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## **GATED DEVELOPMENT PROCESS**

The process of efficiently turning a conceptual idea into a tangible product that meets all the required specifications, and can be serially manufactured cost-effectively, requires solid structure and excellent planning. We structure all of our internal product development activities and external product collaborations using the standard gated development system:

### 1) **Conceptual Design**

Create an accurate *in silico* model for the conceptual solution so that all parties can visualize all aspects of the proposed concept. Reiterate this process until all technical, aesthetic and cost specifications are met. Perform preliminary risk evaluation and establish multiple path scenarios where possible. Identify necessary R&D and create project milestones and schedule. Design review prior to breadboard development authorization.

### 2) **Breadboard Development & Feasibility Testing**

Design concepts implemented in laboratory breadboard setup and tested against specifications. Critical parameters are identified and quantified. Outcome may require concept re-evaluation and/or additional research. Re-evaluate and/or implement changes as necessary. Document feasibility testing in a formal report. Design review prior to prototype authorization.

### 3) **Engineering Prototype**

One or more first article, production-intent products are designed, and manufactured based on Gate 2 results. Operational/Field evaluation testing to specifications is performed including accelerated reliability and lifetime testing. Re-evaluate and/or implement changes as necessary. Preliminary documentation package is released. Design review prior to AME authorization.

### 4) **Advanced Manufacturing Engineering (AME)**

Implement changes identified during Gate 3. Evaluate/refine serial production cost reduction. Define and develop detailed manufacturing methods and procedures including interim and final Testing & Quality Control procedures.

### 5) **Pilot Manufacturing Run**

Establish Pilot manufacturing cell and build small run production lot using Gate 4 documentation package. Test all pilot run products to design specifications. Design review to identify final revisions in design, manufacturing procedures, and quality control procedures. Establish viable insource and outsource production facilities, MOQ run quantities, and production schedules.

### 6) **Documentation Release**

Establish first build quantities and delivery schedule. Prepare formal documentation package and release to manufacturing group(s). Instruction Manuals, Service Manuals, and Marketing documentation are released.

### 7) **Production Release**

Execute first production manufacturing run. Test all production run products to design specifications. Initiate database for statistical quality control. Continuation engineer assigned for revision control, and product management.