# Translation Step #1: Export IDF files

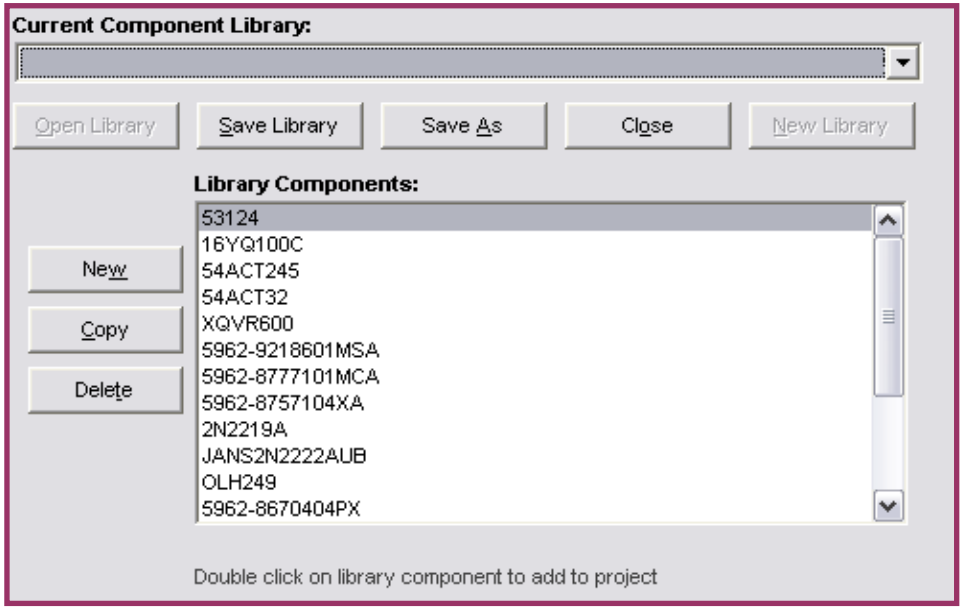
- IDF = Intermediate Data File
  - Industry standard exchange format
- Exported from circuit board design layout tool
  - .emn & .emp files required for thermal analysis
- IDF's include the following:
  - Board outline, part location
  - Part outlines
  - Package types

```
.HEADER
LIBRARY_FILE 3.0
.END_HEADER
.ELECTRICAL
"RM1206" "D55342E07B10B0S" THOU 33.00000
0 -117.50000          -37.50000          0.00000
0 117.50000           -37.50000          0.00000
0 117.50000           37.50000           0.00000
0 -117.50000          37.50000           0.00000
0 -117.50000          -37.50000          0.00000
.END_ELECTRICAL
.ELECTRICAL
"SAM1A" "HTSW-101-23-S-S_TP" THOU 330.00000
0 -50.00000           -50.00000          0.00000
0 50.00000            -50.00000          0.00000
0 50.00000            50.00000           0.00000
0 -50.00000           50.00000           0.00000
0 -50.00000           -50.00000          0.00000
.END_ELECTRICAL
```

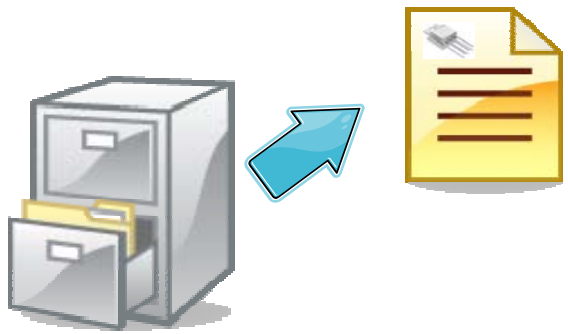
**Sample IDF Text**

# Translation Step #2: Define a PCAnalyze Component Library

- PCAnalyze includes option of creating a Component Library (thermal parts list)
- Library components must consist of:
  - Case dimensions
  - Lead dimensions/quantity
  - Lead material
  - Thermal mass data
  - Junction-to-case resistance ($\theta_{JC}$)
- Populate Component Library according to exact part numbers in board design




**Sample PCAnalyze Library Screenshot**



# Translation Step #3:
# Create the PCAnalyze Import File Using IDFTrans

- Import file is an Excel spreadsheet generated by IDFTrans (called ITP File)
  - Created by cross-referencing IDF data with PCAnalyze Component Library data
  - Includes component listing, board location and thermal data
- Remove components not required for the thermal analysis
- Enter component power dissipations and staking conductances

**IDF to PCAnalyze Translation File**

*(WARNING: Do Not Modify Cell Locations)*

| | |
|---|---|
| Template Revision: | |
| Template Revision Date: | |
| Template File: | |
| IDF Board File: | |
| Source System ID: | |
| Date: | |
| Board File Version Number: | |
| IDF Version Number: | |
| IDF Library File: | |
| Source System ID: | |
| Date: | |
| Board File Version Number: | |
| IDF Version Number: | |
| PCA Comp Library File: | |
| IDF Translator Version: | |
| Creation Date/Time: | |

| Parameter | Value | Options |
|---|---|---|
| Temperature Unit | 0 | 0=C, 1=K, 2=F, 3=R |
| Length Unit | 2 | 0=mm, 1=cm, 2=inch |
| Time Unit | 2 | 0=Hrs, 1=min, 2=Sec |
| Power Unit | 1 | 0=mW, 1=W, 2=Btu/hr |
| Mass Unit | 0 | 0=g, 1=kg, 2=lbm |
| Board X Length | 9.182 | Units Shown Above |
| Board Y Length | 6.300 | Units Shown Above |
| Board Thickness | 0.093 | Units Shown Above |
| Board Material Name | G10 | Valid Name from PCA matl. Database |
| X Mesh | 20 | Valid Range: 2-50 |
| Y Mesh | 20 | Valid Range: 2-50 |

Valid Name From PCAnalyze Material Database

PCAnalyze is limited to either 0 or 90 deg rotations

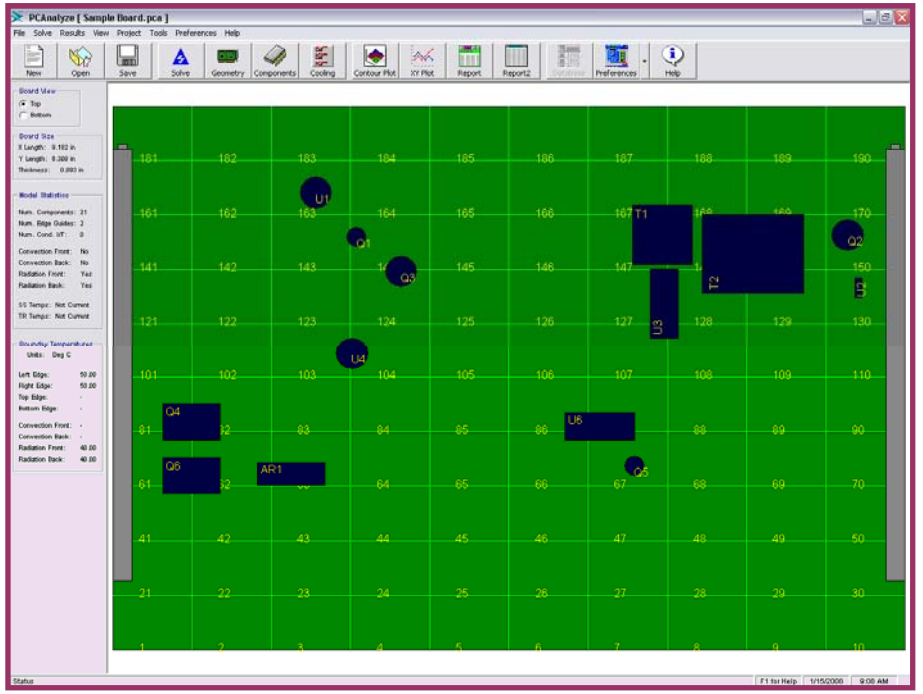
Non-Zero if Staked

| Component Name | Reference Designator | Package Style | Type | Length | Width | Height | Diameter | Mass | Component Cp | Resistances Junc. Case | # Lead | Lead CS Area | Lead Length | Lead Matl. Name | X Location | Y Location | Brd Side (TOP/BOT) | Rotation Angle | Staking Conductance | Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5962F9583303VXA_TH | U18 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 8.439 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U17 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 7.539 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U16 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 6.614 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U15 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 5.814 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U14 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 4.889 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U13 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 4.139 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U12 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 3.389 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U11 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 2.614 | 3.764 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U10 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 1.839 | 3.764 | TOP | 90 | | 0 |
| 5962F9583403VXA_TH | U9 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 7.796 | 4.812 | TOP | 0 | | 0 |
| 5962F9583403VXA_TH | U8 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 6.546 | 4.812 | TOP | 0 | | 0 |
| 5962F9583403VXA_TH | U7 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 5.321 | 4.812 | TOP | 0 | | 0 |
| 5962F9583303VXA_TH | U6 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 4.789 | 4.789 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U5 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 4.064 | 4.789 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U4 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 3.339 | 4.789 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U3 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 2.614 | 4.789 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U2 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 1.889 | 4.789 | TOP | 90 | | 0 |
| 5962F9583303VXA_TH | U1 | FP16A_TH | 0 | 0.44 | 0.245 | 0.155 | 0 | 9.9900E+02 | 9.9900E+02 | 10 | 16 | 1.2025E-04 | 0.31 | Alloy 42 | 1.164 | 4.789 | TOP | 90 | | 0 |

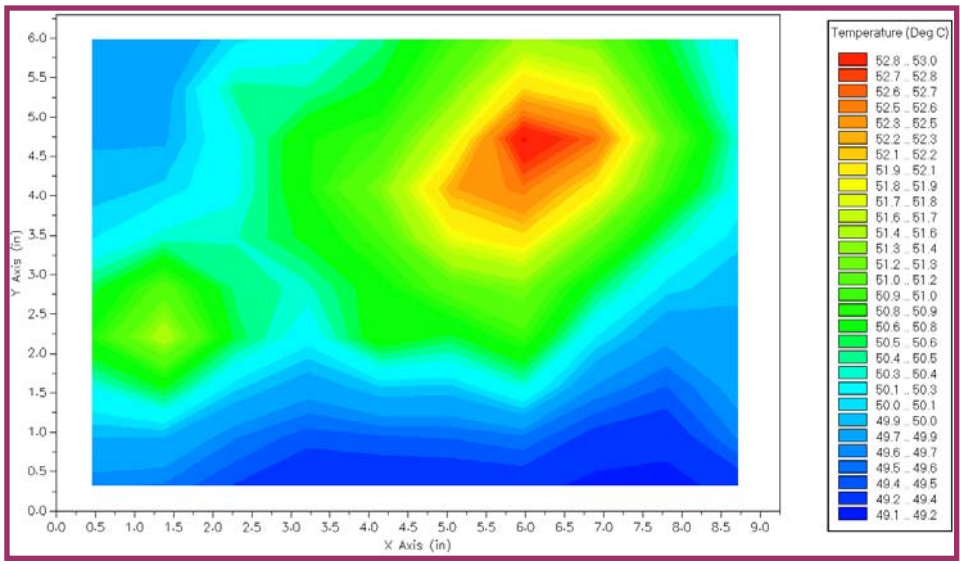
**Example Import Spreadsheet**

# Translation Step #4: Import the ITP file into PCAnalyze 2.0

- Component locations, thermal data and network connections are defined one step
- Define the following within PCAnalyze:
  - Boundary conditions
  - Copper layers
- Solve the PCAnalyze model
  - Generates temperature reports and contour map




| Ref. Desg. | Component Name | Power (W) | ThetaJC (Deg C/W) | XLoc (in) | YLoc (in) | T(j) (Deg C) |
|---|---|---|---|---|---|---|
| AR1 | 5962-8777101MCA | 0.100 | 10.000 | 1.674 | 1.900 | 59.4 |
| AR2 | AD822BR | 0.100 | 28.000 | 6.118 | 1.413 | 81.1 |
| Q1 | JANS2N2907A | 0.100 | 150.000 | 2.824 | 4.783 | 181.8 |
| Q10 | JANS2N2222AUB | 0.100 | 90.000 | 5.089 | 3.273 | 60.9 |
| Q2 | IRHF57133SE | 0.159 | 5.000 | 8.515 | 4.808 | 183.2 |
| Q3 | 2N2219A | 0.159 | 59.000 | 3.340 | 4.383 | 194.1 |
| Q4 | JANS2N7382 | 1.000 | 1.670 | 0.585 | 2.427 | 301.1 |
| Q5 | JANS2N2907A | 0.159 | 150.000 | 6.040 | 2.126 | 248.4 |
| Q6 | JANSH2N7380 | 2.500 | 1.670 | 0.585 | 1.802 | 469.7 |
| Q7 | JANS2N2222AUB | 0.100 | 90.000 | 5.455 | 3.961 | 61.6 |
| Q8 | JANS2N2222AUB | 0.100 | 90.000 | 5.455 | 3.786 | 61.6 |
| Q9 | JANS2N2222AUB | 0.100 | 90.000 | 5.639 | 3.273 | 61.2 |



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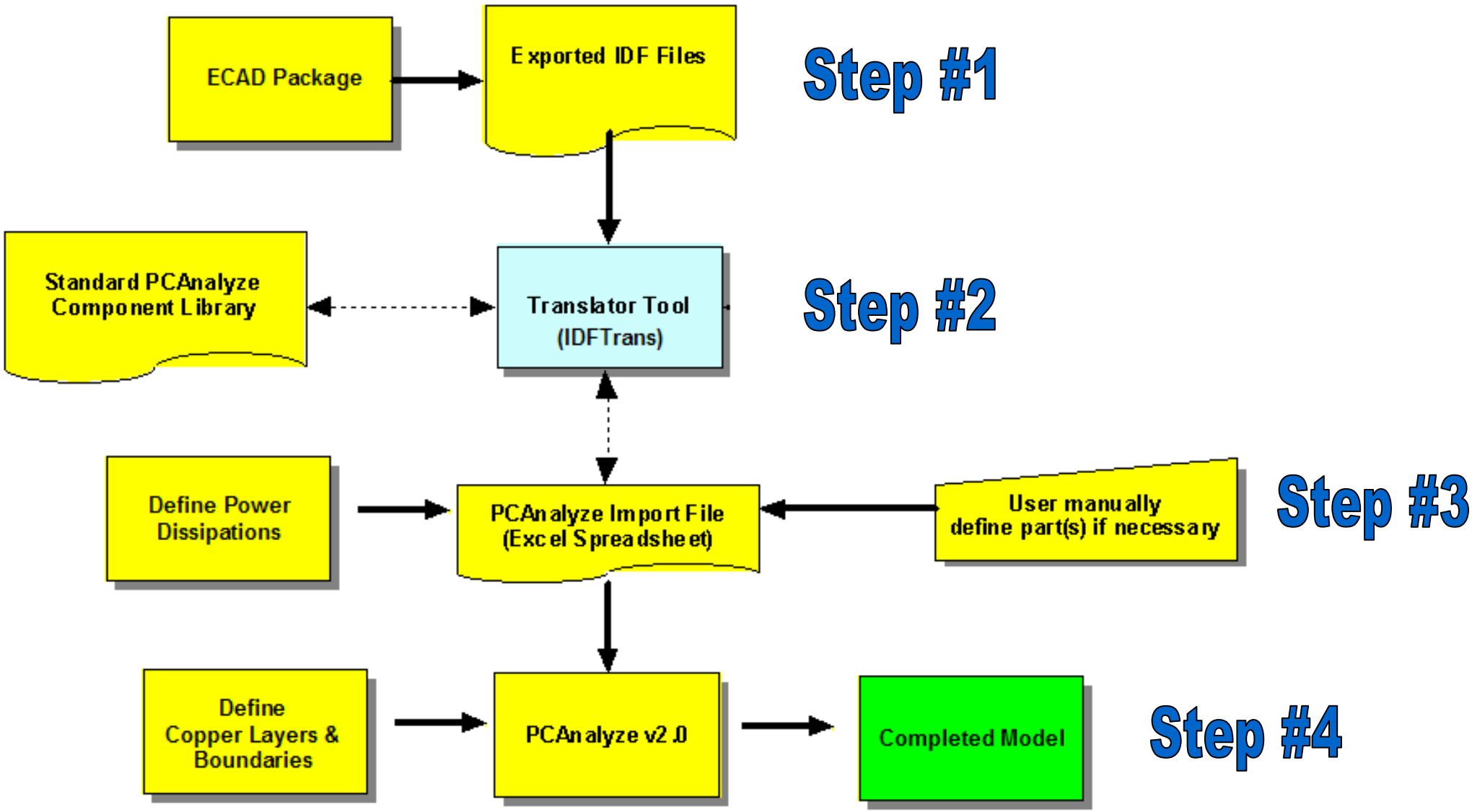
# Translation Process Summary



# Why This Method Works

- Reduces cost and analysis time
  - Board-level thermal analyses labor dramatically reduced
  - 50% less thermal analysis schedule time required
- Higher performance
  - More robust board design
    - identifies thermal issues earlier
  - Quicker analysis process
- Higher reliability
  - Reduces human error

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# Summary

- Took a very labor intensive thermal analysis process and automated it
- PCAnalyze/IDFTrans software accurately models board outline and component orientation in one easy step
  - Eliminates the “guessing” of the board thermal network
- Process enables thermal engineer to suggest changes in the electronics thermal design earlier and more efficiently
- PCAnalyze/IDFTrans combination proven to reduce cost and schedule time
  - Complete board thermal analysis and documentation in approx. 16 hours
    - Minimum of 24 hours/board savings