



esp-engineering gmbh

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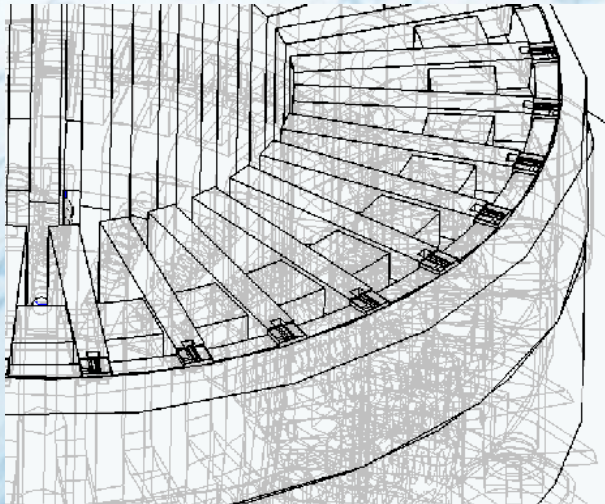
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SOFTWARE ENGINEERING



KNOWING IS NOT ENOUGH,
YOU MUST APPLY;

WANTING IS NOT ENOUGH
YOU MUST DO.



ENGINEERING AREAS



quipment

- PROCESSING AND ASSEMBLY
- TESTING AND MEASURING
- THERMAL TREATMENT
- MECHANICAL DESIGN
- MACHINE VISION



oftware

- PROCESS BASED CODE
- EQUIPMENT BASED CODE
- MACHINE VISION



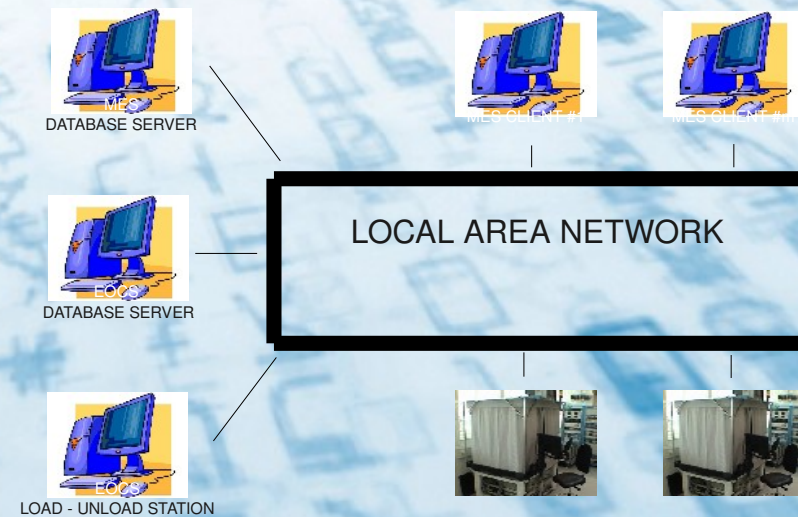
rocess

- PROCESS TECHNOLOGIES
- MEASUREMENT TECHNOLOGIES
- SIMULATIONS



- **MANUFACTURING EXECUTION SYSTEM**

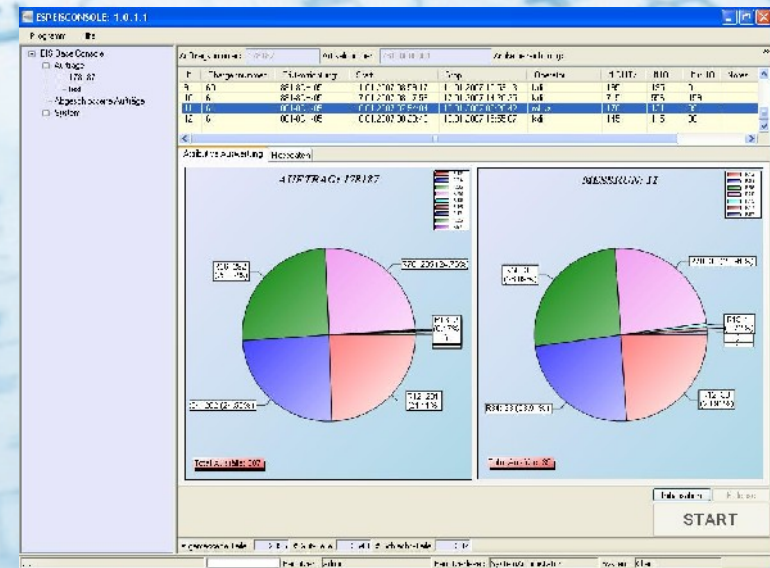
- architecture: multi-tier, client-server
- database backbone: MS-SQL
- programming language: Visual Basic
- installed clients / servers: 52 / 3





• TRACEABILITY SYSTEM FOR MEASUREMENT PROCESSES

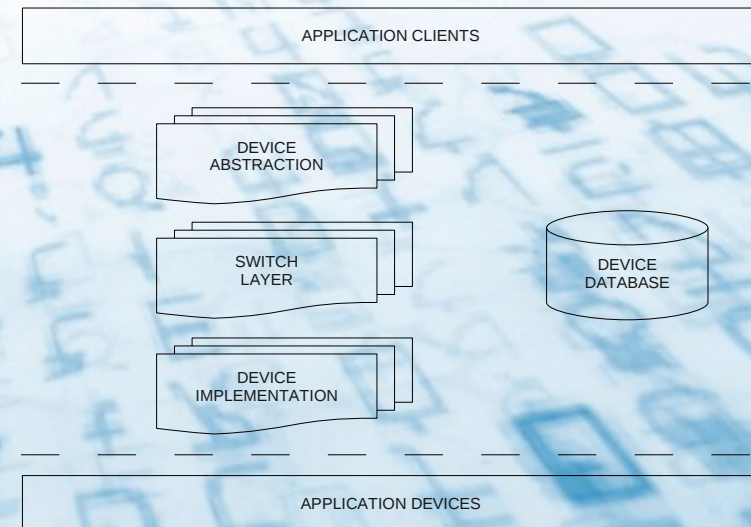
- different user levels for system access (user, power user and system administrator)
- architecture: multi-tier, client-server / programming language: C#, .NET 2.0
- database backbone: object oriented database
- installed clients-servers: 4-2





• DEVICE ABSTRACTION LAYER

- separation of device implementation and definition layer
- dynamical switch of assigned devices without additional compilation
- database application for device storage and distribution
- operating systems: Linux / Microsoft
- programming language: C++





• MEASUREMENT AND IMAGING LIBRARY

- useful for motion and measurement systems
- procedures for statistical process control and yield estimation
- fast measurement data analysis
- operating systems: Linux / Microsoft
- programming language: C++

$$\sum \left(\frac{1}{n} (x_n - \bar{x}) \right)$$

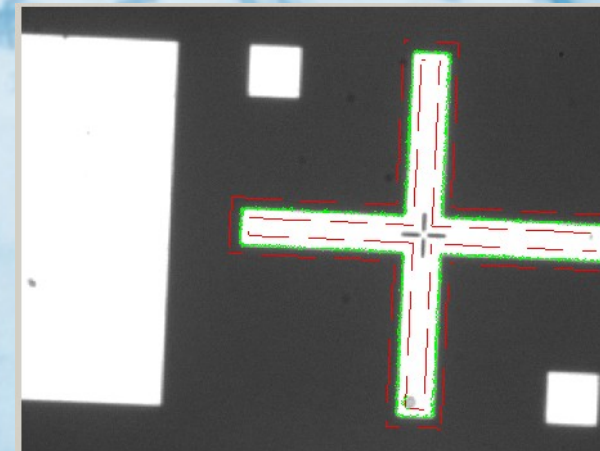
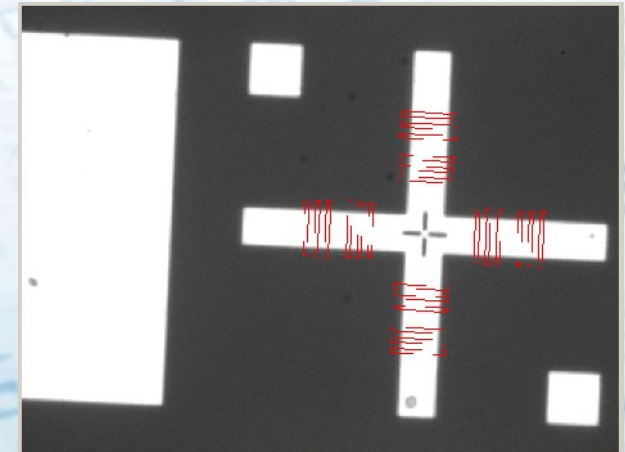
$$dR = \left| \frac{\partial}{\partial a} Rda \right| + \left| \frac{\partial}{\partial D} RdD \right| + \left| \frac{\partial}{\partial l} Rdl \right| = \rho \left(\frac{l(D-2a)}{\pi(aD-a^2)^2} da + \frac{al}{\pi(aD-a^2)^2} dD + \frac{1}{a\pi(D-a)} dl \right)$$

$$f_n(t) = \int a_n \cdot \sin(t) dt + \int b_n \cdot \cos(t) dt$$



• GENERIC ALIGNMENT PROCEDURES

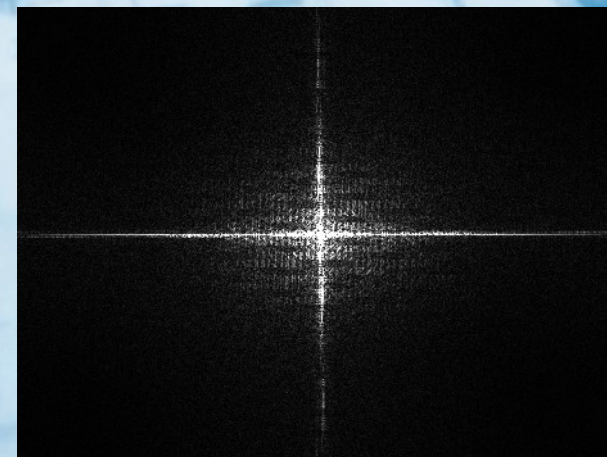
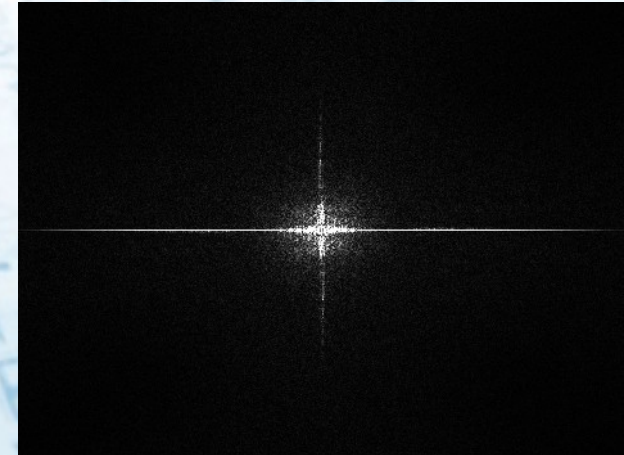
- selectable alignment procedures for flexible product adaption
- alignment procedures with one fiducial (Δx , Δy , Δt)
- alignment procedures with two fiducials (A, B)
 - overlay of fiducial A(Δx , Δy) with BEST-FIT to fiducial B(Δt)
 - BEST-FIT between fiducials A, B(Δx , Δy , Δt)
- alignment procedures with three fiducials (A, B, C)
 - overlay of fiducial A(Δx , Δy) with BEST-FIT to single fiducial B or C(Δt)
 - overlay of fiducial A(Δx , Δy) with BEST-FIT to fiducials B, C(Δt)
 - BEST-FIT between fiducials A, B, C (Δx , Δy , Δt)





- CONTACTLESS WEDGE COMPENSATION

- vision based wedge compensation method for safe and accurate device processing
- detection accuracy of approximately 1% of DOF
- increasing yield on imprinting lithography process due to non-contact operation





THANK YOU FOR YOUR ATTENTION

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If you always put limits on everything you do,
physically or anything else,
it will spread into your work and into your life.

There are no limits. There are only plateaus, and
you must not stay there,
you must go beyond them.

Bruce Lee