

## Systematic Assembly Analysis and Planning Process

### Understand context (addressed in more detail later)

- management's objectives for the product or product line
  - production volume
  - cost
  - quality
  - model mix or evolution
  - schedule for going into production
  - status of the design: new, reused
- character of the product, nature of the market and customers
  - customer expectations
  - nature of customer interaction with the product
  - reuse, upgrade

### Assembly in the Small

#### Understand each assembly step in detail

- the basic requirements
  - size, shape, weight, dimensions of each part
  - characterization of each mate between parts
  - special character of particular parts
- assembly difficulty
- handling constraints
  - gripping
  - feeding

#### Conventional Design for Assembly

- part consolidation opportunities
- part feeding difficulty
- part handling difficulty

#### Identify high risk areas

- part damage
- wrong part
- misassembly
- safety or regulatory issues
- tasks so hard only one person can do them

#### Identify necessary experiments

#### Recommend local design improvements

### Assembly in the Large (aka Design of Assembly)

#### Understand the business context

- product character and type of market
- sales volume anticipated
- model variety anticipated
- plans for new versions
- delayed committment
- supplier logistics and make vs buy
- cost limits
- labor costs and any regulations
- cost calculation and ROI methods
- ROI targets

#### Understand the factory context

- labor conditions, training, shift policies
- space and facility constraints

#### Identify system requirements

- tentative cycle time
- production flow and floor layout
- feasible methods and equipment
- required sensing and communication
- required displays and controls
- parts presentation
- alternate assembly sequences
- fixtures and parts carriers

Design a concept assembly system

- system architecture
- equipment selection and task assignment
- cost and economic performance
- simulation

- average flow and production rate

- uptime

- queues, blockage, starvation

- model changeovers

Make final recommendations

- additional design improvements

- line design or sequence options

- remaining risk areas