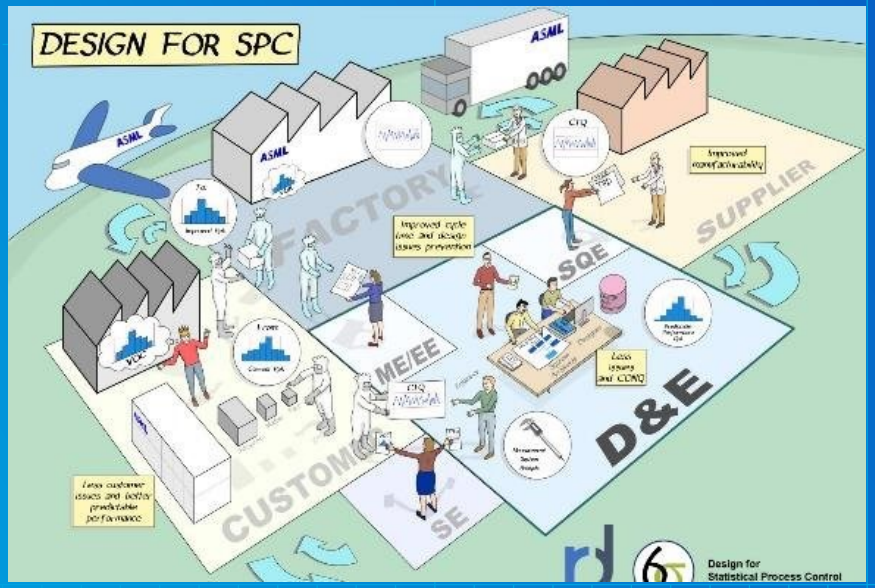

MTC 2024

DfSPC Poster Voice-over

Marina Morales Hurtado, Abdullah Cobanoglu, Pepe Vera Campello, Serkan Erdural

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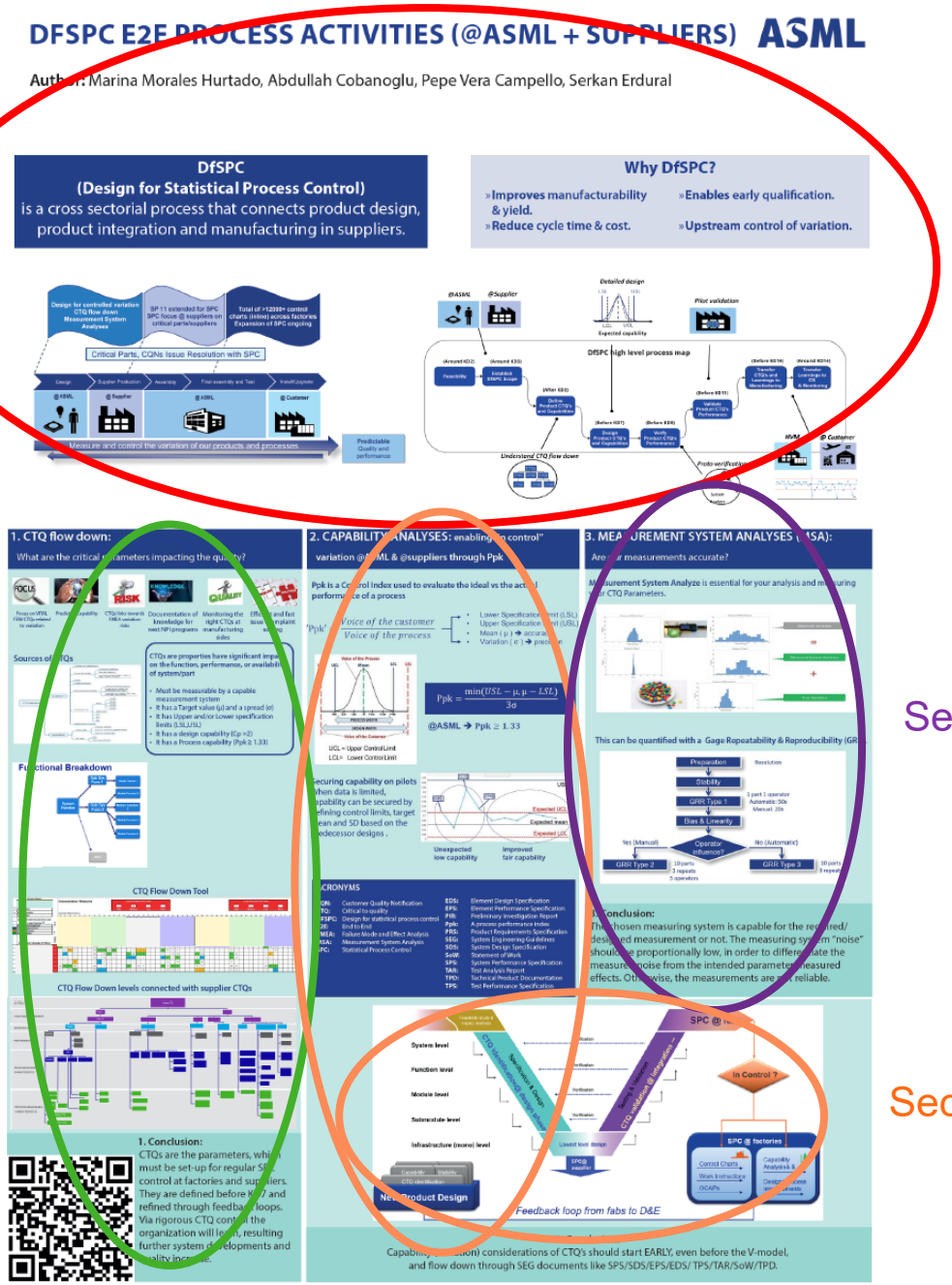
Introduction

Section-1 CTQ

Section-3 MSA

Section-2 Capability



Introduction

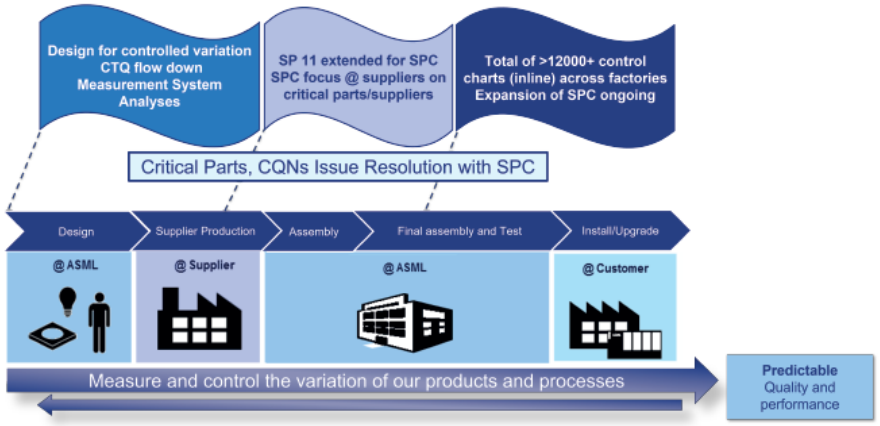
DFSPC E2E PROCESS ACTIVITIES (@ASML + SUPPLIERS)

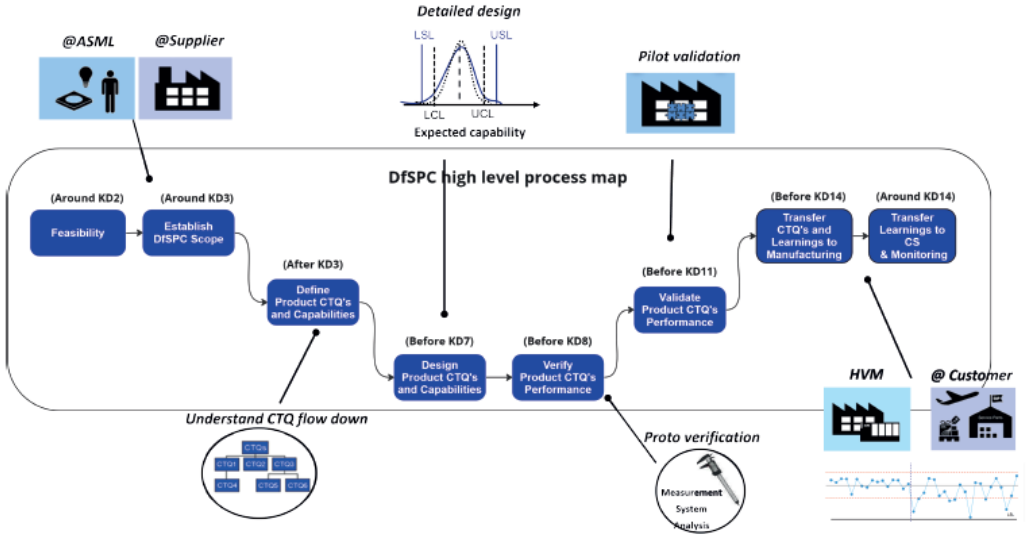
Author: Marina Morales Hurtado, Abdullah Cobanoglu, Pepe Vera Campello, Serkan Erdural

DfSPC
(Design for Statistical Process Control)
is a cross sectorial process that connects product design, product integration and manufacturing in suppliers.

Why DfSPC?

- »**Improves** manufacturability & yield.
- »**Reduce** cycle time & cost.
- »**Enables** early qualification.
- »**Upstream** control of variation.





1. CTQ Flowdown

1. CTQ flow down:

What are the critical parameters impacting the quality?

Focus on VITAL FEW CTQs related to variation


Predicted Capability

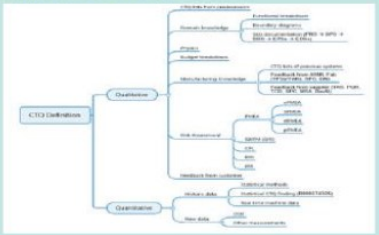
CTQs links towards FMEA variation risks

Documentation of knowledge for next NPI programs

Monitoring the right CTQs at manufacturing sides

Efficient and fast issue - complaint solving

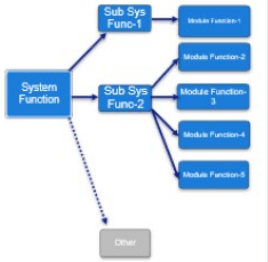
Sources of CTQs



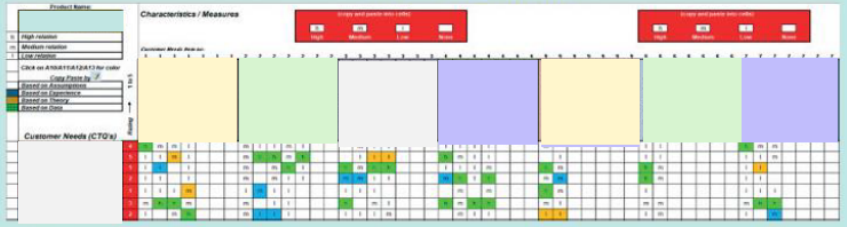
CTQs are properties have significant impact on the function, performance, or availability of system/part

- Must be measurable by a capable measurement system
- It has a Target value (μ) and a spread (σ)
- It has Upper and/or Lower specification limits (LSL,USL)
- It has a design capability (Cp =2)
- It has a Process capability (Ppk ≥ 1.33)

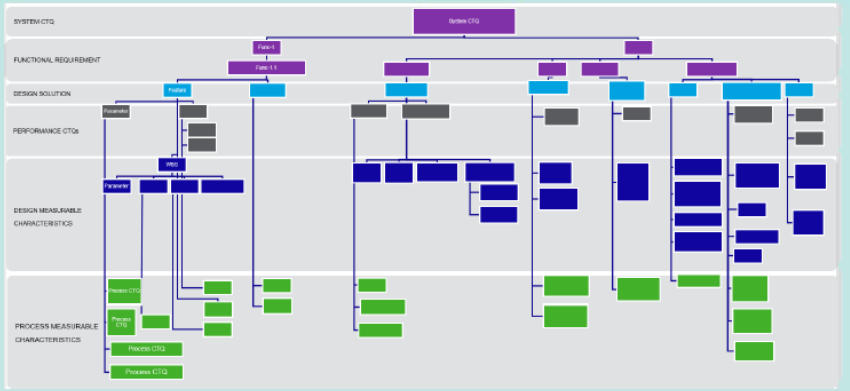
Functional Breakdown



CTQ Flow Down Tool



CTQ Flow Down levels connected with supplier CTQs



1. Conclusion:

CTQs are the parameters, which must be set-up for regular SPC control at factories and suppliers. They are defined before KD7 and refined through feedback loops. Via rigorous CTQ control the organization will learn, resulting further system developments and quality increase.

2. Capability Analysis

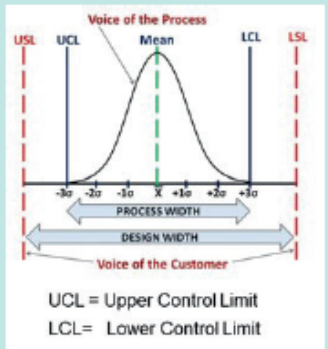
2. CAPABILITY ANALYSES: enabling "in control"

variation @ASML & @suppliers through Ppk

Ppk is a Control Index used to evaluate the ideal vs the actual performance of a process

$$'Ppk' = \frac{Voice\ of\ the\ customer}{Voice\ of\ the\ process}$$

- Lower Specification Limit (LSL)
- Upper Specification Limit (USL)
- Mean (μ) ➔ accuracy
- Variation (σ) ➔ precision

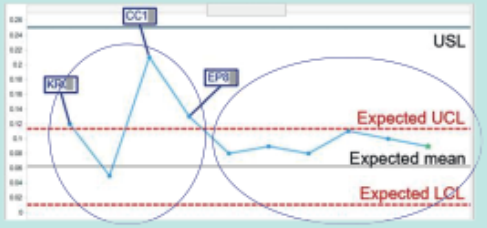


UCL = Upper Control Limit
LCL= Lower Control Limit

$$Ppk = \frac{\min(USL - \mu, \mu - LSL)}{3\sigma}$$

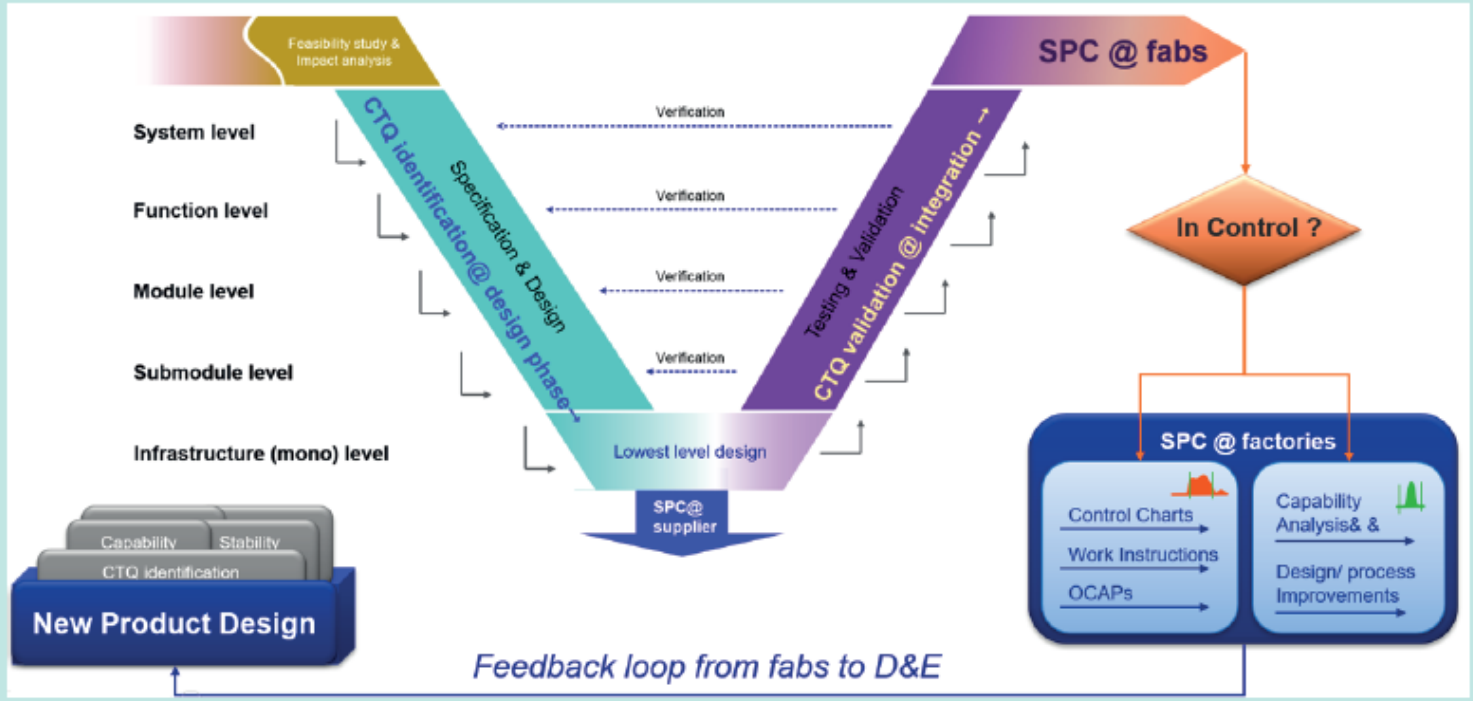
@ASML ➔ $Ppk \geq 1.33$

Securing capability on pilots
When data is limited, capability can be secured by defining control limits, target mean and SD based on the predecessor designs .



Unexpected low capability

Improved fair capability



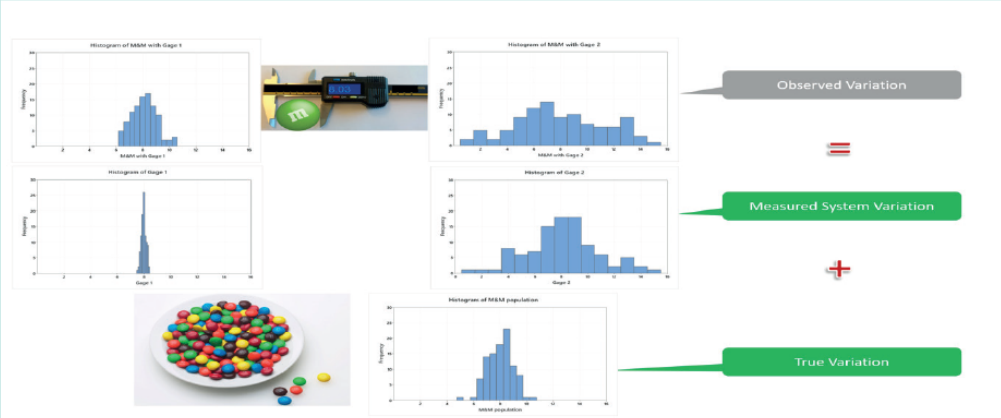
2. Conclusion:
Capability (variation) considerations of CTQ's should start EARLY, even before the V-model, and flow down through SEG documents like SPS/SDS/EPS/EDS/ TPS/TAR/SoW/TPD.

3. Measurement System Analysis

3. MEASUREMENT SYSTEM ANALYSES (MSA):

Are our measurements accurate?

Measurement System Analyze is essential for your analysis and measuring your CTQ Parameters.



3. Conclusion:
The chosen measuring system is capable for the required/ designed measurement or not. The measuring system "noise" should be proportionally low, in order to differentiate the measured noise from the intended parameter measured effects. Otherwise, the measurements are not reliable.

This can be quantified with a Gage Repeatability & Reproducibility (GRR)