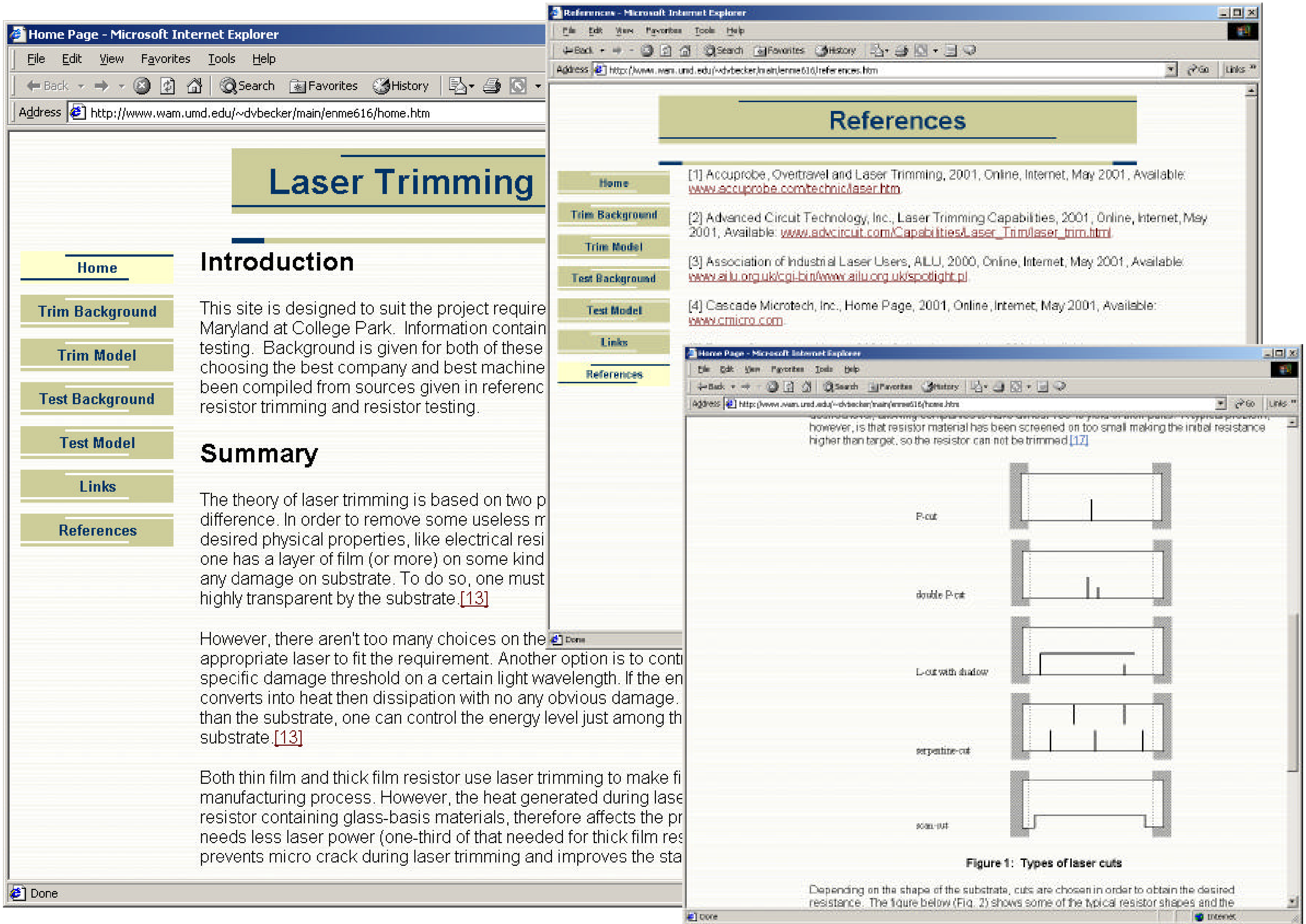
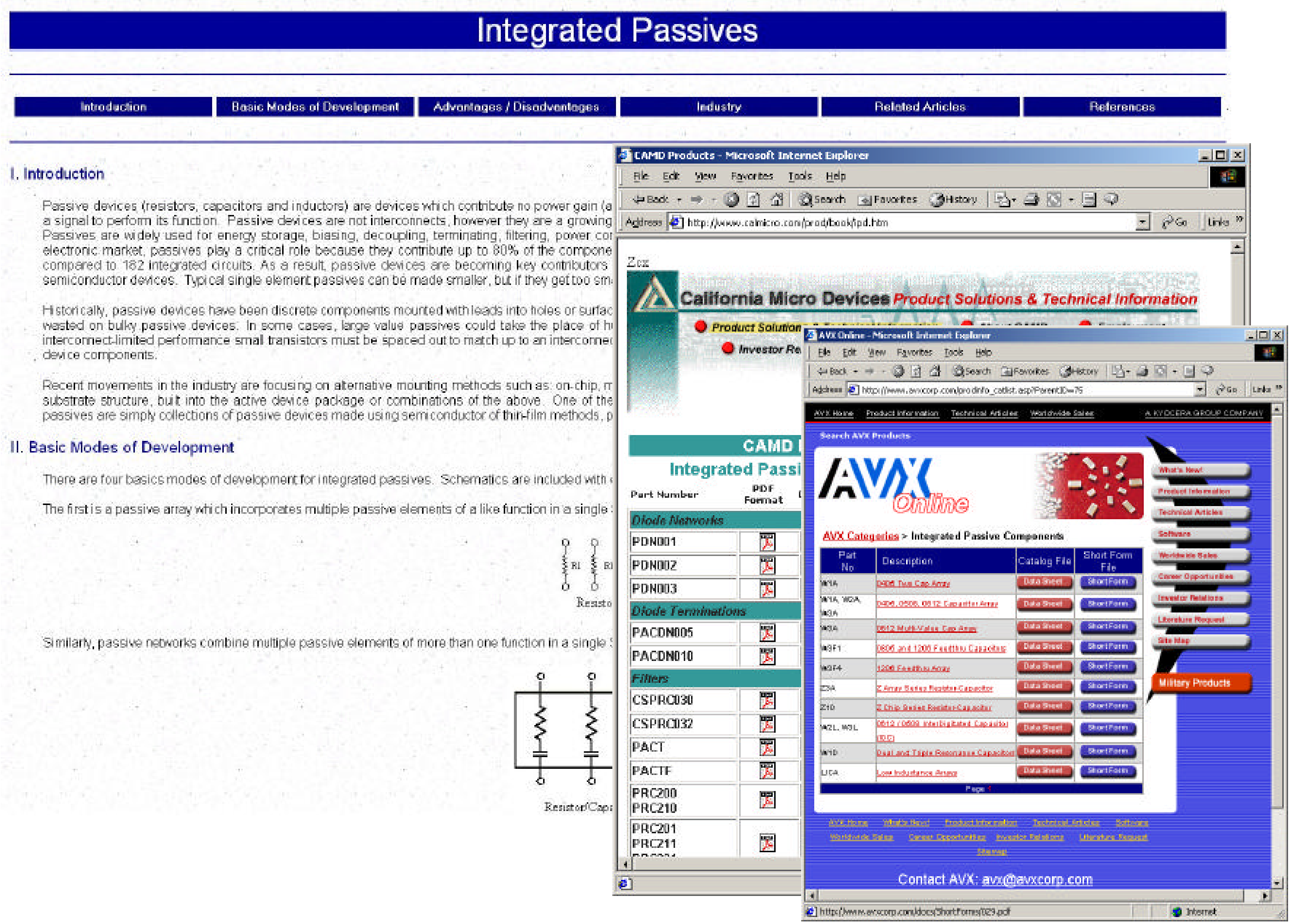
C01-11

Integral and Integrated Passives Webbook Update - Part 2

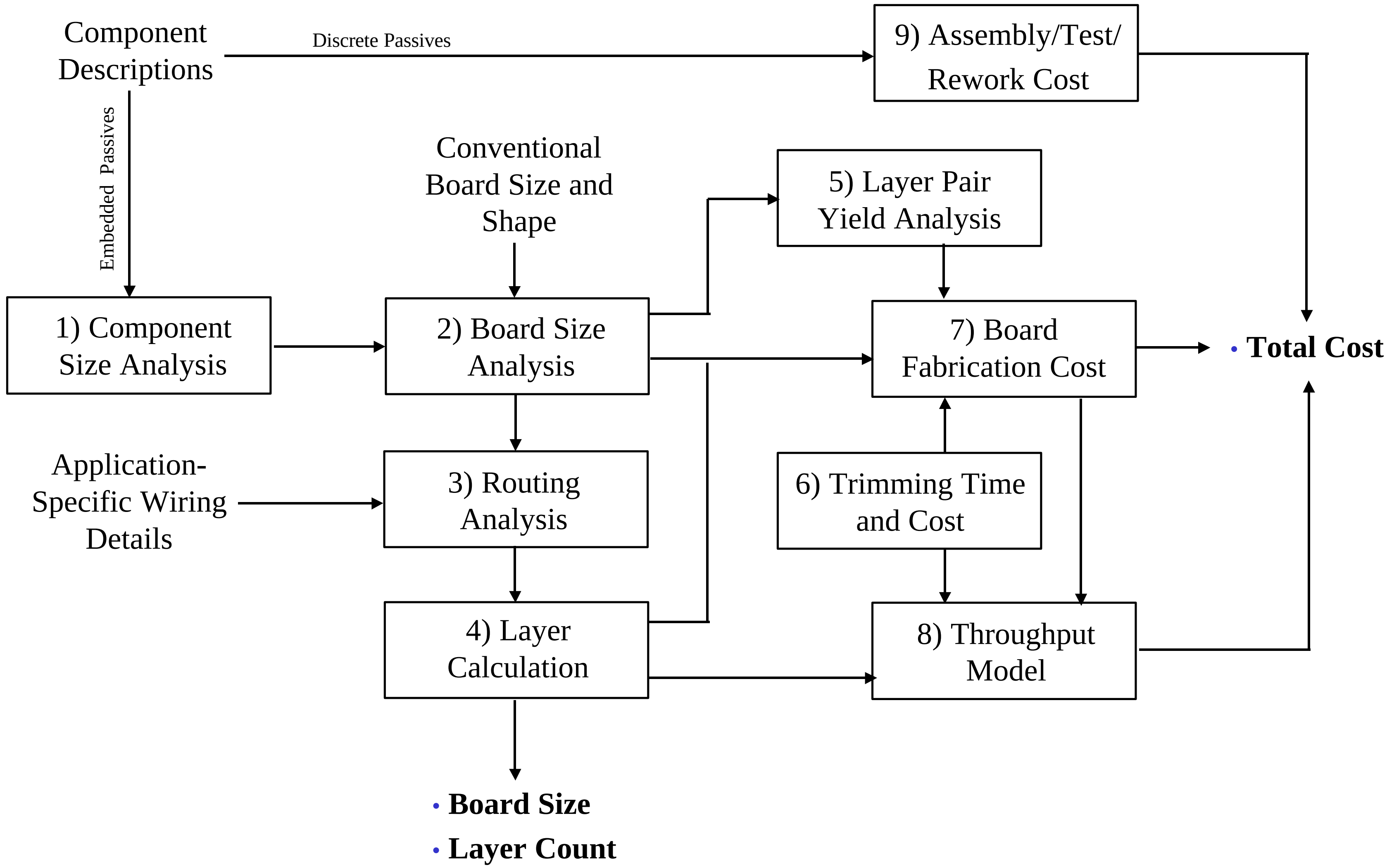
B. Etienne, D. Becker, and P. Sandborn

Objective: *Complete an updated review of state-of-the-art integral and integrated passive technologies. Compare size, cost, and performance for systems constructed with and without integral or integrated passive components (resistors and capacitors). Develop guidelines for determining when and how it makes sense to include integral and/or integrated passives within a system (i.e., what system characteristics, if any, indicate the opportunity for cost savings through the use of integral or integrated passives).*


Home Page - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://www.wam.umd.edu/~dvbecker/main/enme616/home.htm
Laser Trimming
Home
Trim Background
Trim Model
Test Background
Test Model
Links
References
Introduction
This site is designed to suit the project require
Maryland at College Park. Information contain
testing. Background is given for both of these
choosing the best company and best machine
been compiled from sources given in referenc
resistor trimming and resistor testing.
Summary
The theory of laser trimming is based on two p
difference. In order to remove some useless m
desired physical properties, like electrical resi
one has a layer of film (or more) on some kind
any damage on substrate. To do so, one must
highly transparent by the substrate.[13]
However, there aren't too many choices on the
appropriate laser to fit the requirement. Another option is to conti
specific damage threshold on a certain light wavelength. If the en
converts into heat then dissipation with no any obvious damage.
than the substrate, one can control the energy level just among th
substrate.[13]
Both thin film and thick film resistor use laser trimming to make fi
manufacturing process. However, the heat generated during lase
resistor containing glass-basis materials, therefore affects the pr
needs less laser power (one-third of that needed for thick film res
prevents micro crack during laser trimming and improves the sta
Done
References - Microsoft Internet Explorer
Address http://www.wam.umd.edu/~dvbecker/main/enme616/references.htm
References
[1] Accuprobe, Overtravel and Laser Trimming, 2001, Online, Internet, May 2001, Available:
www.accuprobe.com/technic/laser.htm
[2] Advanced Circuit Technology, Inc., Laser Trimming Capabilities, 2001, Online, Internet, May 2001, Available: www.advcircuit.com/Capabilities/Laser_Trim/laser_trim.html
[3] Association of Industrial Laser Users, AILU, 2000, Online, Internet, May 2001, Available:
www.ailu.org.uk/cgi-bin/www.ailu.org.uk/spotlight.pl
[4] Cascade Microtech, Inc., Home Page, 2001, Online, Internet, May 2001, Available:
www.cmicro.com
Home Page - Microsoft Internet Explorer
however, is that resistor material has been screened on too small making the initial resistance higher than target, so the resistor can not be trimmed.[17]
P-cut
double P-cut
L-cut with shadow
serpentine-cut
scan-cut
Figure 1: Types of laser cuts
Depending on the shape of the substrate, cuts are chosen in order to obtain the desired resistance. The figure below (Fig. 2) shows some of the typical resistor shapes and the


Integrated Passives
Introduction
Basic Modes of Development
Advantages / Disadvantages
Industry
Related Articles
References
I. Introduction
Passive devices (resistors, capacitors and inductors) are devices which contribute no power gain (a
a signal to perform its function. Passive devices are not interconnects, however they are a growing
Passives are widely used for energy storage, biasing, decoupling, terminating, filtering, power co
electronic market, passives play a critical role because they contribute up to 80% of the compone
compared to 182 integrated circuits. As a result, passive devices are becoming key contributors
semiconductor devices. Typical single element passives can be made smaller, but if they get too sm
Historically, passive devices have been discrete components mounted with leads into holes or surfac
wasted on bulky passive devices. In some cases, large value passives could take the place of h
interconnect-limited performance small transistors must be spaced out to match up to an interconne
device components.
Recent movements in the industry are focusing on alternative mounting methods such as: on-chip, m
substrate structure, built into the active device package or combinations of the above. One of the
passives are simply collections of passive devices made using semiconductor of thin-film methods, p
II. Basic Modes of Development
There are four basics modes of development for integrated passives. Schematics are included with
The first is a passive array which incorporates multiple passive elements of a like function in a single
Similarly, passive networks combine multiple passive elements of more than one function in a single
CAMD Products - Microsoft Internet Explorer
http://www.calmicro.com/prod/book/ipd.htm
California Micro Devices
Product Solutions & Technical Information
Integrated Passi
Part Number
PDF Format
Diode Networks
PDN001
PDN002
PDN003
Diode Terminations
PACDN005
PACDN010
Filters
CSPRC030
CSPRC032
PACT
PACTF
PRC200
PRC210
PRC201
PRC211
AVX Online - Microsoft Internet Explorer
http://www.avxcorp.com/prodinfo_catlist.asp?ParentID=75
AVX Online
AVX Categories > Integrated Passive Components
Part No
Description
Catalog File
Short Form File
Military Products
Contact AVX: avx@avxcorp.com

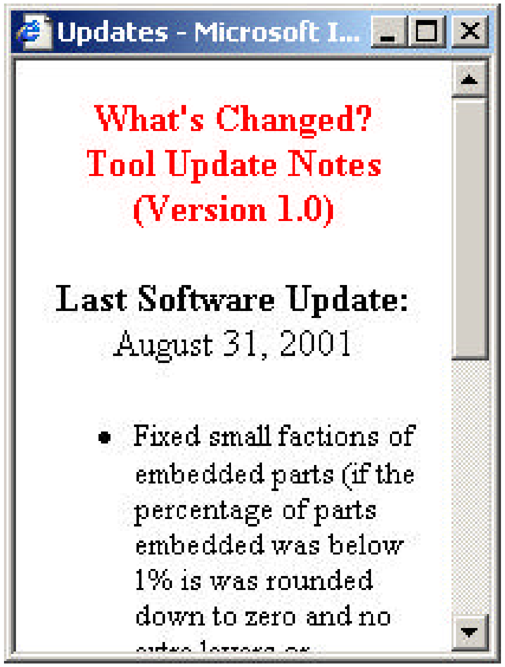
Embedded Passives Tradeoff Model



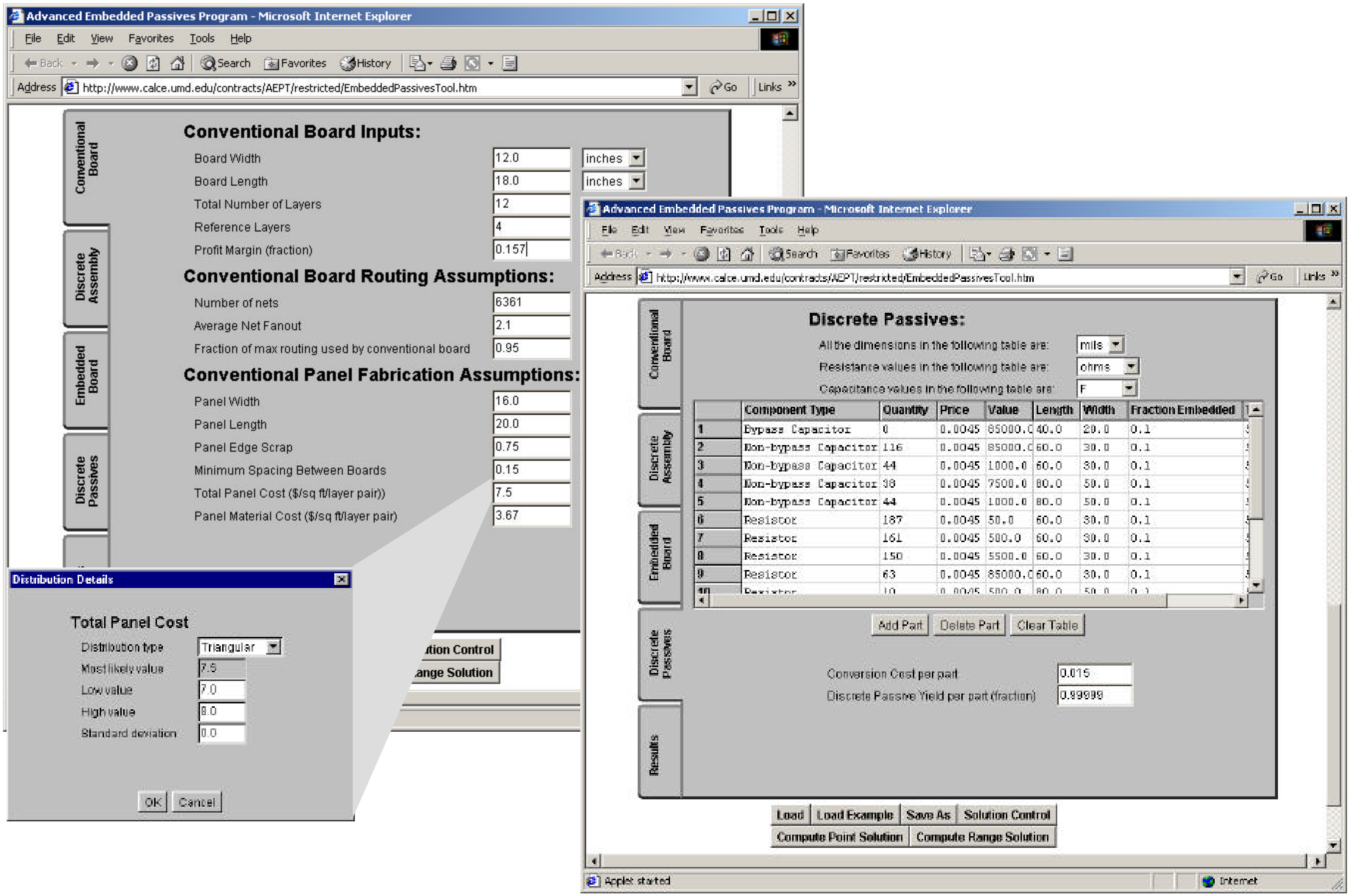
Model Features and Assumptions

Features:

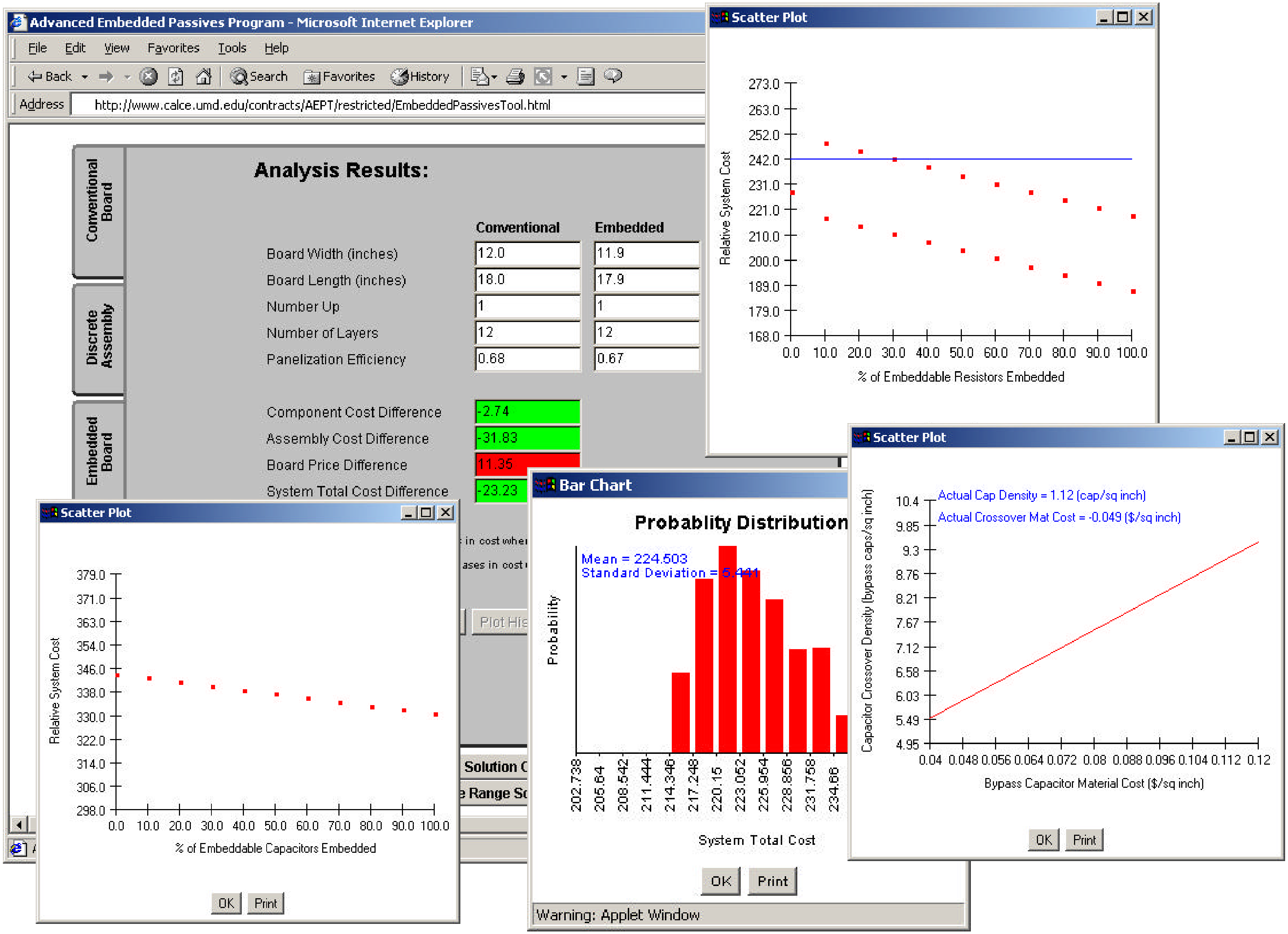
- Supports resistor, capacitor, and mixed resistor and capacitor embedding
- Board fabrication throughput treated via profit margins
- Bypass and non-bypass capacitors supported
- Board re-sizing (option to fix or float)
- Routing estimation (board layer requirements)
- Board panelization (homogeneous layout only)
- Discrete passive yields
- Discrete passive assembly costs and yields
- Discrete passive assembly rework
- Supports full Monte Carlo uncertainty analysis
- Supports local file system Save and Load
- Includes plotting and printing
- Includes help page defining all input fields



Tradeoff analysis tool



http://www.calce.umd.edu/contracts/AEPT/restricted/EmbeddedPassivesTool.html



Advanced Embedded Passives Program - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://www.calce.umd.edu/contracts/AEPT/restricted/EmbeddedPassivesTool.html
Conventional Board
Discrete Assembly
Embedded Board
Analysis Results:
Conventional
Embedded
Board Width (inches) 12.0 11.9
Board Length (inches) 18.0 17.9
Number Up 1 1
Number of Layers 12 12
Panelization Efficiency 0.68 0.67
Component Cost Difference -2.74
Assembly Cost Difference -31.83
Board Price Difference 11.36
System Total Cost Difference -23.23
Scatter Plot
Relative System Cost
% of Embeddable Resistors Embedded
Scatter Plot
Relative System Cost
% of Embeddable Capacitors Embedded
OK Print
Bar Chart
Probablity Distribution
Mean = 224.503
Standard Deviation = 5.441
Probability
System Total Cost
OK Print
Warning: Applet Window
Scatter Plot
Actual Cap Density = 1.12 (cap/sq inch)
Actual Crossover Mat Cost = -0.049 ($/sq inch)
Capacitor Crossover Density (bypass caps/sq inch)
Bypass Capacitor Material Cost ($/sq inch)
OK Print

Case Studies

Case studies are available within the tradeoff tool

- Load them
- Run them
- View the results from them