"SOC InfoComm Camps"

- **Computational Problem Solving**
  - **Packing Problems and Algorithmic Solutions**
    - *What are Packing Problems*
    - *Types of Packing Problems*
    - *PSA Berth Allocation Problem*

Quickly get up to speed…

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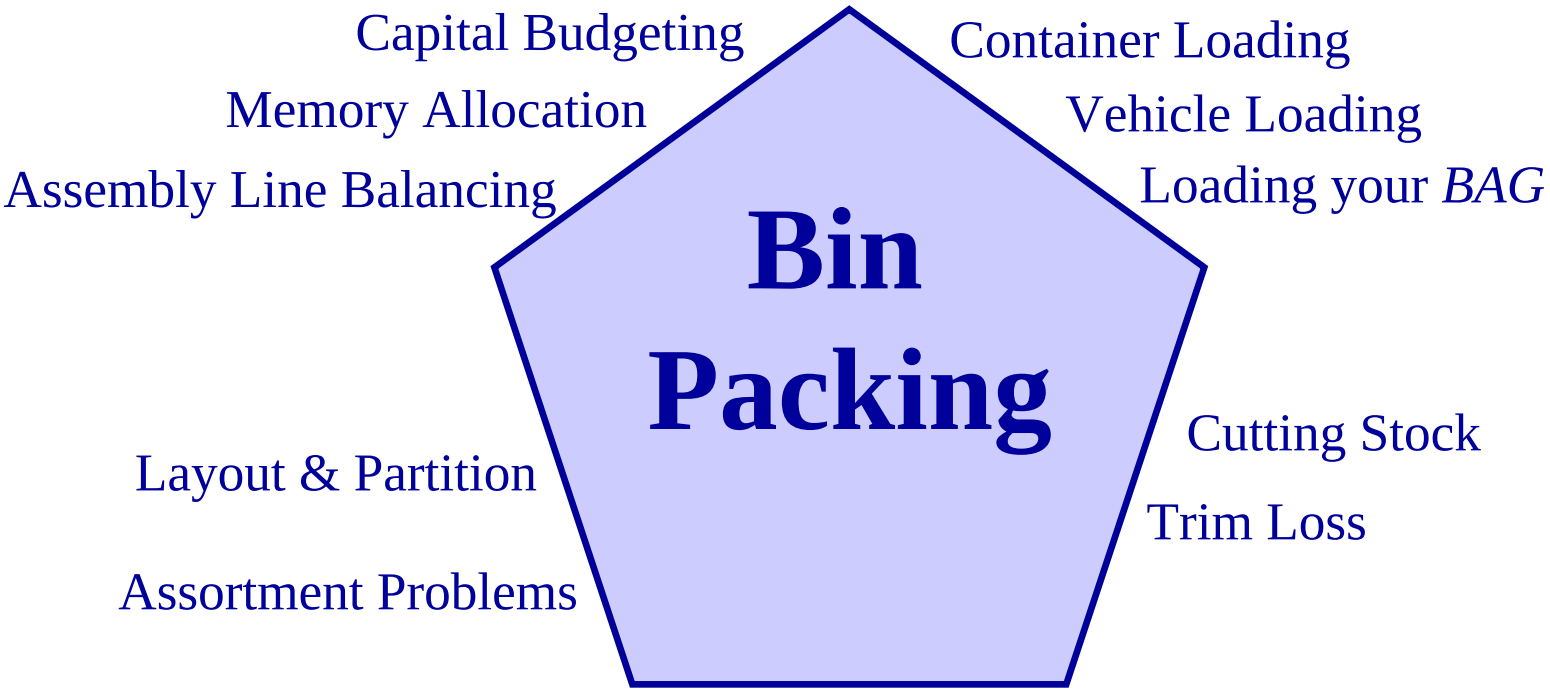
Large Variety of Packing Problems



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The Packing / Nesting "industry"

- **Industry Applications**
  - Manufacturing industry (ship building)
  - Construction industry
  - Furniture industry
  - Packing and Moving industry
  - Garment industry
- **Vendor Solutions**
  - AutoNEST, RNest, BarNest (Radan System)
  - FastNEST (Fagan…)
  - SIGMANEST (SigmaTech Inc)

Vendor solution…

RADAN SYSTEMS PTE LTD

❑ AutoNEST (from Radan Systems)

Manufacturing

- AutoNEST
- BarNEST
- CP Manager

Structural Detailing

- QuickBAR
- QuickSTEEL

Quality Management - ISO 9000

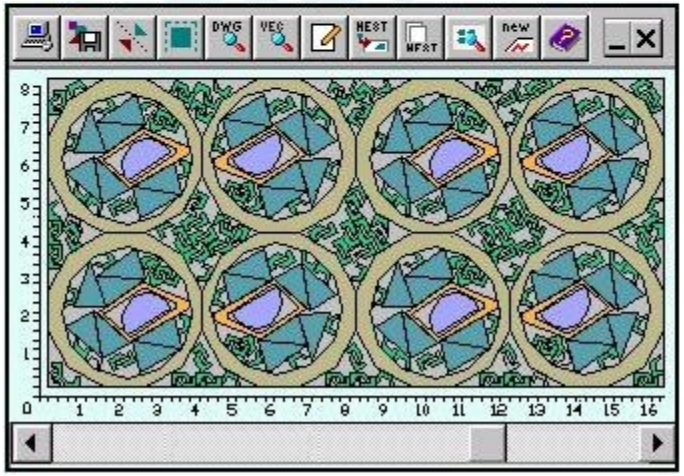
- Q-Pulse

*Auto*NEST

Computer Aided Flat Pattern Nesting

***Auto*NEST** is a computer aided nesting software for the optimal use of stock sheet materials. The application is suitable in shipbuilding, heavy engineering, fabrication, synthetic leather/fabric goods and furniture manufacture. ***Auto*NEST** is the solution to quick material estimation for purchasing requirements and shop floor cutting plans.

With automatic generation of nested layouts, ***Auto*NEST** reduces man-hours and maximizes material usage in different manufacturing conditions. ***Auto*NEST-FX** module enhances the output plans with detailed information on parts, stock materials, weights and cutting plan reports. ***Auto*NEST** also links with other NC software and CAD packages.



Sample of Nested Layout.

Highlights

- AutoNEST Features
- Nesting Engine
- Nest Preference
- Strategic OEM Alliances
- System Requirements

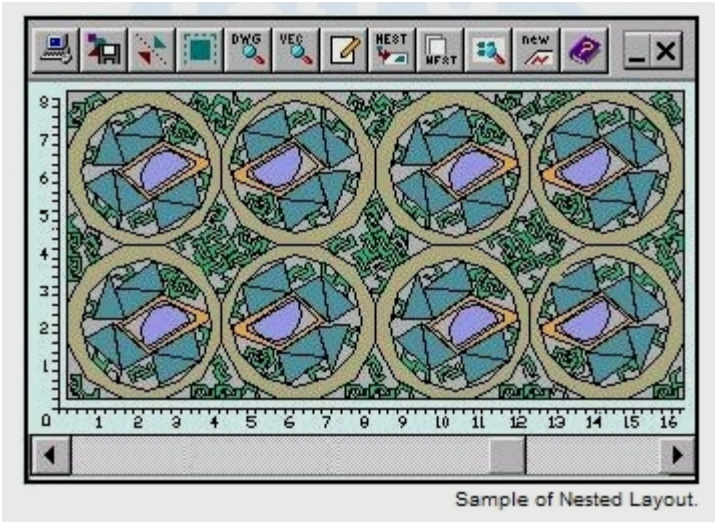
Vendor solution (an example)

AutoNEST (from Radan Systems)

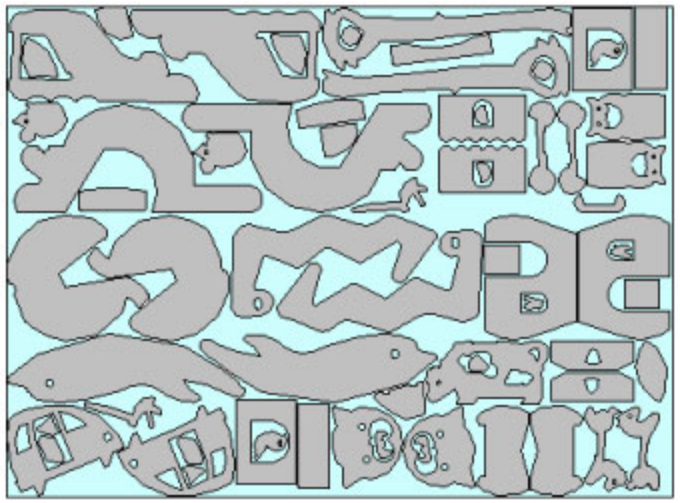
- Optimize use of stock sheet
- Can handle complicated shapes
- Can do “picture-in-picture”

Industries

- Shipbuilding
- Heavy engineering,
- Fabrication,
- Leather/fabrics, furniture



Sample of Nested Layout.



Packing problems are *everywhere*

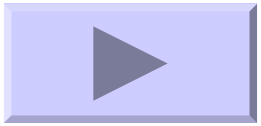
- **Packing books into shelves**
  - ***different height, width, thickness, classification***
- **Packing books into your school bag**
- **Packing apples into boxes**
- **Packing squares, rectangles, hexagons**
  - ***tessellations?***
- **Packing songs into your MP4 player**

1-D Packing Problems

- **You are going on a trip**
  - **You have a list of songs (mp3 files)**
    - ***A long, long list of your favorite song***
      http://mixitup987.blogspot.com/2008/01/top-10-songs-of-month.html
    - ***Each of different file sizes***
  - **You want to store into your MP3 player**
    - ***But you cannot fit them all in***
  - **You want to store as many song as possible**
    - ***What are your preferences (by favourites, by singers)***
- **Photos from your trips**
  - **You are storing "different collections of photos, video from various trip" onto CDs / DVDs**

1-D Bin Packing Algorithms

- Most "well-solved" packing problem
  - Many software solutions can be found
    - *Google "1-D packing software"* [here]
- Some algorithms for 1-D bin packing



- Interval Packing (2 of Everything)

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2D Packing Problems

- **Construction Industry**
  - **Cutting glass/aluminium panels for windows**
  - **Sign boards, Furnitures**
- **Media Industry**
  - **Advertisements layout in newspaper**
  - **Leather, Fabrics**
- **Shipbuilding, Engineering Industry**
  - **Parts of a ship, machine, car**
  - **(Often irregular shapes)**

3-D Packing Problems

- **Many examples:**
  - **Packing suitcases for a trip**
  - **Container loading**

An *un-expected* packing problem…

- **Berth Allocation Problem in PSA**
  - **Allocate berths to ships**
  - **similar to 2-D packing (after suitable modelling)**

Thank you!