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Experiences with A3s in Devotek

SESG - Revisiting A3s,
Presented by Anders Fuglesteg Nilsen on 16.10.2014

Presented in Master Project

Doc.nr: **Author:** **Project & task:**
Issue: **Responsible:** **Date:**

Linear Valve Actuator (LVA)

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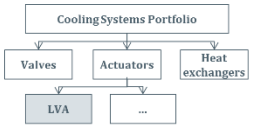
Product Portfolio



Definitions

Ctrl.	-	Control
Mvt.	-	Movement
PV	-	Process Value (% valve opening)
Pwr.	-	Power
SP	-	Set Point (% valve opening)
TBC	-	To Be Confirmed
TBD	-	To Be Decided

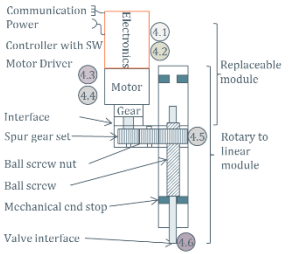
Design Strategy

- ❑ High efficiency and reliability
- ❑ Modular design
- ❑ Smaller, lighter and cheaper than competing products.

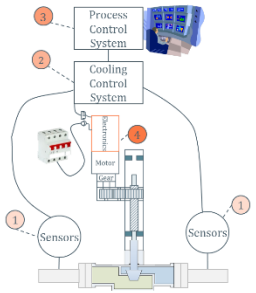
Background

- ❑ Cooling Systems are expanding their product portfolio with actuators that can operate their valves
- ❑ First actuator to be developed is the linear valve actuator.

Physical Diagram



Context Diagram



Functional Flow

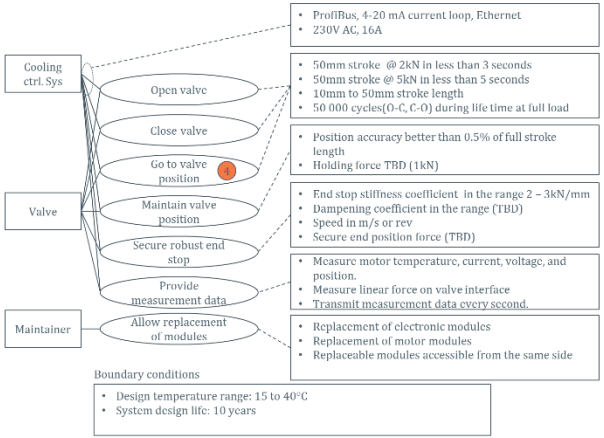
System in context

1. Sensor measurement changed
2. Detect change and transmit
3. Calculate new SP and transmitt
4. Go to valve position

System internally

4.1. Calculate SP-PV
4.2. Adjust motor power
4.3. Convert electric to rotational pwr.
4.4. Increase torque / reduce speed
4.5. Convert rotation to linear mvt.
4.6. Move valve stem

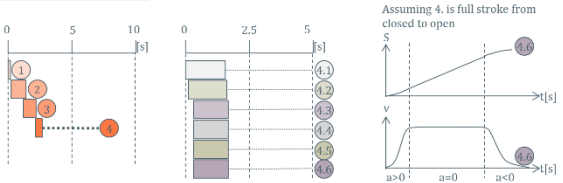
Functional Design



Boundary conditions

- Design temperature range: 15 to 40°C
- System design life: 10 years

Timing Diagram



Concerns & Mitigations

Concern

The duty cycle of the actuator is determined by control loop outside system boundary. Continous operation with small changes in actuator set point is expected. Friction loss will be converted to heat.

Mitigation

Design the actuator with as high efficiency as possible to reduce friction loss.

What did we conclude

- The A3 helps in developing the system and sub-system requirements
- Connecting system view points together in an A3 helps the understanding of single view point
- It is easier to provide feedback on A3s than the more commonly used requirement specification documents

Typical A3 used in Devotek Today

Systems Engineering in Devotek

Author	Responsible	Doc. Nr	Issue	Project & task	Date
A.F. Nilsen	E. Karlson	NA	NA	NA	03.10.2014

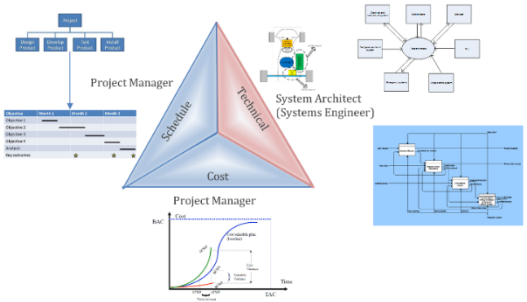
What is systems engineering

Systems Engineering is an interdisciplinary approach and means to enable the realization of successful systems.

The term systems engineering dates back to Bell Telephone Laboratories in the early 1940s and the first attempt to teach systems engineering as we know it today came in the 1950 at MIT.

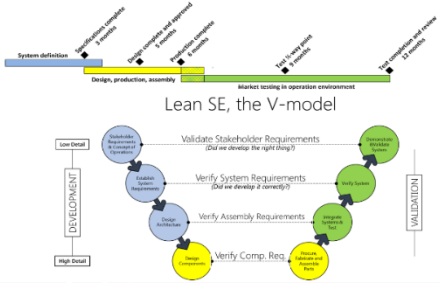
How Does Systems Engineering Fit in the projects

Systems engineering is used for planning and specifying the technical part of a project.



How is technical product development planned

The V-model is illustrated as a waterfall model, but the actual implementation of it is not necessarily top-down. The three first steps is repeated for each of the components/sub systems.



The left side of the V-model