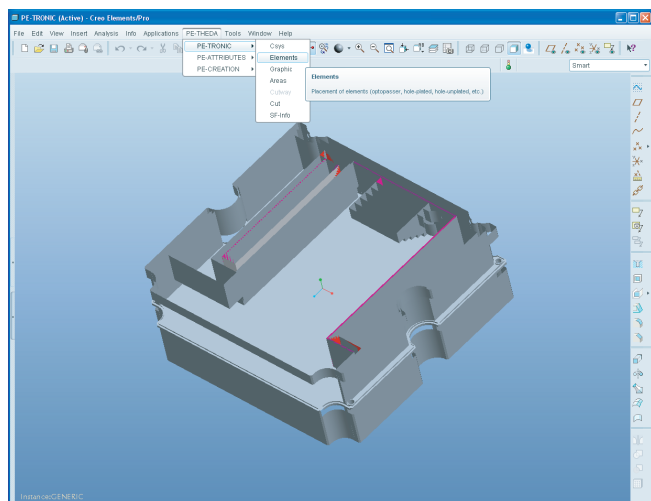## *Mechanical Design of Printed Circuit Boards*

Software Factory, in cooperation with well known producers of circuit boards and layout system manufacturers, created a product for the development of circuitboards with Creo. eTRONIC for Creo is equipped with interfaces for different circuit board layoutsystems.

Design of Circuit Boards with eTRONIC

Assignment of Printed Circuit Board specific Attributes

The development of eTRONIC is based on the Pro/TOOLKIT programing interface.

Design of Circuit Boards
The circuit board specific design elements available through eTRONIC can either be placed by mouse-click or by numeric input of coordinates. The following elements are available:

- Drill hole with contact surface

- Drill hole without contact surface

- Position hole

- Photo marks (on component or solder side)

The aforementioned elements can be distinguished visually. This way the designer can distinguish between different types of drilled holes or photomarks at any time.

- ECAD-components for placement on component or solder side
  The ECAD-components can be imported from libraries and may be placed on the PCB with minimal interaction.

- Coordinate systems on component or solder side
  The coordinate systems are representatives for design elements and components. They also carry information about the type identification number, library-identifier and location for use in the layout system.

- Surfaces
  Surfaces serve as representatives of circuit board specific areas. They can either be chosen and placed from a set of pre-defined design elements or be newly created.

Assignment of Attributes
With eTRONIC circuit board specific attributes can be assigned to the aforementioned design elements. These attributes can be changed or deleted at any time. For the description of circuit board specific areas attributes and combinations of attributes will be assigned to surfaces.

After assigning attributes to the surfaces they can be visualized on the circiut board by labels. This allows the designer to review the design status as well as the already used attributes. Furthermore, if inside positions, all positions or both sides is selected, the surface for visualization is automatically mirrored to the opposite side. With the combination keepout-component an interactive query of the Z-offset as well as the height restriction is carried out to describe the barred building volume. After entering these values a 3D-display of the barred building volume will be visualized.

All functions are linked with an automatic layer assignment, so that specific elements or attributes can be switched on or off for matters of visualization or the creation of production instructions.
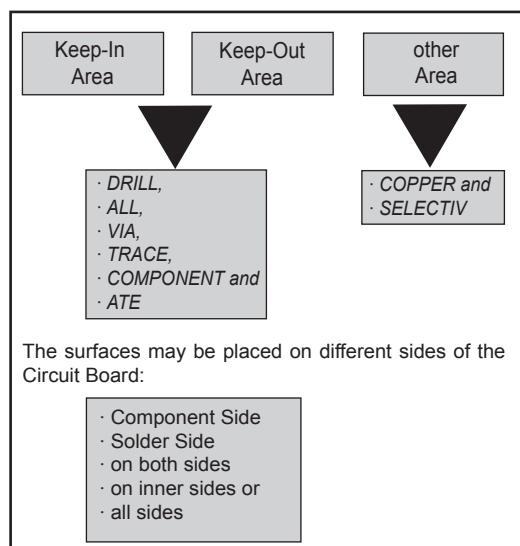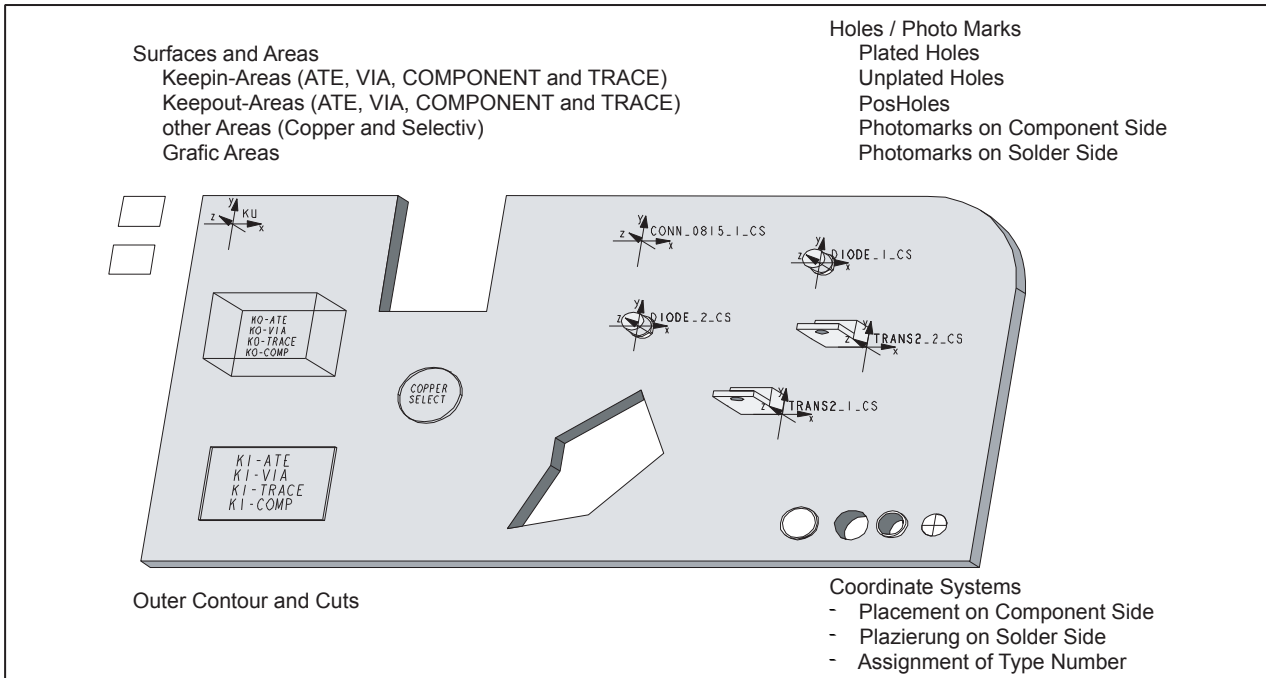
Control and information functions allow the examination and visualization of construction elements and their attributes.

SOFTWARE FACTORY - THE EXPERTS FOR PTC PRODUCTS

Surfaces and Areas
 Keepin-Areas (ATE, VIA, COMPONENT and TRACE)
 Keepout-Areas (ATE, VIA, COMPONENT and TRACE)
 other Areas (Copper and Selectiv)
 Grafic Areas

Holes / Photo Marks
 Plated Holes
 Unplated Holes
 PosHoles
 Photomarks on Component Side
 Photomarks on Solder Side

Outer Contour and Cuts

Coordinate Systems
 - Placement on Component Side
 - Plazierung on Solder Side
 - Assignment of Type Number

Placement of Design Elements with different Attributes on a Printed Circuit Board created with eTRONIC

Geometric Analysis with eTRONIC

During geometric analysis the position and form of the circuit board, the construction elements and the components placed on it are examined. The analysis considers:

■ All above mentioned construction elements, fitted in by eTRONIC

■ Any design elements with aforementioned attributes

■ The outline contour

■ Surfaces and their attributes

Develoment of Circuit Board Panels with eTRONIC

eTRONIC supports the development of circuit board panels. The program automatically recognizes whether a single circuit board or a circuit board panel is processed. The menu sequence of the program is adjusted in accordance. In panel mode additional construction elements as well as own libraries are available (e.g. for the placement of circuit boards or elements for bad circuit board identification).

Different configuration files enable the user to adapt eTRONIC to his personal requirements.
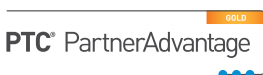
Interfaces for eTRONIC

The following interfaces to layout systems for eTRONIC already exist:

Interface	Layout System	Manufacturer
PE-MENTOR	Boardstation	Mentor Graphics
PE-INTEGRA	INTEGRA-Station	Mentor Graphics
PE-THEDA	THEDA	INCASES ENGINEERING

Interfaces to different Layout Systems

Supported Hard- and Software:

eTRONIC is available for the current and supported versions of PTC Creo, PTC Creo Elements/Pro and Pro/ENGINEER.

PTC® PartnerAdvantage GOLD

PTC® ServiceAdvantage

PTC® ChannelAdvantage™ SILVER 2015

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SYSTEM INTEGRATOR