto types

Use of existing WiP, inventories, and NPI
Configuration management
Value Engineering process
Analysis, Idea generation, Implementation (‘bucketing’)

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Example Project approach

Pressure cooker
- Supply Chain
- Value Stream
- Design
- Existing ideas via SIG

Feasibility
- PIR
- Business Cases

Bucket 1
Bucket 2
Bucket 3

Implementation

Idea Repository
- x wks @Customer
- xx wks/mths @Customer + @NTS
- xxx wks/mths

Suspend

Bucket #
Example large project: Value Engineering high-tech module

- Realized an ongoing cost reductions
- 2013-2017, total NRE ~20fte

- July 2016 – July 2017
- Cost reduction in design: more complex changes

- Implementation Jan 2016 – Dec 2016
- Cost reduction in design mainly

Cost reduction status

- 2013 – 2015
- Create common focus for COG reduction
- Cost reduction: supply chain and manufacturing mainly

Top 25 Norma suppliers are involved

To review customer spec versus manufacturability

Goal: 30% cost reduction while maintaining suppliers’ margin

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Example small project - Value Engineering mechanical structure

**Price reduction from 20.9k€ to 12.9k€ ±10%**

- Bucket 1: reduction 5k€ ± 10% (potential)
- Bucket 2: reduction 3.9k€ ± 10% (potential)
- Product improvement (+0.9k€)
- Delivery of qualified module by NTS Norma
- Position accuracy improvement (encoders)
- Continues rotation (slip ring)
- Quality improvements

**Lead time reduction from 52 to 20 wks**

- Elimination of productions steps, reduced lead time (7wks)
- Low value stock levels in supply chain iso at Thales (reduces 25wks)
- Quicker response to customer orders
- Target: reduce to 16wks

**Unburden Logistics**

- Higher integration level, shift responsibilities
- Reduce overhead
VE in NTS Organisation

- NTS Ecosystem Suppliers
  - Embedded in ecosystem of high-tech component & module suppliers

- NTS manufacturing & assembly competences
  - 16 manufacturing locations, 1500 colleagues with passion of technology

- NTS DfX competences
  - Business Case driven, Cost engineering, VSM, DfX, Supplier mngt

- NTS Value Engineering core
  - VE People, Processes, Tools
Operational model @NTS

- To execute cross-company VE projects:
  - Have all cost-related functions staffed and operational at the Group level
  - Have cost engineer and calculation function operational at business unit level
  - Have Value and DfX engineers in the Development division
HR: Identified cost-related Functions

- **Cost Engineer:**
  - Calculeert, documenteert, monitort/bewaakt productkosten en cost targets, en de calculatieprincipes die daarin een rol spelen; escaleert bij afwijkingen
  - Ontwikkelt mede de kostenmodellen en bewaakt de juistheid ervan

- **Calculator:**
  - Uitvoerende in calculatie
  - Past voorgedefinieerde kosten/calculatiemodellen toe op specifiek systeem

- **Value Engineer:**
  - typisch actief in procesbegeleiding, analyses, stuurt op het totstandkomen van kostenrandvoorwaarden en een ontwerp dat daaraan voldoet;
  - altijd ook actief aan de klantkant

- **DfX(=C) Engineer:**
  - Is in staat kostenbewuste ontwerpen te maken met gebruikmaking van kosten targets en industriële kennis;
  - Signaleert wanneer de kostentargets ontbreken of onvoldoende zijn
  - Is in staat de mensen met de relevante kennis te betrekken in het ontwerp
  - niet noodzakelijk met de klant, kan wel.
Function landscape

- Technical solution oriented
  - DfX Engineer
  - Value Engineer
- Product oriented
  - Calculator
- Process/Business oriented
  - Cost Engineer
- Finance oriented
# Individual career paths – Individual Maturity Model

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<th>Function</th>
<th>Junior</th>
<th>medior</th>
<th>senior</th>
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<tr>
<td>Calculator</td>
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<td>Cost Engineer</td>
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<td>Value Engineer</td>
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<td>DfX-engineer</td>
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Process/organisational Maturity Model

Initial

Repeatable

Defined

Managed

Optimising

DfX Engineer
Value Engineer
Calculator
Cost Engineer

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Value Engineering @NTS at a glance...

- **Focus on high tech industries**
  - Emphasize design and production processes
  - Roadmaps for both costs and performance
- **Methods & Tools**
  - Methodological and rooted in standards: WoW in accords with EN 12973
  - Close tracking of current & target value and cost level
- **Expert involvement**
  - Involve practical knowledge of manufacturing experts
- **Supplier Involvement**
  - Involve suppliers, use expertise & partner-up
- **System Engineering**
  - Correct requirement engineering leads to cost-effective quality products
  - Technical leadership in cross-organisational teams of multi-disciplinary experts
- **Implementation**
  - Technical Management & Design Realization
  - Assess feasibility through (rapid) prototyping at NTS
  - Ensure rapid EC implementation
Summary

- **NTS view on VE**
  - Value Engineering & DfX is important service offering
  - Structured yet pragmatic approach, rooted in standards, embedded in organisation
  - *Connect system engineering & craftsmanship*
    - Indispensable in edge-of-technology high-tech systems
  - Requires adaptation of the NTS organisation to achieve value engineering and co-development in a customer intimacy paradigm
- **Significant savings are possible when there is a close collaboration of all parties in a win-win fashion**
Thank you!
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