Intermedius

INTERMEDIUS DESIGN INTEGRATION, LLC

Bringing Electrical and Mechanical Design Together

An Overview of IDF 4.0

Dave Kehmeier

Dave.Kehmeier@intermedius.com

IDF 4.0 Development Sponsors

ECAD Vendors

cadence

INCASES

Mentor Graphics
THE POWER TO CREATE™

OrCAD

PADS

VERIBEST
INCORPORATED

ZUKEN-REDAC

MCAD Vendors

BENTLEY

Co|Create
A Hewlett-Packard Company

LTX Software

MAYA

PARAMETRIC TECHNOLOGY CORPORATION

SDRC

End-Users

DELPHI
Automotive Systems

Delco Electronics Systems

HEWLETT PACKARD

intel

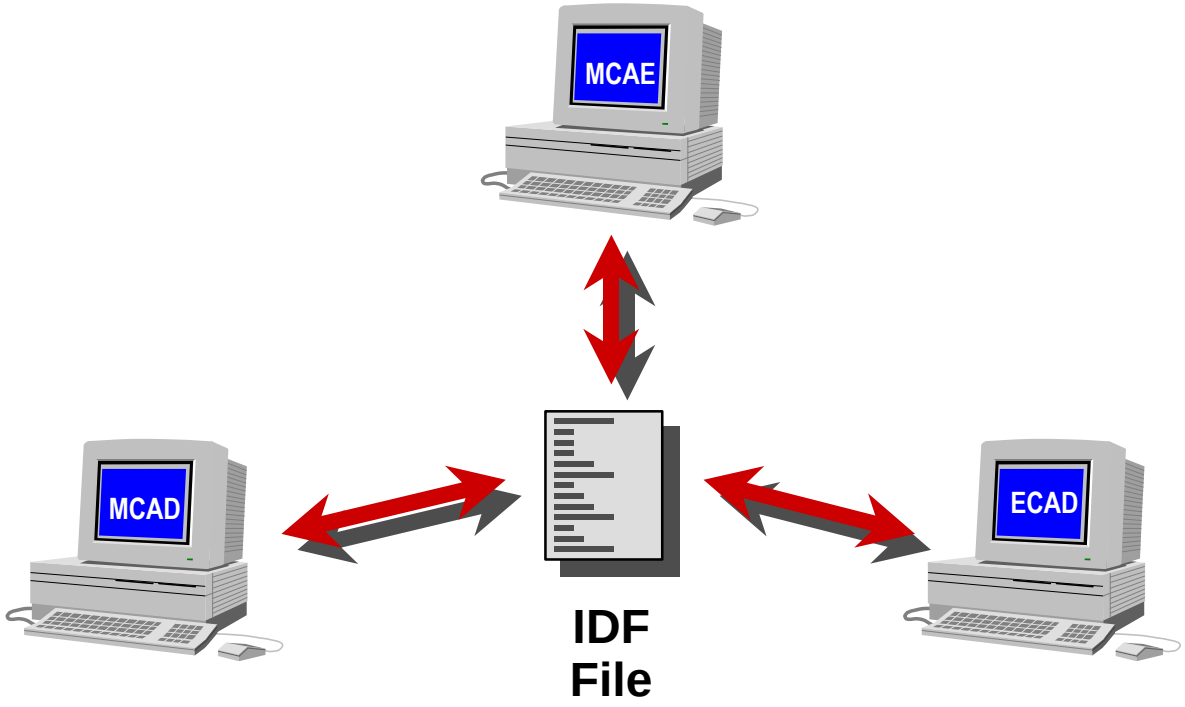
SQUARE D
GROUPE SCHNEIDER

Visteon

IDF 4.0 Development

- **Requirements Analysis**
  - September 1997 - March 1998
  - Interviewed 24 end-user companies, all industries
- **Specification Development**
  - March 1998 - June 1998
  - IDF 4.0 Rev. A (Pre-implementation Draft) released July 1998
- **IDF 4.0 available at http://www.intermedius.com**

Purpose of IDF



To provide a neutral representation for exchanging PCA data among mechanical design (MCAD), PCA layout (ECAD), and physical design analysis (MCAE) applications.

Scope of IDF 4.0

- **In Scope:**

  All information that is commonly shared among mechanical design, circuit board layout, and physical analysis during the design and analysis of products containing PCAs

- **Not in Scope:**

  IDF 4.0 does not provide a full product or design representation of a PCA. It is not intended to:

  - Provide a full functional or electrical description of the PCA
  - Be used to convert PCA designs from one ECAD system to another
  - Provide a means for archiving PCA designs
  - Provide a complete means for manufacturing, assembling, testing, or creating detailed documentation of a PCA

IDF 4.0 Key Features

- Panel and board assemblies
- Panel, board, component parts
- 3D part shapes
- Holes (mounting, tooling, pin, via)
- Conductors (pads, traces, fill areas)
- Keepins and keepouts
- Graphics
- Annotations
- Figures, footprints, and sublayouts
- Thermal characteristics
- Board design variants
- Properties
- Entity owners (MCAD, ECAD)

Data Model and Representation

- **PCA design data is modeled as:**
  - Assemblies (board, panel)
  - Parts (electrical, mechanical, board, panel)
  - Features (extrusions, cutouts, holes, keepins/outs, conductors, graphics, etc.)
- **All data is represented by:**
  - Entities (consist of attributes)
  - Attributes (consist of values which may be other entities)
  - Values (integer, real, string, enum, etc,)

File Format

- **IDF 2.0/3.0**

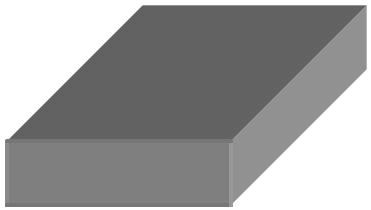
```
DIP_8  PN-2245-D  U1
100.0  600.0  0.0  270.0  TOP  PLACED
```

- **IDF 4.0**

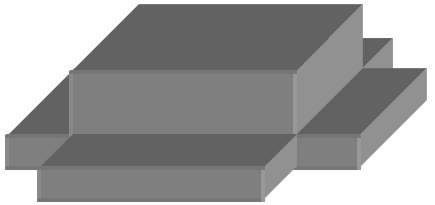
```
Electrical_Part_Instance (
 Entity_ID (#3003),
 Part_Name (“DIP_8”),
 Part_Number (“PN-2245-D”),
 Refdes (“U1”),
 XY_Loc (0.1, 0.6),
 Side (Top),
 Rotation (270.0),
 Mnt_Offset (0.0, 0.0)
); /* End Electrical_Part_Instance */
```

Component Shapes

IDF 2.0/3.0



IDF 4.0



Component Instances

IDF 2.0

IDF 3.0

IDF 4.0

Annotations

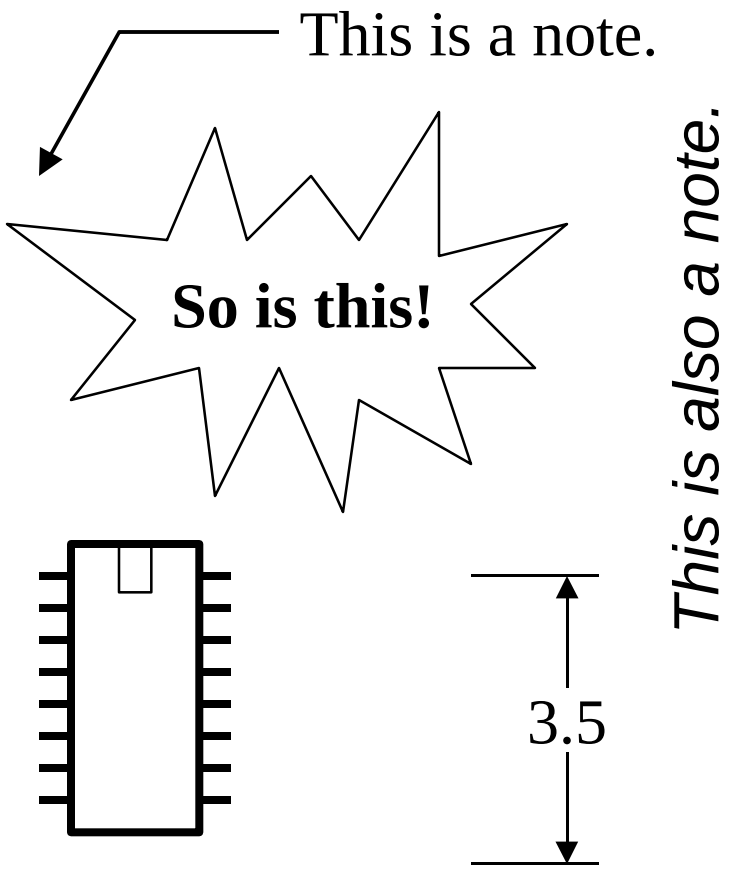
IDF 2.0

X

IDF 3.0

This is a note.

IDF 4.0



Graphics

IDF 2.0

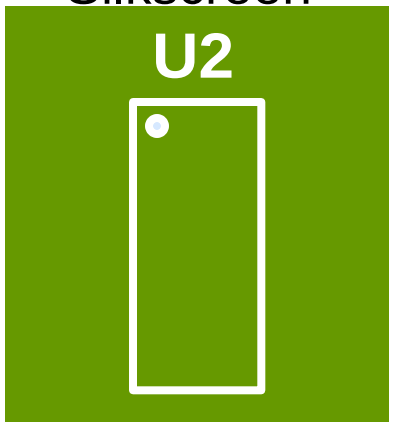
X

IDF 3.0

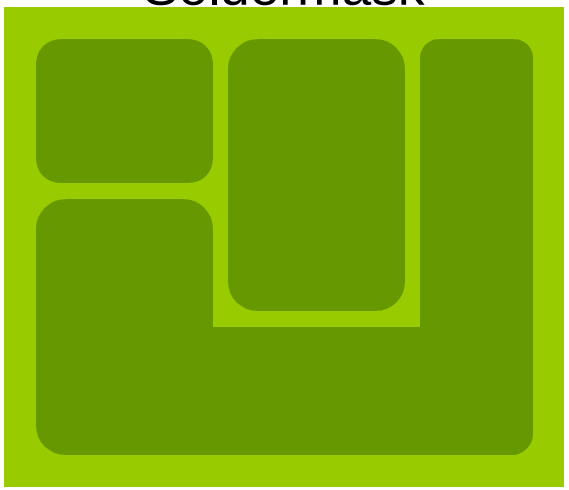
X

IDF 4.0

Silkscreen



Soldermask



Fiducials

Holes

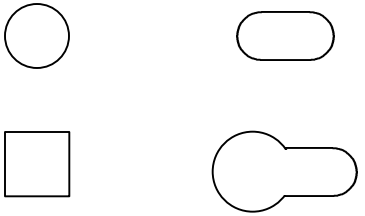
IDF 2.0

Attributes include:
- Plating status
- Assoc. comp. inst. (explicit)

IDF 3.0

Attributes include:
- Plating status
- Hole type
- Owner
- Assoc. comp. inst. (explicit)

IDF 4.0



Attributes include:
- Plating status
- Hole type
- Owner
- Layers spanned
- Assoc. net
- Assoc. comp. inst. (implicit)

Conductors

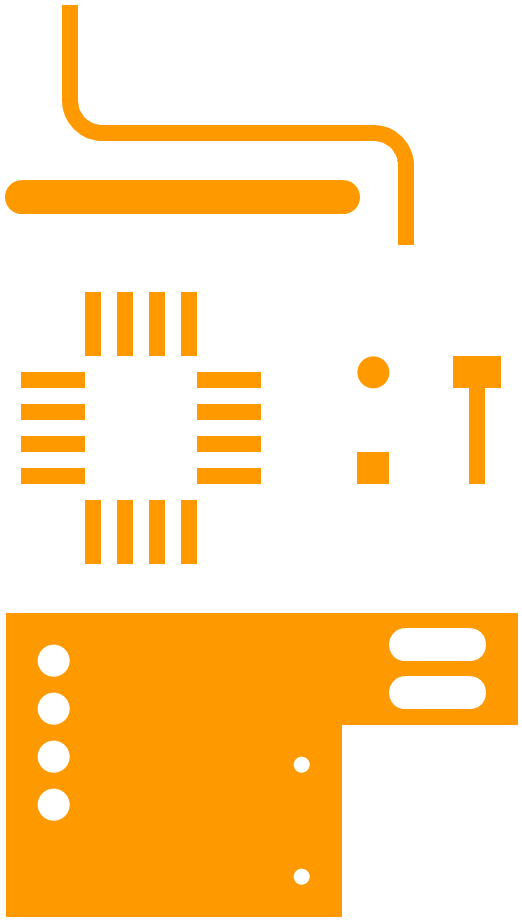
IDF 2.0

X

IDF 3.0

X

IDF 4.0



Traces

Pads

Filled Areas

Footprints

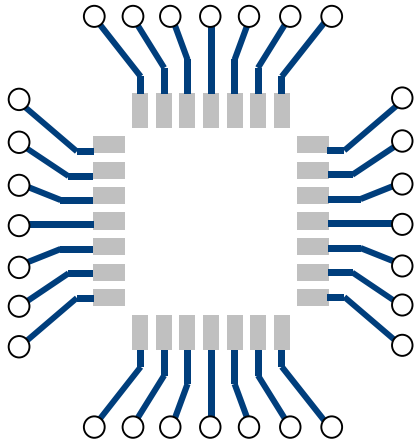
IDF 2.0

X

IDF 3.0

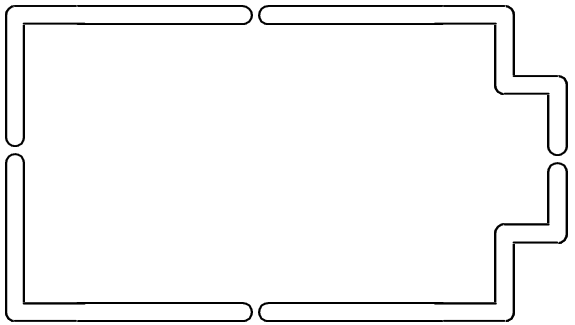
X

IDF 4.0



Component pads, breakout traces, via holes, and reference designator

Board milling cutouts (in panel)



Sublayouts

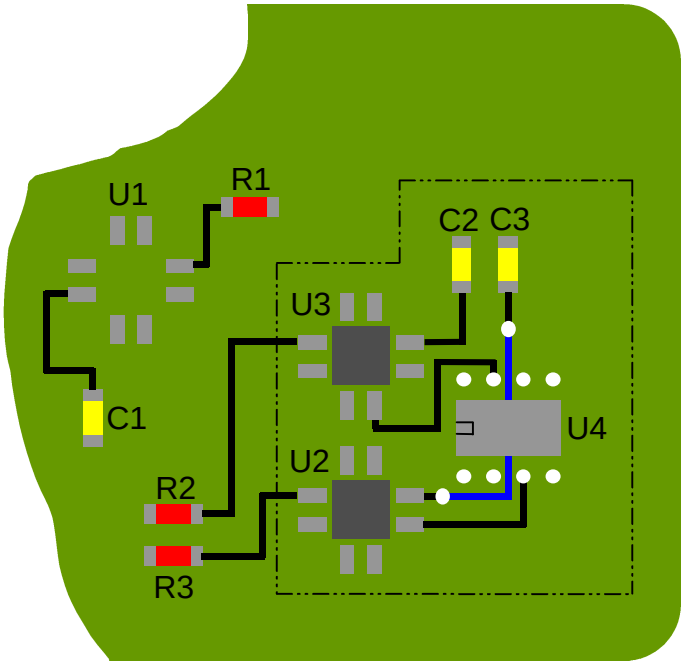
IDF 2.0

X

IDF 3.0

X

IDF 4.0



Sublayout includes component instances U2, U3, U4, C2 & C3, plus the routing connections between these five components.

Figures

IDF 2.0

X

IDF 3.0

X

IDF 4.0

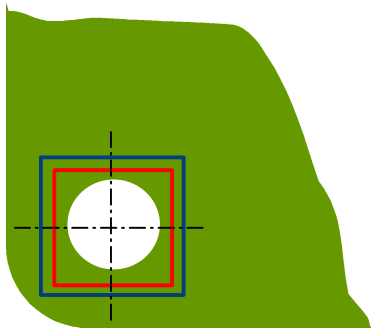


Figure Representing:
- Mounting Hole
- Placement Keepout
- Routing Keepout
- Annotation (Centerlines)

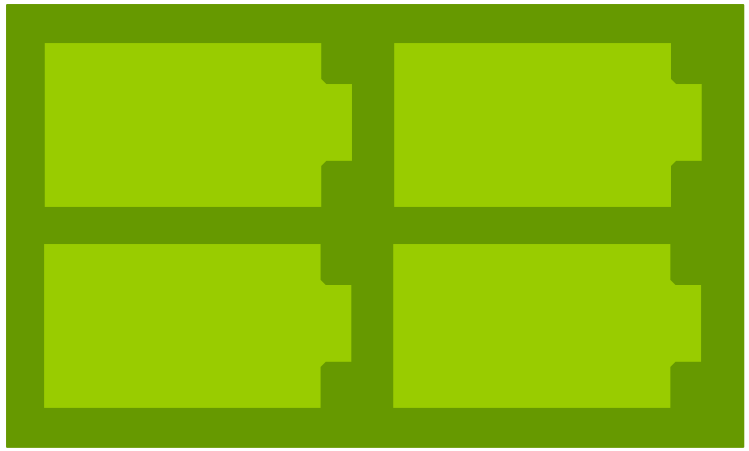
Panels

IDF 2.0

X

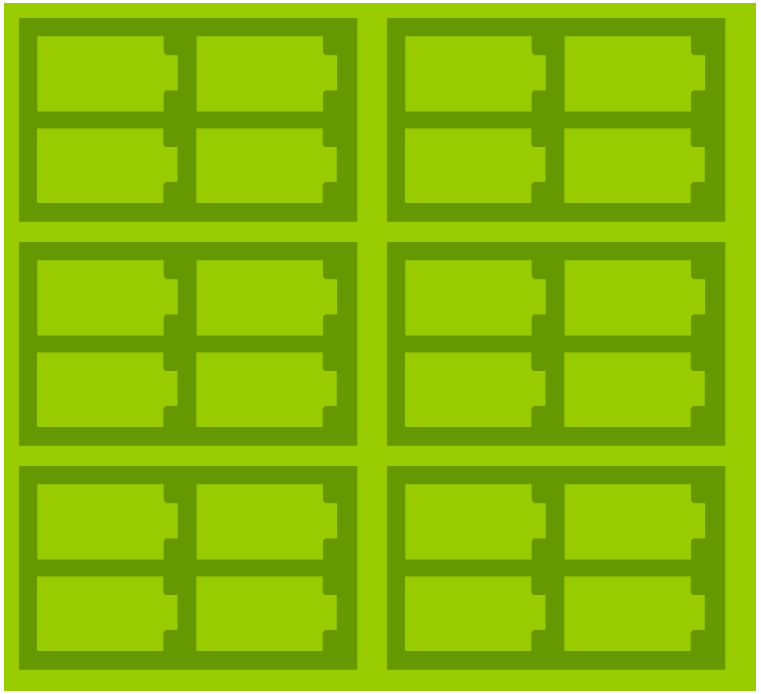
IDF 3.0

Simple panels only



IDF 4.0

Simple panels and subpanels



Thermal Properties

IDF 2.0

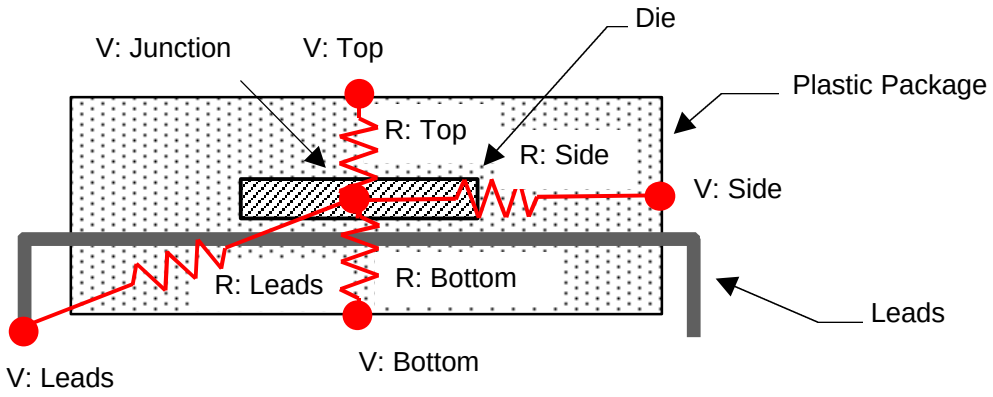
X

IDF 3.0

POWER_OPR
POWER_MAX
THERM_COND
THETA_JB
THETA_JC

IDF 4.0

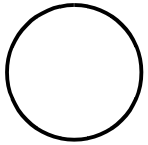
Complete thermal and material models



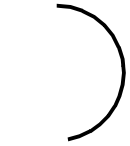
Basic Geometry

IDF 2.0

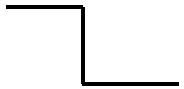
IDF 3.0



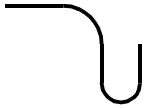
IDF 4.0



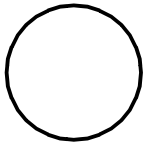
Circular Arc



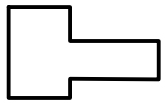
Polyline



Polycurve

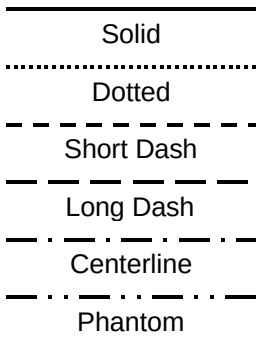


Circle

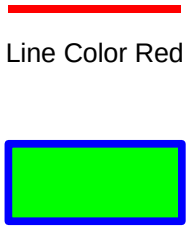


Polygon

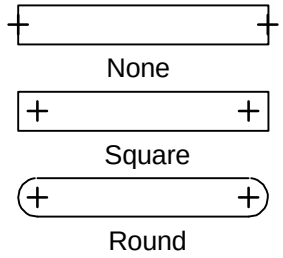
Polycurve Area



Line Fonts



Line Color Blue &
Fill Color Green



End Styles

IDF 4.0 Implementation Proposal

- **Implementation will be a vendor initiative**
- **Goals and Objectives**
  - Get all the major vendors onto an IDF 4.0 baseline concurrently
  - Build effective, reliable, useful IDF 4.0 translators
  - Spread some implementation costs across vendors
  - Validate IDF 4.0; Modify as needed
- **Intermedius will supply**
  - Implementation tools
  - Design guidelines
  - Testcases
  - Initial integration testing
- **12 month program; Proposed start Jan. 1999**

What You Can Do to Make IDF 4.0 a Reality

- **Talk to Intermedius**
  - Tell us what you need and how you would like it implemented
  - Provide us with real examples, testcases
- **Talk to your vendors**
  - Tell them why ECAD/MCAD integration is important to you
  - Urge (require) them to participate in IDF 4.0 implementation
  - Offer to beta test their IDF 4.0 translators
- **Get going on ECAD/MCAD integration now!**