CONCEPT to PRODUCT
Product Design Cycle for the Start Up Company

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The ‘Engineering’ Product Development Cycle

What is it?

- Develops your original idea (napkin sketch) into an actual, reliable, cost effective product .
- It insures that the product (or services or software) meets the requirements (customer needs).
- It encompasses processes that include incremental design steps, testing, and prototypes.
- The product development cycle can be categorized into three phases and then transitioning into production.
- This process guarantees a reliable product that meets the goals including development costs, schedule (timelines), scalability, requirements, and projected retail price.

Tailorable Process …

- The design/development process is tailored depending on:
  - The complexity of the product
  - Brand new “grounds-up” product or modification to an existing product.
- This process is flexible – jump in and out at any point – depending on the product.

Phases for the Product Development Cycle

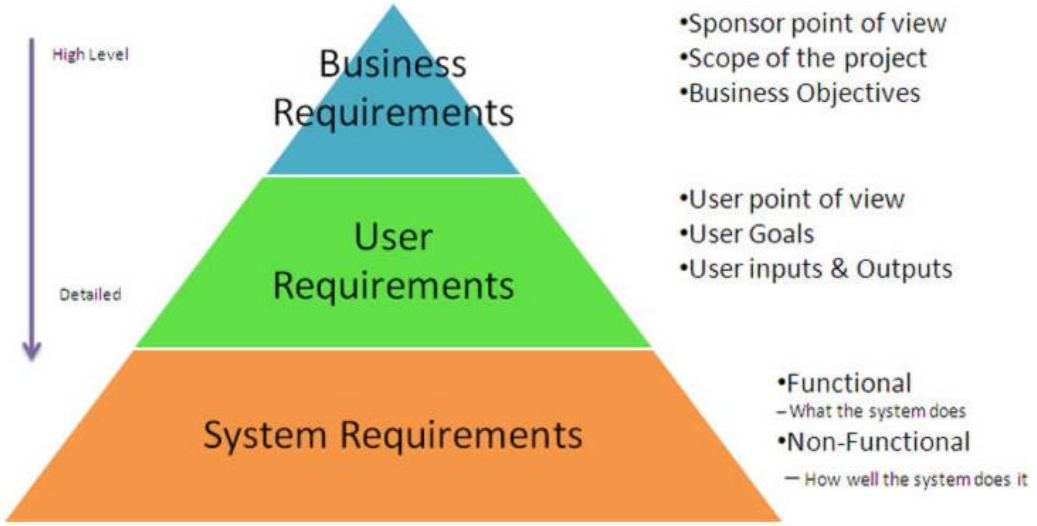
Phase 1
IDEA!!
Initial Concept

Phase 2
Preliminary
Design

Phase 3
Final
Design

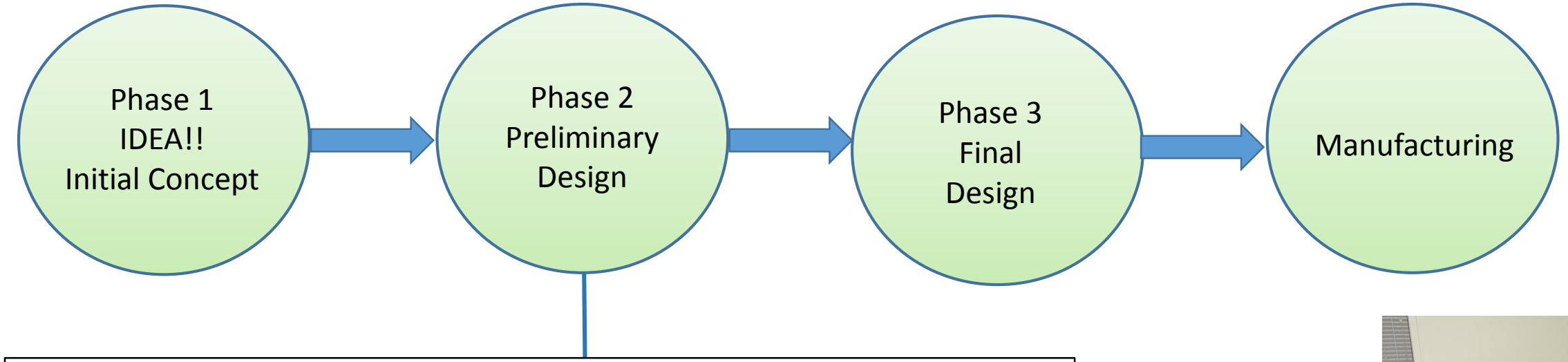
Manufacturing

- **IDEA!** - Brainstorm – develop **initial concept**
- Study the market potential
- Determine cost goal
- **Requirements**!! – think size, color, weight, power, projected retail price, customer's needs

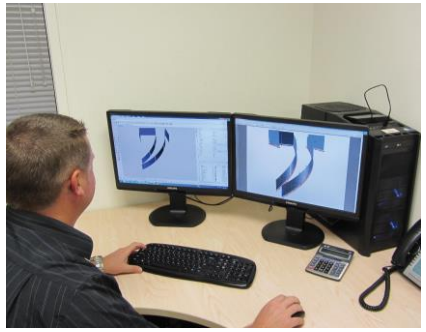


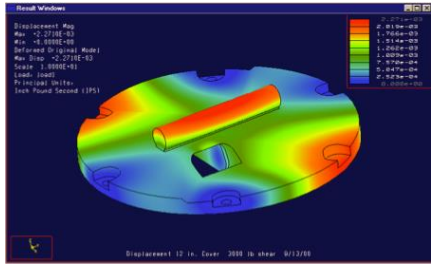
Diagrammatic representation of the different types of requirements (Source: SatheesPractice)

Phases for the Product Development Cycle

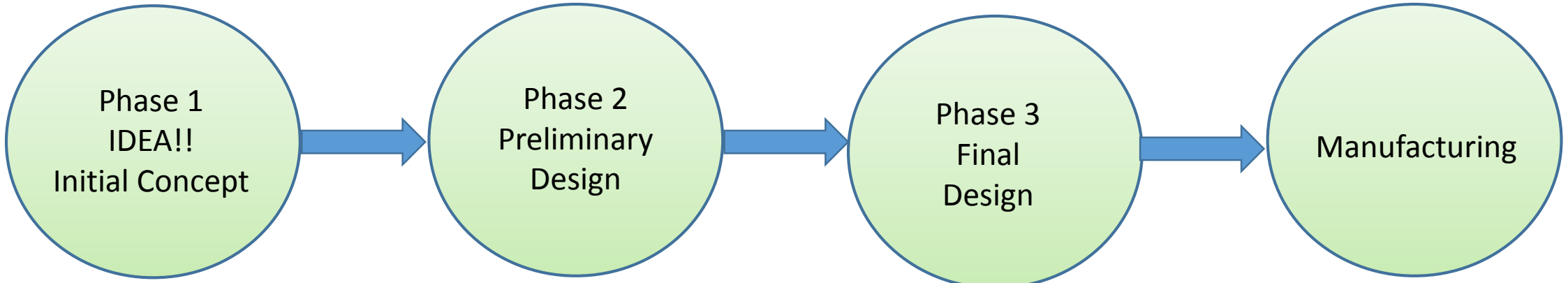


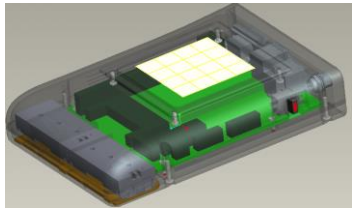
- **Preliminary design** – 3D CAD – preliminary drawings
  - Non Disclosure Agreement (NDA)
  - Patent Considerations
- **Prototype** – 3D Printed, machined, or combination thereof
  - Solicit feedback
- Preliminary Analyses
  - Verification Tests / Preliminary market review **(USER community)**
- **Preliminary Design Review**





Phases for the Product Development Cycle





- **Final design** – Update design per feedback/results from Phase 2
  - Update 3D CAD models and analyses
- Build **final prototype (should look and act like the final product**)/ test
  - Qualification Tests (prove out the design – does it meet the requirements?)
- **Critical (or final) Design Review – Ensure that the customer's needs/requirements are met!**
- Release drawings

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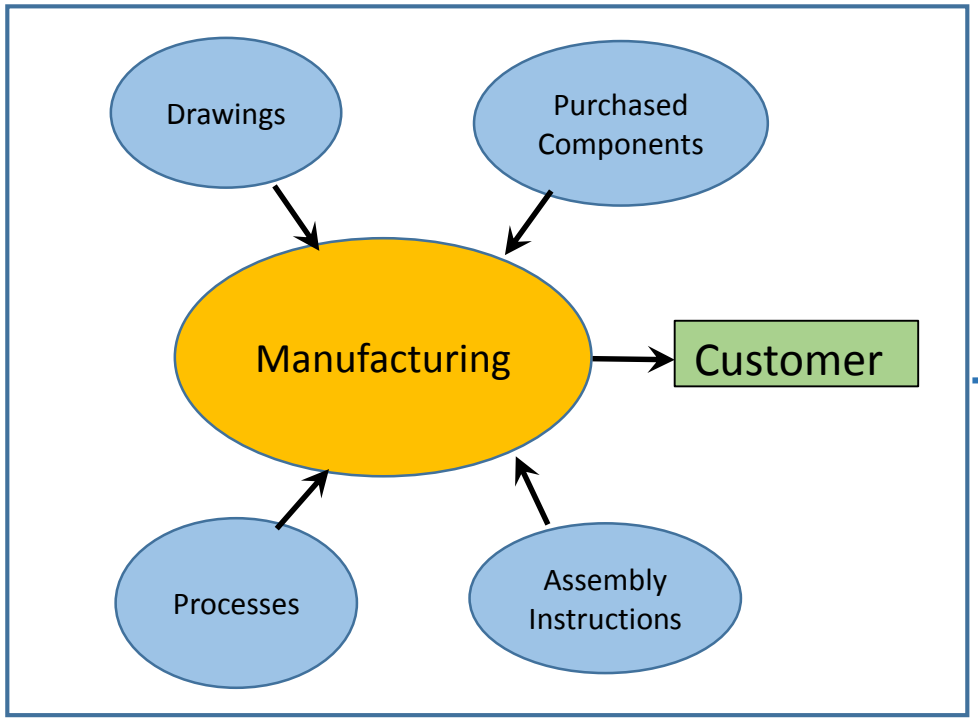
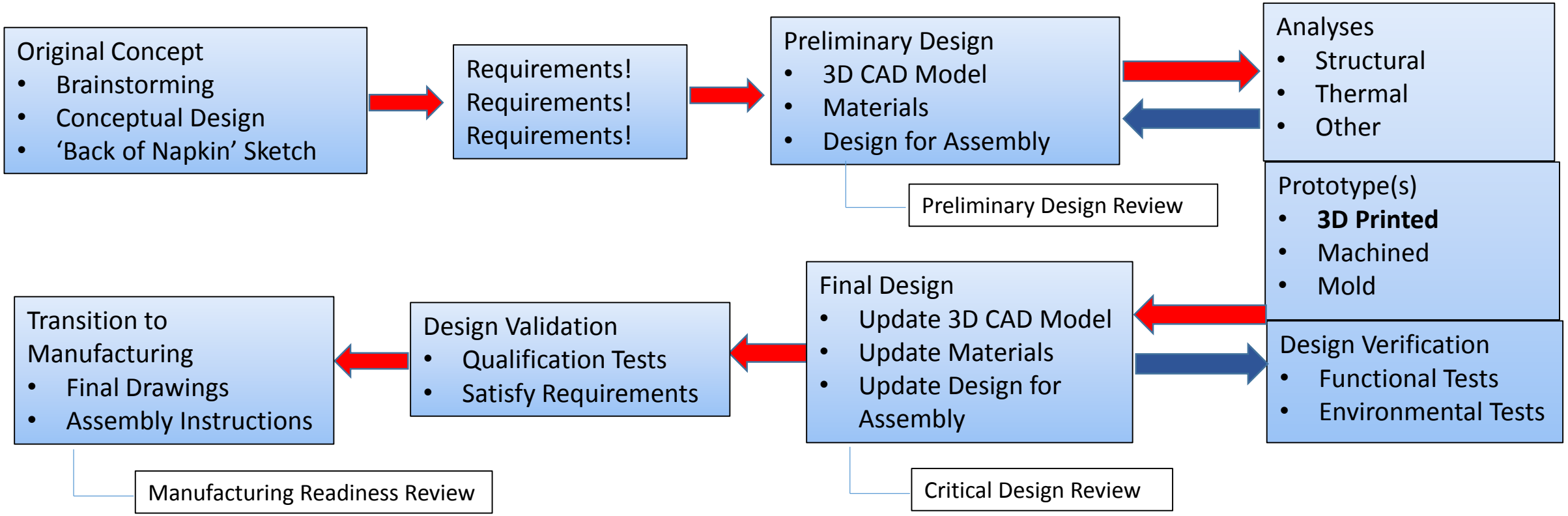


- **Manufacturing**
- Conduct manufacturing readiness review (**MRR**)
  - Assembly Instructions (AIs)
  - Review manufacturing processes
  - Review manufacturing costs
- Transition into manufacturing with “pilot” run
- Parts Procurement
- Tooling
- Production
- Packaging / Delivery

Product Design & Development Methodology



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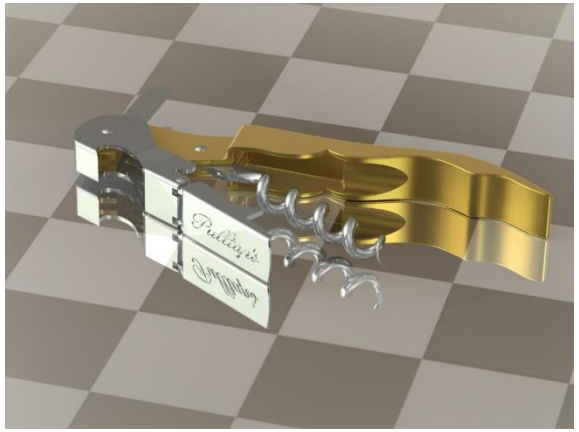
Marketing from your 3D-CAD Design

- Beautiful renderings
  - In appropriate setting
- Animation – viewing enhancement for your clients
  - Spin – turntable type spin or rotate in all axes
  - Demonstrate function
  - Demonstrate assembly
- Create views for patent application



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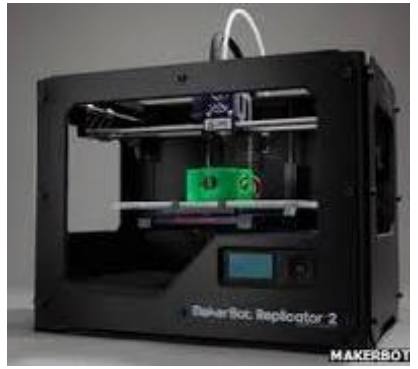
Prototyping Methods

- Machining
  - CNC Lathes, milling machines, sheet metal forming, EDM.
  - Welding, brazing, forming, stamping, laser engravers.
- Molding, Casting
  - Silicon molds for quick low volume product
- **3D Printing** -widely used for start-up companies.
- What is 3D Printing
  - Additive manufacturing as opposed to subtractive manufacturing.
  - More popular types of 3D printing.
    - Fused Deposition Modeling (FDM) – Stratasys tradename
    - Stereolithography (SLA)
    - Selective Laser Sintering (SLS) - 3D Systems tradename
      - Direct Laser Sintering (DMLS)
    - Inkjet Systems and three dimensional printing (3DP)
      - Polyjet



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