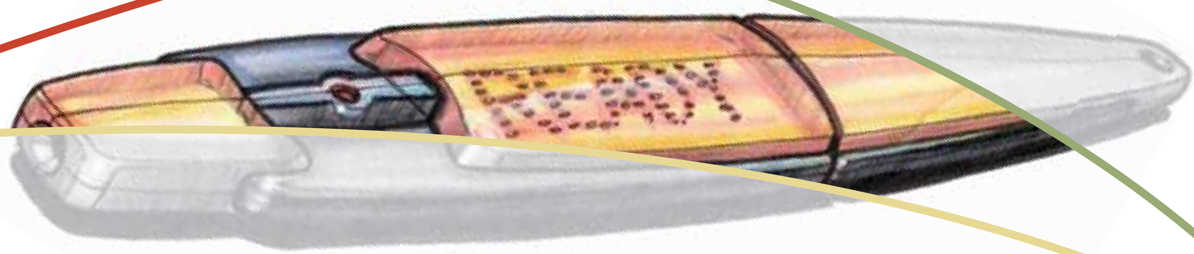
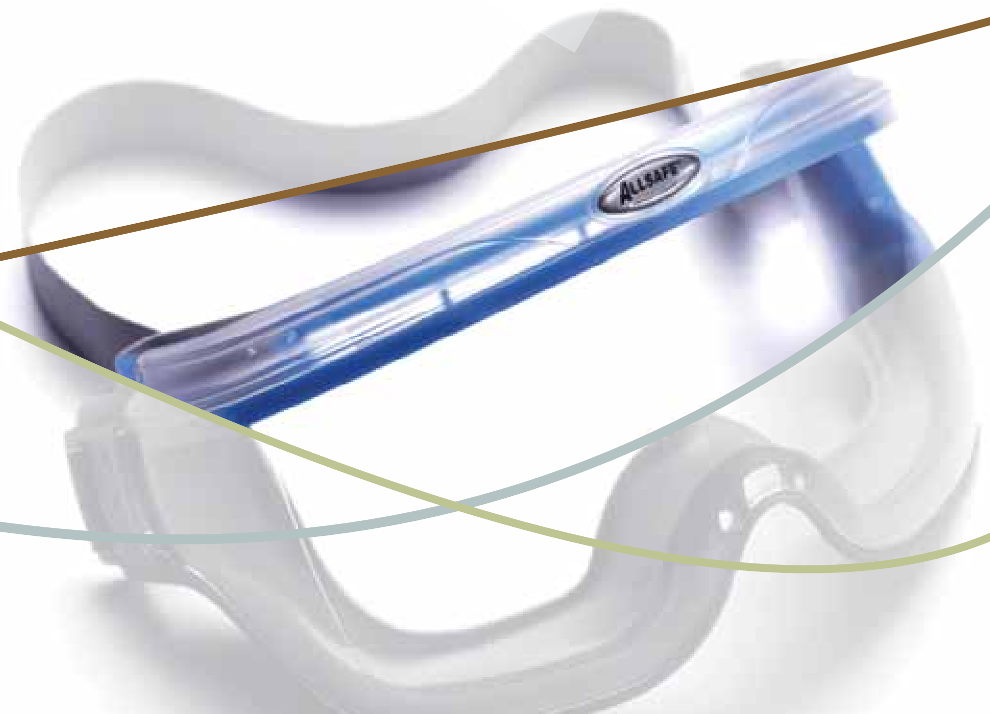


Design Through Distribution: Phillips' Competitive Edge



PHILLIPS PLASTICS CORPORATION®

Design – to plan out in systematic form

Development – process in which something passes by de grees to a more advanced or mature stage

“It’s a speed thing.”

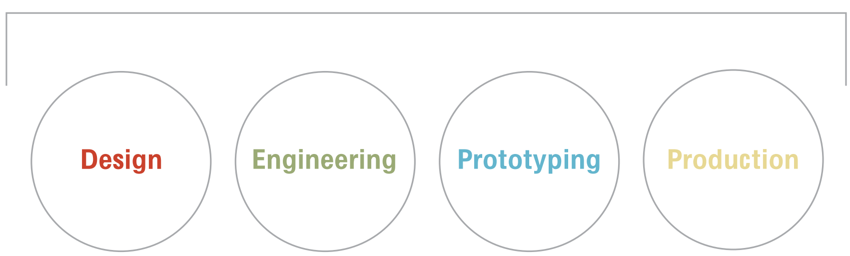
“Technology-focused design enhances the overall product.”

“Time is money.”

You’ve heard it all – emphasizing that today, it is becoming increasingly important for original equipment manufacturers to be involved, as early as possible, with a partner that can provide industrial design and design for manufacture services along with manufacturing through distribution capabilities – and all under one roof.

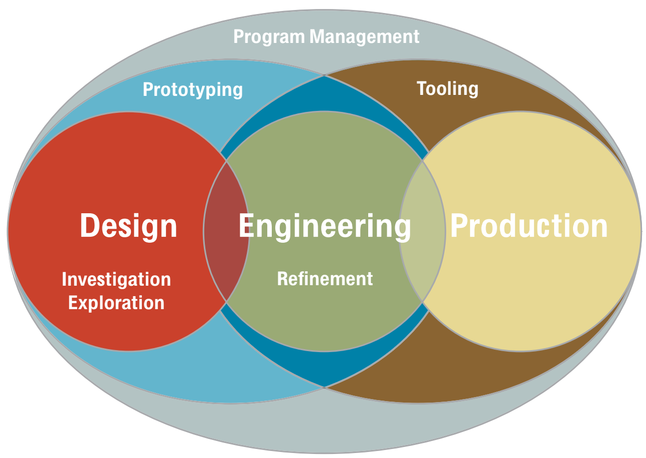
The in-house design development team at Phillips Plastics Corporation® provides full-service capabilities which support the earliest possible involvement in the development process. When involved early enough in the process, Phillips’ development team is able to create solutions that result in the highest possible quality, reduced program costs, shorter time-to-market, and greater total program value. In addition, Phillips’ team will partner with independent or in-house design firms as the manufacturing provider to aid in designs which are optimum for manufacture of complex processes such as multi-shot molding, magnesium injection molding, and metal injection molding.

Traditional Development Process

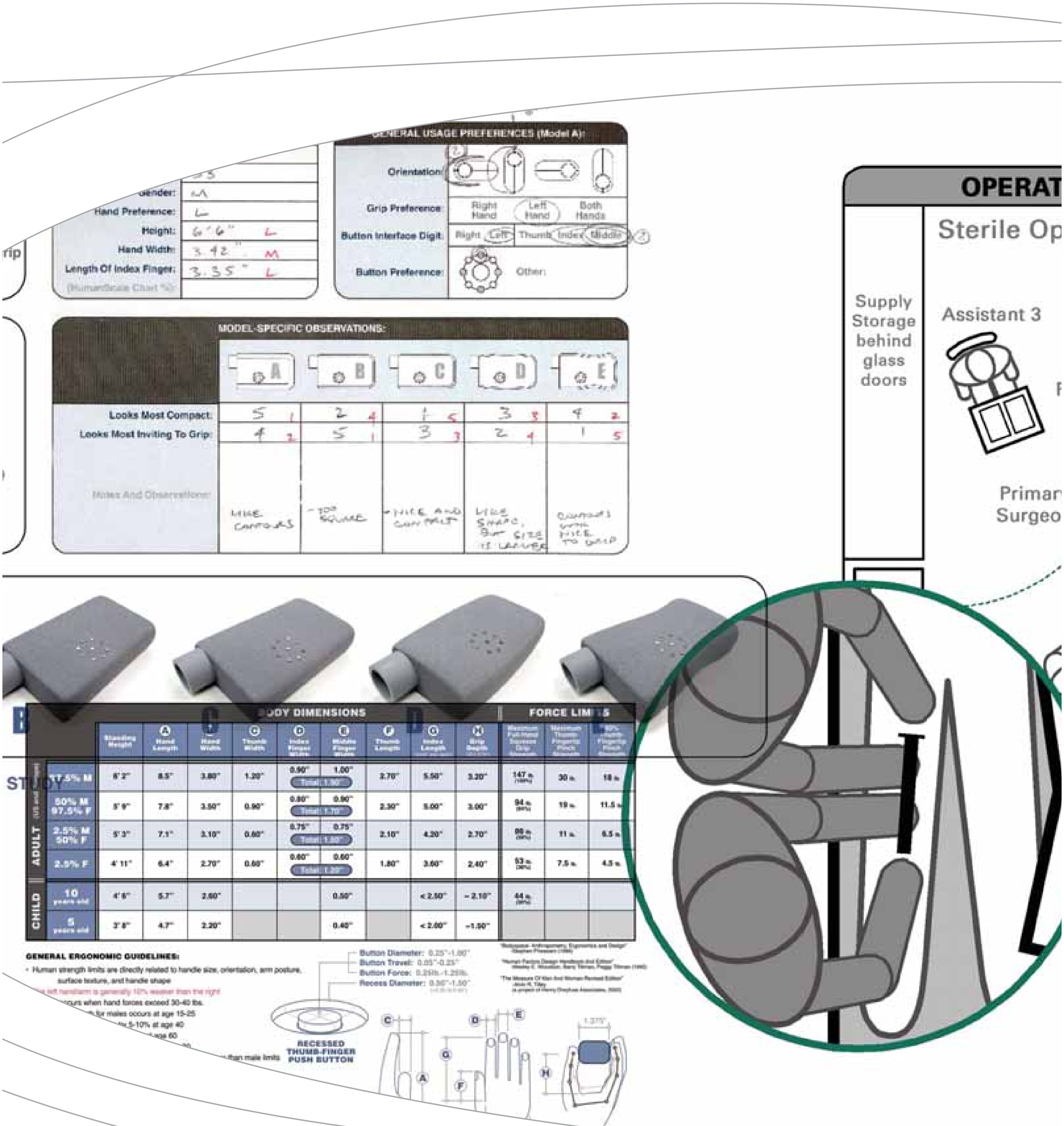


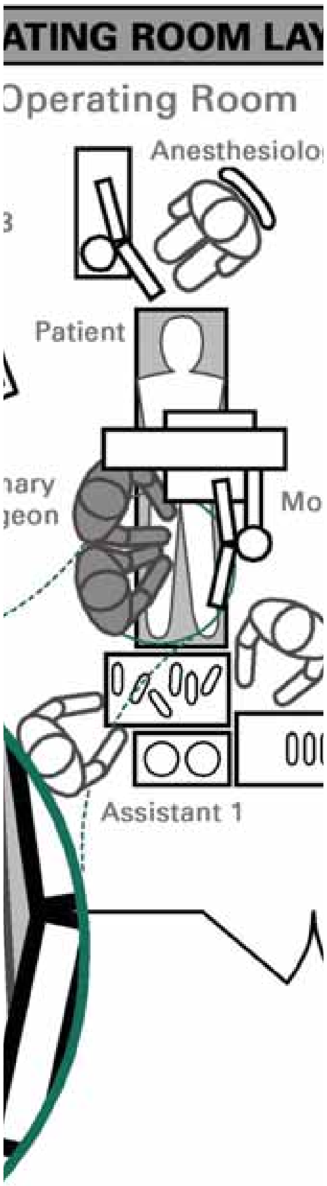
The traditional development process involves distinct phases – design, engineering, prototyping, and production. Most often these steps take place sequentially, and some duties are performed by separate companies. As a result, the traditional process can lend itself to disconnect, extended lead times, and higher overall program cost.

Phillips Plastics' Integrated Development Process



At Phillips Plastics Corporation®, the process is accelerated due to the in-house, cross-functional team involvement throughout the phases of the development process.


GENERAL USAGE PREFERENCES (Model A):
Orientation:
Grip Preference:
Right Hand
Left Hand
Both Hands
Button Interface Digit:
Button Preference:
Other:
Gender:
Hand Preference:
Height:
Hand Width:
Length Of Index Finger:
MODEL-SPECIFIC OBSERVATIONS:
Looks Most Compact:
Looks Most Inviting To Grip:
Notes And Observations:
OPERAT
Sterile Op
Supply Storage behind glass doors
Assistant 3
Primar
Surgeo
BODY DIMENSIONS
FORCE LIMITS
ADULT
CHILD
GENERAL ERGONOMIC GUIDELINES:
RECESSED THUMB-FINGER PUSH BUTTON

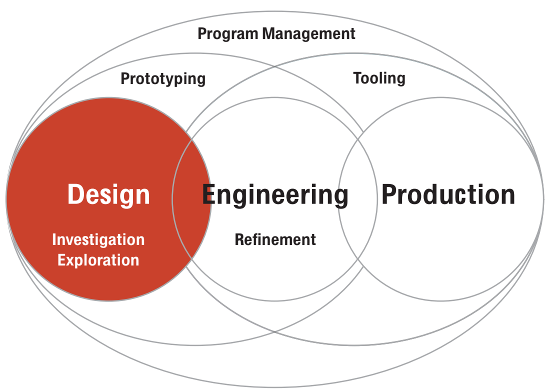


Investigation

During the investigation phase, the goal is to establish project guidelines and uncover user needs. This phase precedes every development program and is essential in gathering and documenting information for the program.

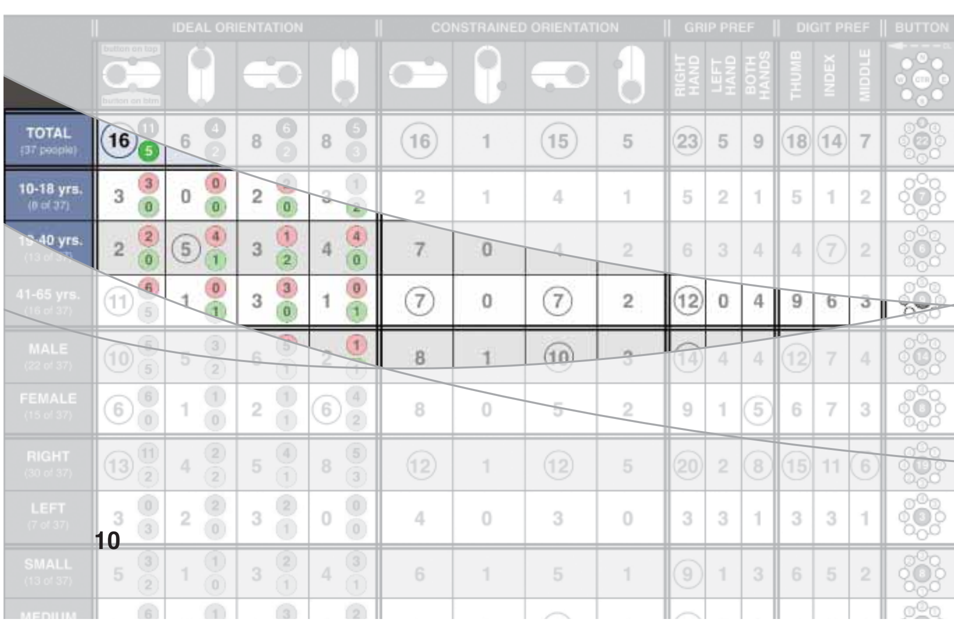
Typical Activities in the Investigation Phase:

- Assemble cross-functional teams
- Conduct analogous and competitive product research
- Conduct user observation and feedback activities
- Ergonomic analysis
- User interface studies
- Visual trends mapping
- Contextual observations

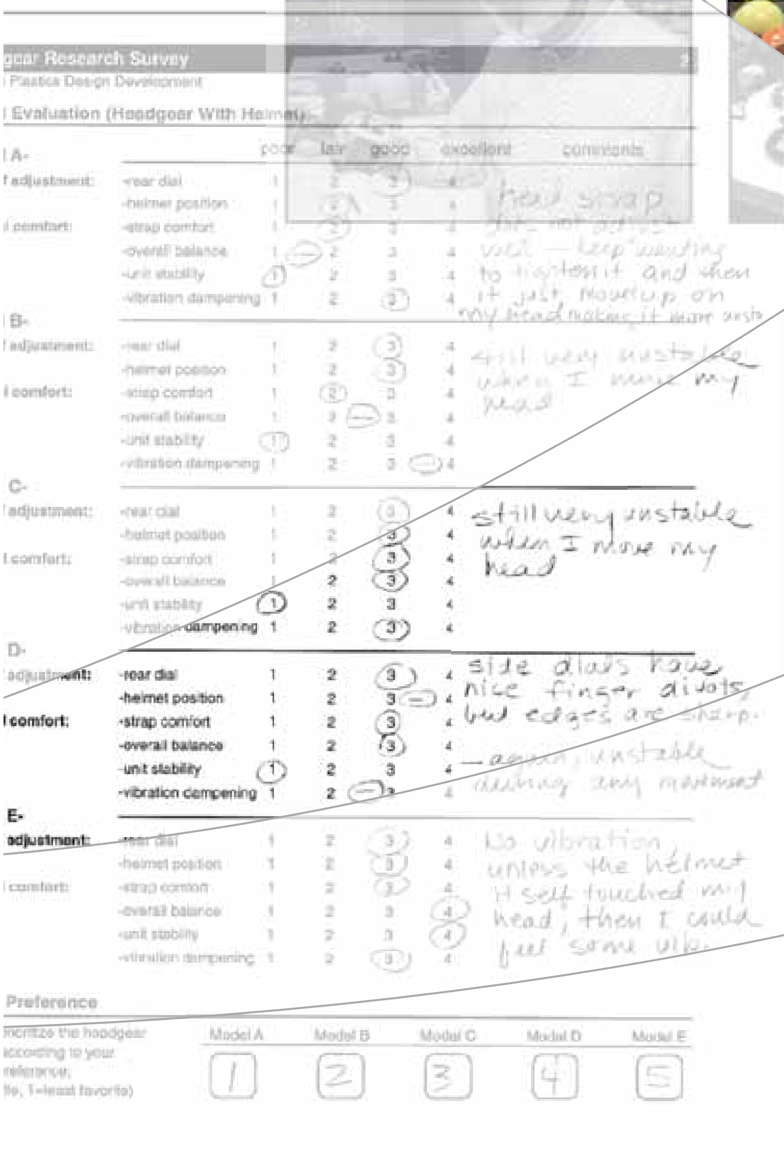


“Fully utilizing Phillips’ design capabilities cannot be oversold.”

Steve Ruskewicz, Director of Mechanical Engineering,
Aradigm Corporation



HEADGEAR EVALUATION AND DATA COLLECTION




LENS SAGS
OVER FRAME

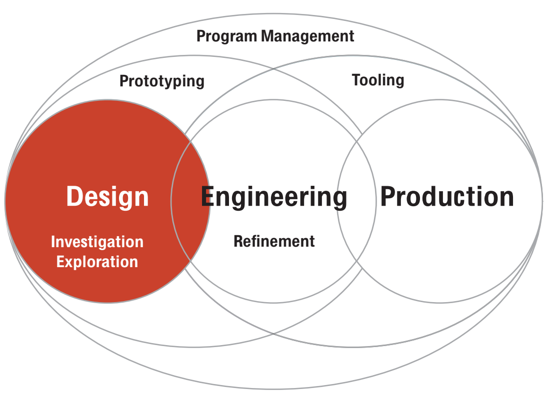

central cable exit location emphasizes vertical theme
high-gloss front surface of window consistent with patient programmer appearance
stacked button layout provides for sequential interface, icons coupled with text to clarify button functionality
majority of window is masked on back side by printed or in-mold graphics, LCD window remains clear

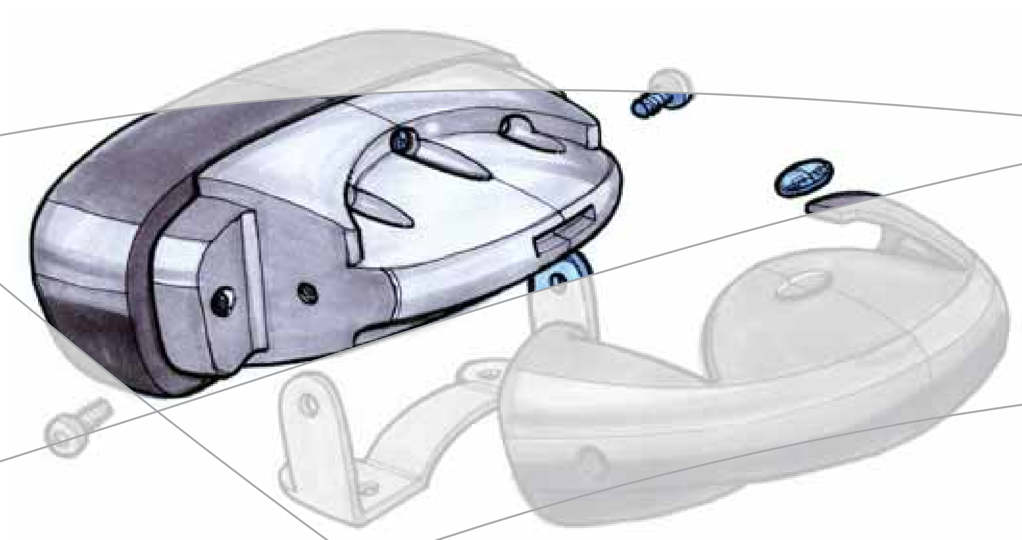
Exploration

Often referred to as concept ideation or concept generation, the exploration phase involves defining the concept direction for the program.

Typical Activities in the Exploration Phase:

- Brainstorming
- Concept ideation
- Manufacturing option exploration
- Physical model construction
- Develop two-dimensional orthographic and cross-sectional studies
- Create preliminary three-dimensional CAD models

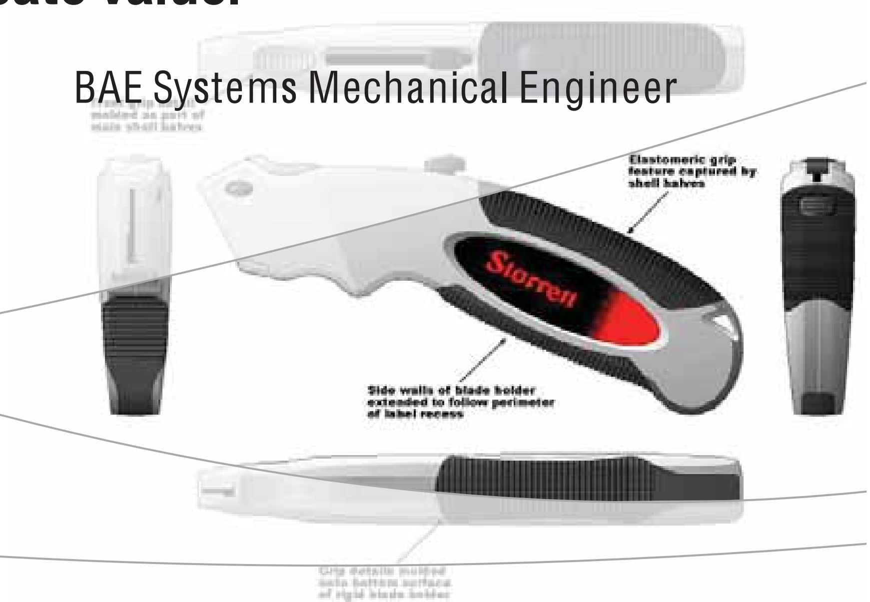


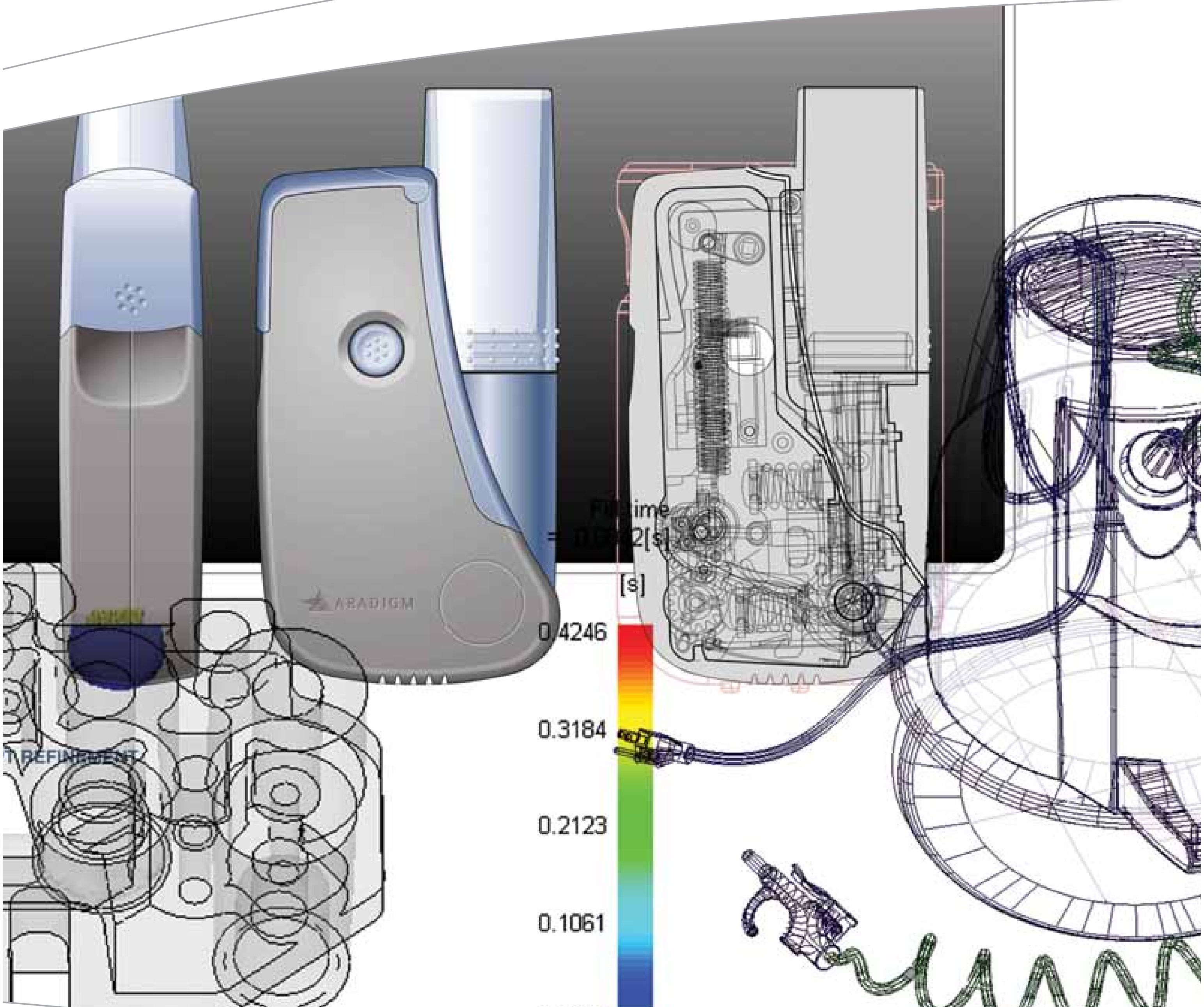


Concept Illustration	Concept Description	Pros	Cons	Cost E
Gizmo A	• front shell, rear shell, battery door, bezel, volume dial molded in opaque PC-ABS • polycarb LCD window • silicone keypad • pad printed logo	• low tooling cost • low part cost • moderately simple assembly • soft tactile feel on buttons • durable assembly • water resistant keypad gasketing	• low perceived value • high part count • target market demands not satisfied	Molded Components Purchased Components Secondary Operations Enclosure Assembly TOTAL
Gizmo B	• front and rear shells molded in translucent PC-ABS blend • battery door, bezel, volume dial molded in opaque PC-ABS • electroplated bezel and buttons for (chrome finish) • polycarb LCD window • pad printed logo	• low tooling cost • moderately simple assembly • individual button actuation	• high part cost • high part count • lack of keypad gasketing	Molded Components Purchased Components Secondary Operations Enclosure Assembly TOTAL
Gizmo C	• front and rear shells overmolded with soft-touch Santoprene (PC-ABS base material) • battery door, bezel, volume dial molded in opaque PC-ABS • polycarb LCD window with in-mold graphic applique • integral keypad buttons	• high perceived value • low part cost • low part count • simple assembly • highly gripable enclosure • water resistant keypad gasketing • no secondary ops	• very high tooling cost	Molded Components Purchased Components Secondary Operations Enclosure Assembly TOTAL
Gizmo D	• front and rear shells overmolded with soft-touch Santoprene (PC-ABS base material) • battery door, bezel, navigation keys,volume dial molded in PC-ABS • polycarb LCD window • paint/laser-etch backlit keypad buttons	• very high level of perceived value • aggressive design appeals to targeted market • highly gripable enclosure • "cool" factor	• high tooling cost • high part cost • high part count • moderately difficult assembly • minimal keypad gasketing	Molded Components Purchased Components Secondary Operations Enclosure Assembly

"Phillips Plastics is a proactive supplier that strives to engage with the customer early in the design and development process and remains engaged to communicate openly, provide quality data from Phillips' processes, and seeks opportunities to improve responsiveness, reduce cost, and create value."

BAE Systems Mechanical Engineer




ARADIGM
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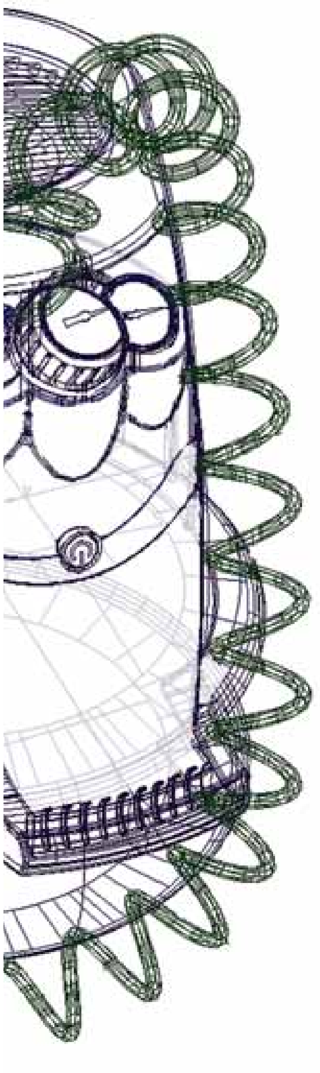
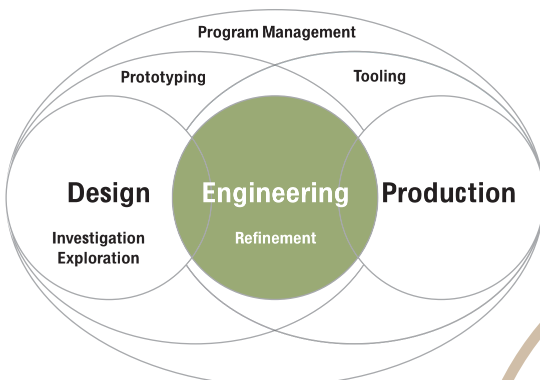


Refinement

In the refinement phase, a virtual and physical representation of the established concept direction is developed with a focus on designing for manufacture and assembly.

Typical Activities in the Refinement Phase:

- Finalize manufacturing approach and molding requirements
- Develop three-dimensional database
- Prepare preliminary cost estimates
- Conduct proof of concept user observation and feedback analysis
- Material selection
- Conduct Moldflow® and finite element analysis (FEA) evaluations
- Create functional models
- Conduct team design reviews
- Conduct mechanical testing

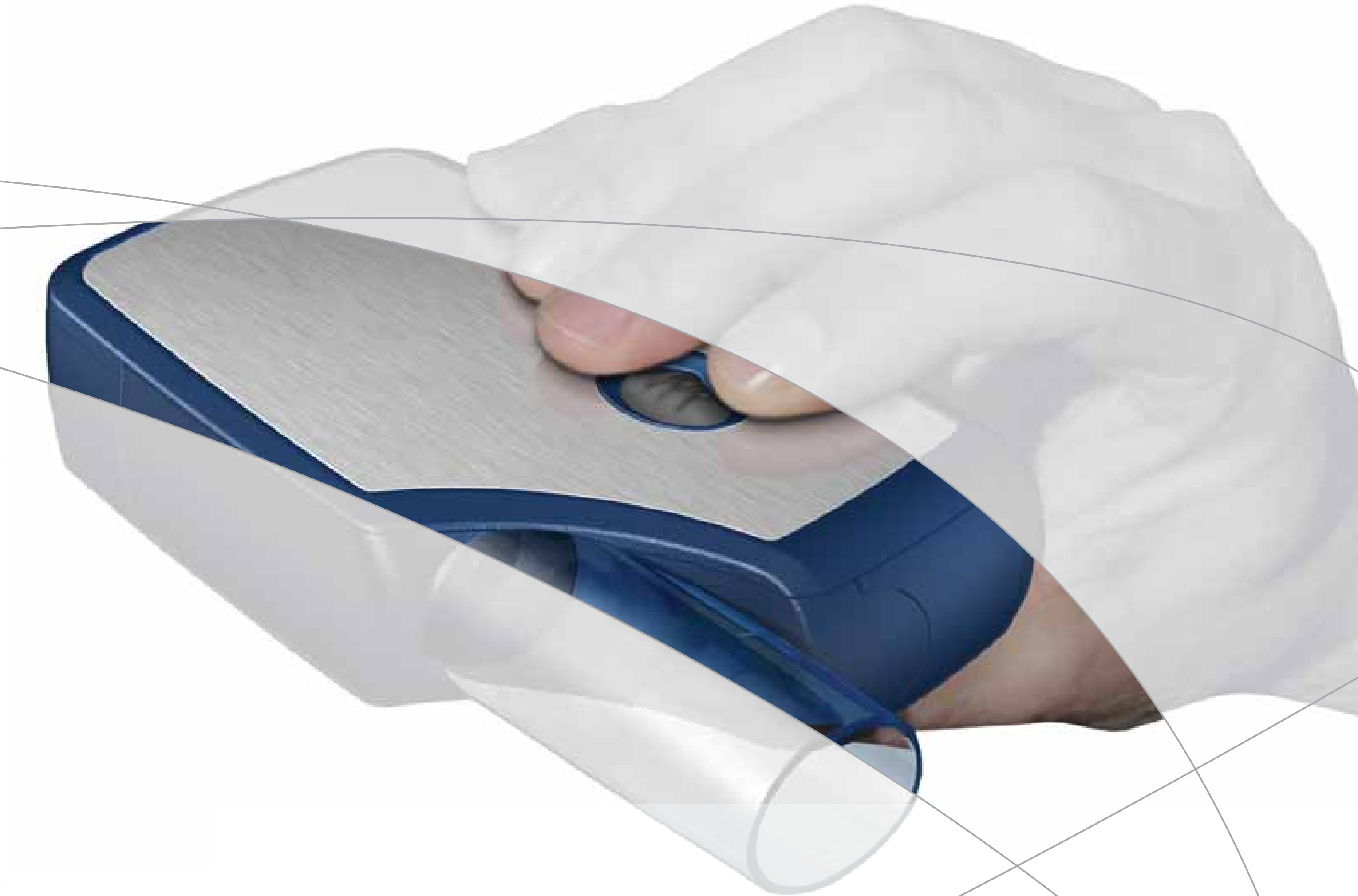


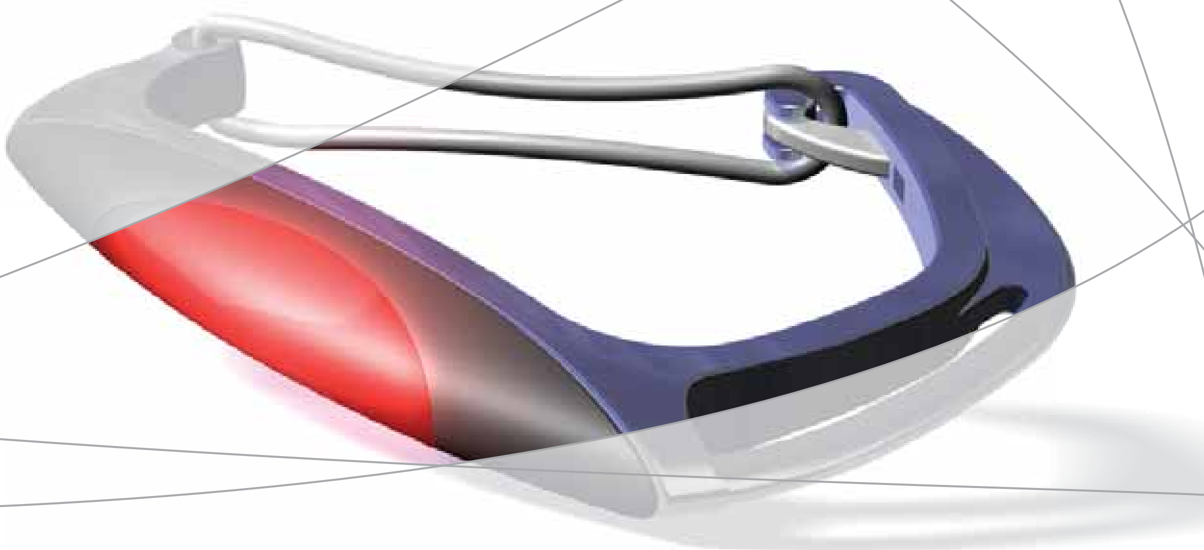
The Lab

Offering yet another service for customers during the development phase of their program, The Lab at Phillips Plastics provides testing capabilities to evaluate your product's intended performance in the marketplace. From functional and material testing to temperature, drop, and immersion testing, Phillips' test engineers are specialists in their field. With state-of-the-art test equipment under the same roof as industry leading advanced development technologies at the Company's Design Development Center, design changes can quickly be made in response to test results, saving valuable time and overall program costs. In addition, Phillips' test engineers collaborate with independent test labs and other in-house resources to augment The Labs' capabilities to suit the needs of the customer.

“Phillips’ lead designer worked with me on a daily basis to make sure our design could be manufactured. Phillips clearly supported the look we wanted, and in their surface data work, kept the design we provided.”

Chris Barrow, Industrial Designer, Insync Design





Prototyping

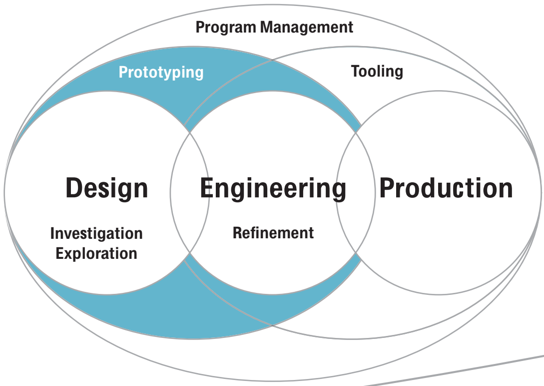
Prototyping solutions are utilized to verify fully developed concepts for manufacturability, facilitate extremely accelerated verification time frames, and can help achieve significant reductions in development costs. Phillips Plastics' prototyping capabilities provide the following: proof of concept and performance; user and time studies; verification of production manufacturing assembly lines; engineering builds; fit, form, and function testing; and clinical trials. Working with Phillips' engineering services will help ensure you choose the best prototype option for your program.

Various Prototyping Options Offered by Phillips Plastics:

- Models – Machined, cast urethane, stereolithography (SLA), and fused deposition modeling (FDM)
- Level 1 Prototype – RPTech™ when you "need parts fast"
    - Part area up to 70 in^2 aluminum or P-20, manual side actions
- Level 2 Prototype
    - Allows more complex geometry and larger part sizes than RPTech
    - Aluminum or P-20, manual, or automatic side actions
- Level 3 Prototype – Market-entry/pilot
    - A great option for low volume or scaling up for high volume
    - P-20 or hardened steel, automatic side actions

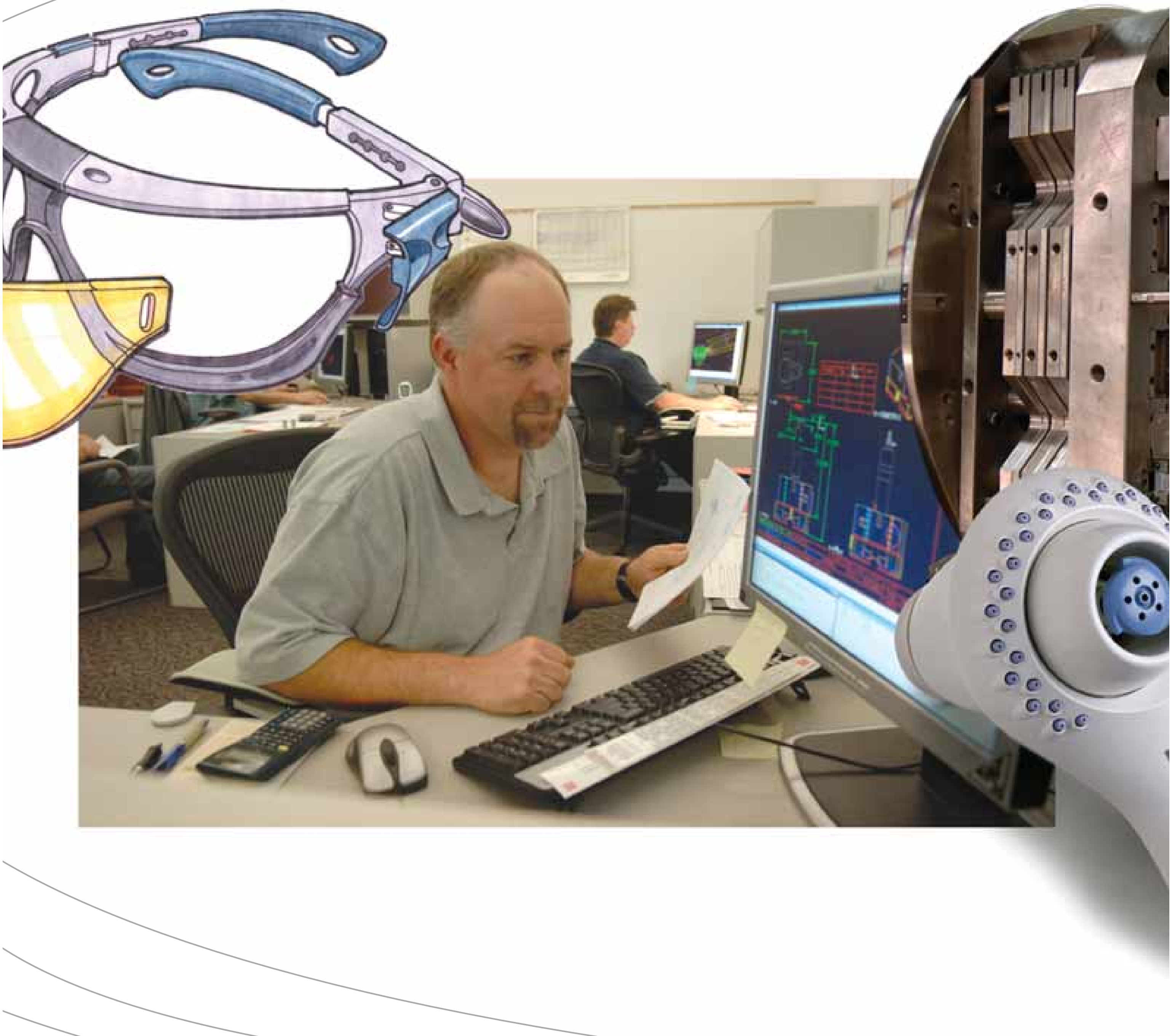
Pre-Pilot/Development

During the pre-pilot or development phase of the product life cycle, Phillips supports limited runs while multi-cavity tools are being manufactured at one of the Company's manufacturing facilities. Developmental resources are always available to support these lower volume runs, providing flexibility, while saving time and money before production tool steel is cut.



“This is going to improve our time-to-market and save us money because we were able to prototype this for considerably less than we could build a mold.”

Nate Nearman, Design Engineer, Daktronics

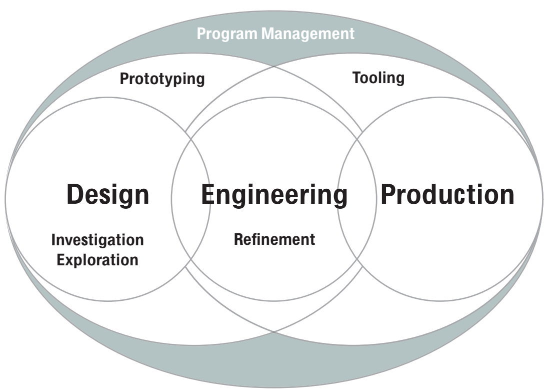


Program Management

Phillips Plastics' program management offers an efficient conduit for communication by utilizing cross-functional experts facilitating shortened time-to-market. Cohesive customer/supplier partnerships are formed to determine alternative solutions for part design optimization and cost-saving manufacturing opportunities.

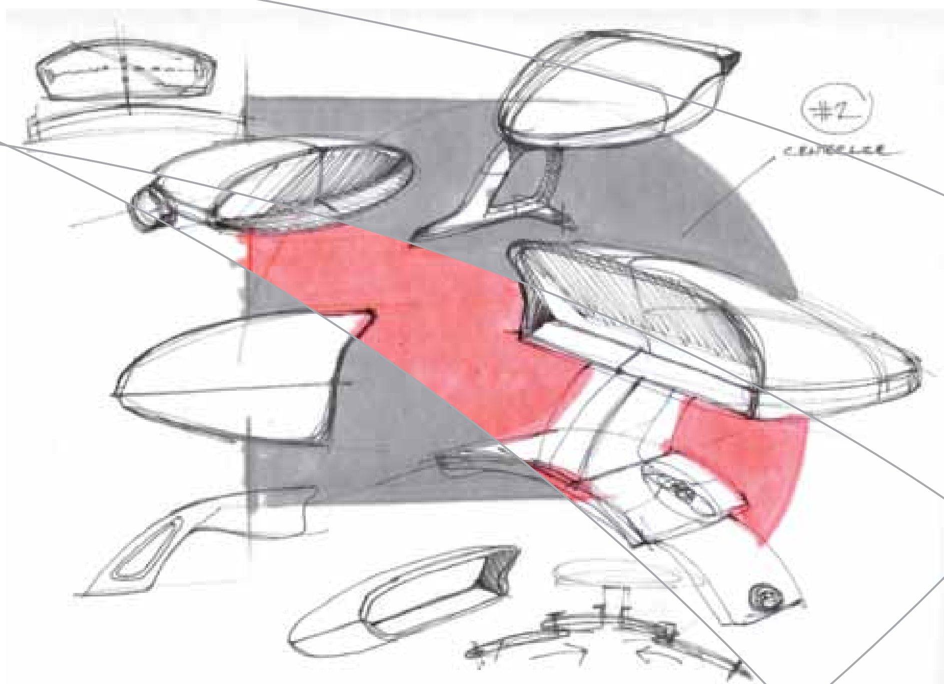
Phillips Plastics' Program Managers Provide:

- Seamless flow-through from concept to production
- Coordination and support of programs that may involve multiple tools, technologies, and facilities
- Efficient internal and external communication
- Primary customer contact for overall program specifics
- Global, customer-oriented perspective
- Cross-functional teams including customers, designers, engineers, manufacturing, and suppliers



"I had prior experience with Phillips and they are a first class supplier. Phillips was engaged early in the product design process. This ensured that we achieved the most effective component and system design with respect to design for manufacturability and assembly (DFM/DFA), process control, and component cost. Phillips is a one-stop-shop and the Company's diversified capabilities were a huge benefit to us."

Kevin Schmid, Vice President of Manufacturing, Insulet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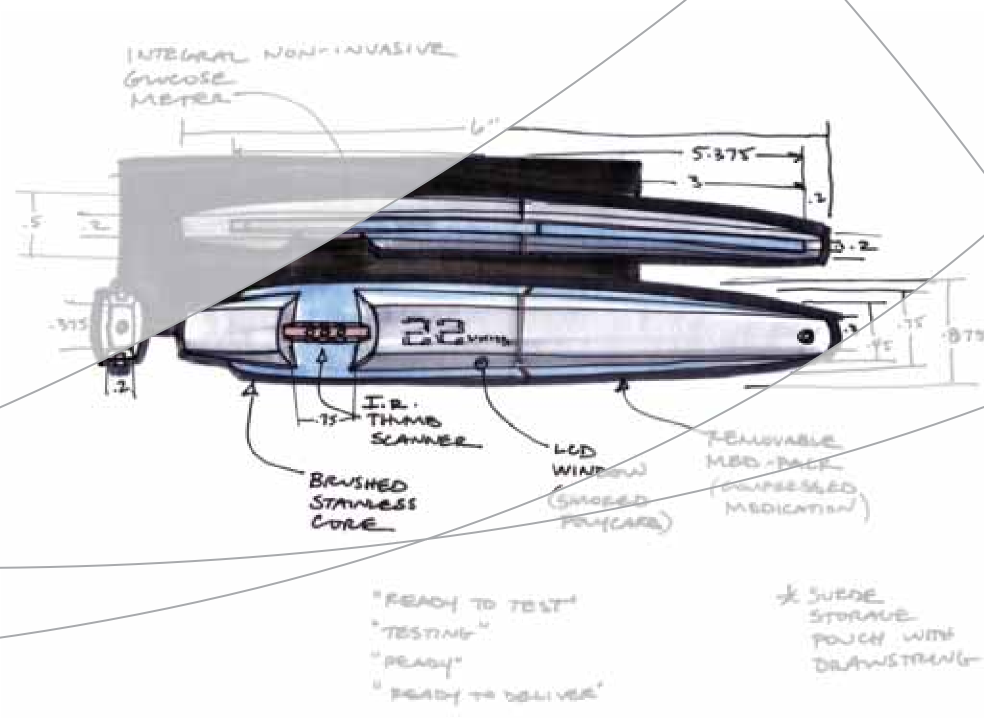

INTEGRAL NON-INVASIVE GLUCOSE METER
I.R. THUMB SCANNER
BRUSHED STAINLESS CORE
LCD WINDOW (SMOKED POLYCARB)
REMOVABLE MED-PACK (COMPRESSED MEDICATION)
"READY TO TEST"
"TESTING"
"READY"
"READY TO DELIVER"
SUEDE STORAGE POUCH WITH DRAWSTRING

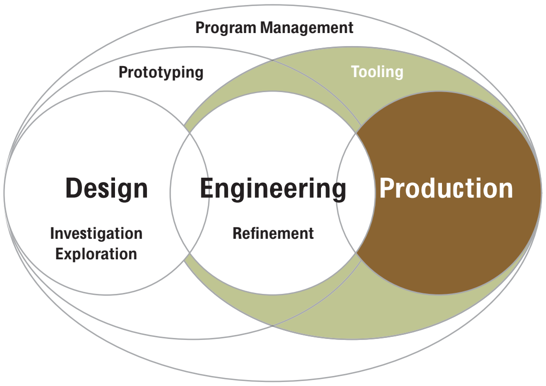

QuikSpin

Tooling/Production

Understanding the value of having a single source providing development through production services under one roof, Phillips offers cross-functional experts in the areas of tooling and production to ensure that components are tooled and molded to the highest quality and lowest cost possible.

During all phases of the process, the ultimate focus is to design and build quality production tooling in the least amount of time at a competitive cost. This will enable the best components and, ultimately, products. Tooling capabilities include rapid prototype, market-entry, and production tooling.

The production phase encompasses injection molding of plastic and metal from high or low volume production, large or small parts, and market considerations. Products are designed for manufacture and a refined manufacturing process ensures the highest level of quality and process repeatability.



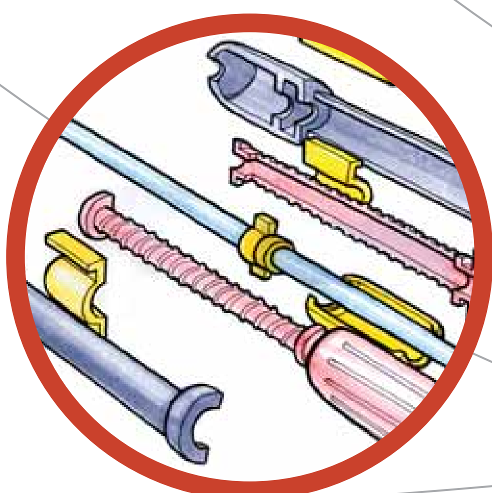
“[Phillips] understands their field very well, and [they] have tremendous expertise for manufacture and assembly of parts. Our group has a great appreciation for the need to design for manufacturing from the beginning, at the ‘back of the envelope’.”

Bill Atkinson, Director, Project Management,
Fallbrook Engineering

The Process

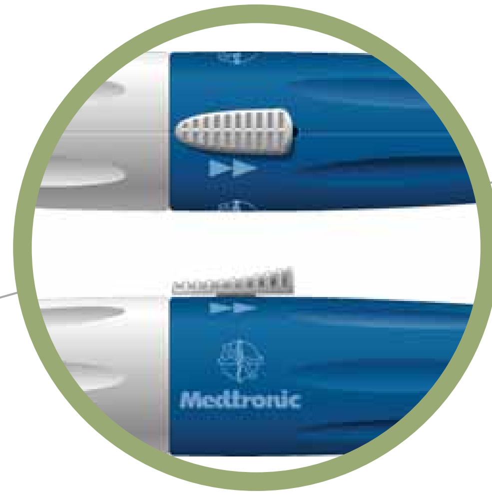
Investigation

- Team Creation
- Design Input – Product Specification
- Research: Ergonomics, User Interface, Visual Trends, and Contextual Observation



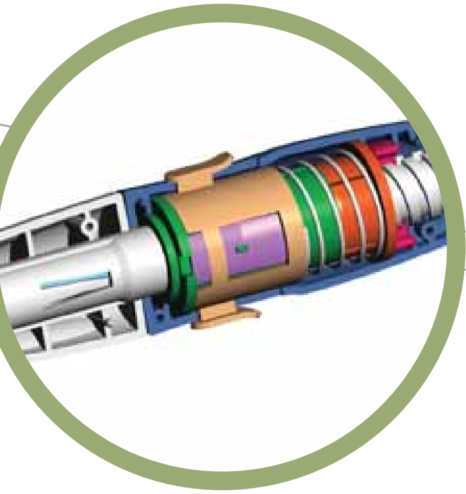
Exploration

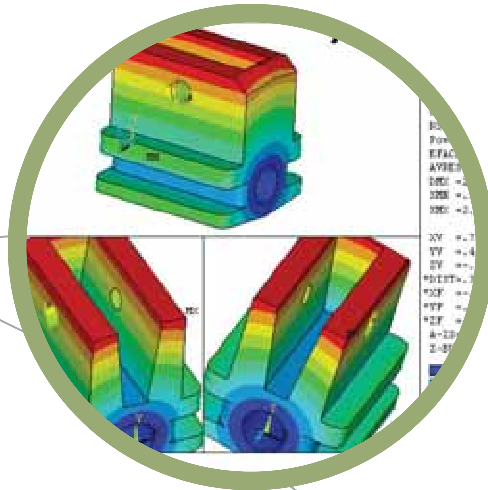
- Brainstorming
- Manufacturing Options
- Concept Ideation: Sketches, 2D Illustrations, and Foam Models



Refinement

- Concept Revisualization
- Manufacturing Method
- Finalization
- Concept Definition: Preliminary 3D CAD, Appearance Models, Preliminary Cost Estimation, Value Assessment, and Animation



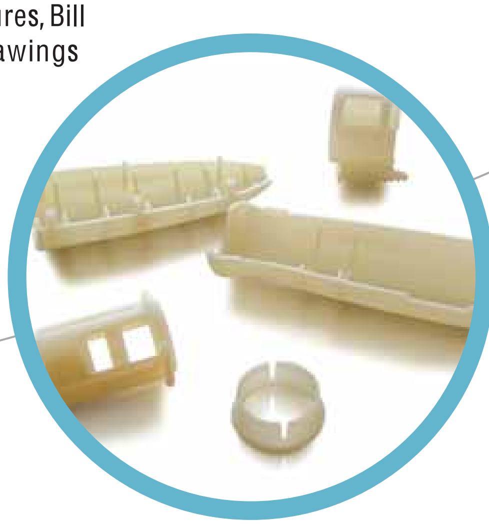


Design Verification

- Moldflow® Studies
- Finite Element Analysis (FEA)
- Physical Product Testing

Database Development

- Material Selection
- Cost Estimation
- Design Implementation: Detailed Part Design, Assembly Features, Bill of Materials, and Control Drawings



Prototyping Options

- Stereolithography (SLA)
- Machined Models
- Urethane Castings
- RPTech™
- Market-Entry Tooling

Tooling/Production

- Tooling capabilities include rapid prototyping, market-entry, and production tooling
- Overseas tooling resources
- Injection molding of plastic, metal, ceramic, and silicone
- High and low volume capabilities
- Micro to large components

Design Through Distribution: Phillips' Competitive Edge

- Molding capabilities including high and low volume molding, micro molding, insert molding, medical molding, metal injection molding, magnesium injection molding, multi-shot molding, ceramic injection molding, and silicone injection molding
- Materials evaluation, analysis, and testing
- Value-added services: assembly, packaging, and sterilization
- Secondary decorating
- Secondary operations
- Tooling
- RPTech™ (Rapid Process Technologies) – rapid tooling when you need parts fast, with lead times measured in days
- Extensive internal resources resulting in a one-stop-shop and expertise in all phases of design for manufacture and design for assembly
- Compatibility and availability of Alias, Ashlar Cobalt, CATIA® V5, PTC – Pro/ENGINEER, UGS – NX, SolidWorks
- Simulation analysis experts utilizing Moldflow® and ANSYS® software
- Project management offering seamless communications from cross-functional teams and a primary contact for customers
- Established in 1964, Phillips Plastics is a privately held custom injection molder of plastic, ceramic, silicone, and metal
- Phillips Plastics is a technology driven Company, providing contract manufacturing services to original equipment manufacturers in the medical, automotive, appliance, telecommunications, consumer electronics, industrial, defense, and recreational markets
- Phillips Plastics employs more than 1,600 people; supported by a network of 814 production people, 31 quality assurance people, 20 designers, 166 engineers (includes design, process, and manufacturing), and 115 toolmakers (includes tool managers, coordinators, team leaders, mold makers, mold polishers, machinists, jig and fixture, EDM specialists, and apprentices)
- Total number of presses is 228, ranging in tonnage from 0.44 to 935
- Phillips Plastics consists of 14 locations throughout the United States, occupying over 718, 737 square feet, with total manufacturing square footage equaling 333,658 square feet
- Facilities are certified to TS 16949:2002, ISO 14001, ISO 13485:2003, and ISO 9001:2000. Our medical facilities are registered with the FDA for medical device manufacturing and/or drug packaging. Facility certificates will be supplied upon request

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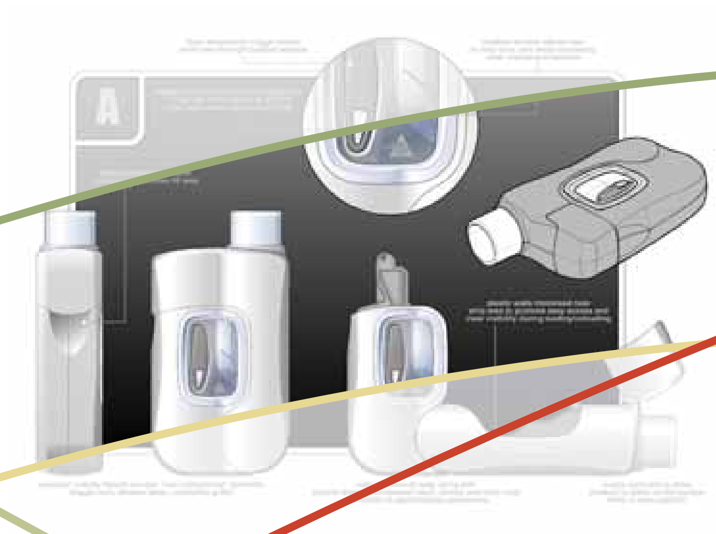
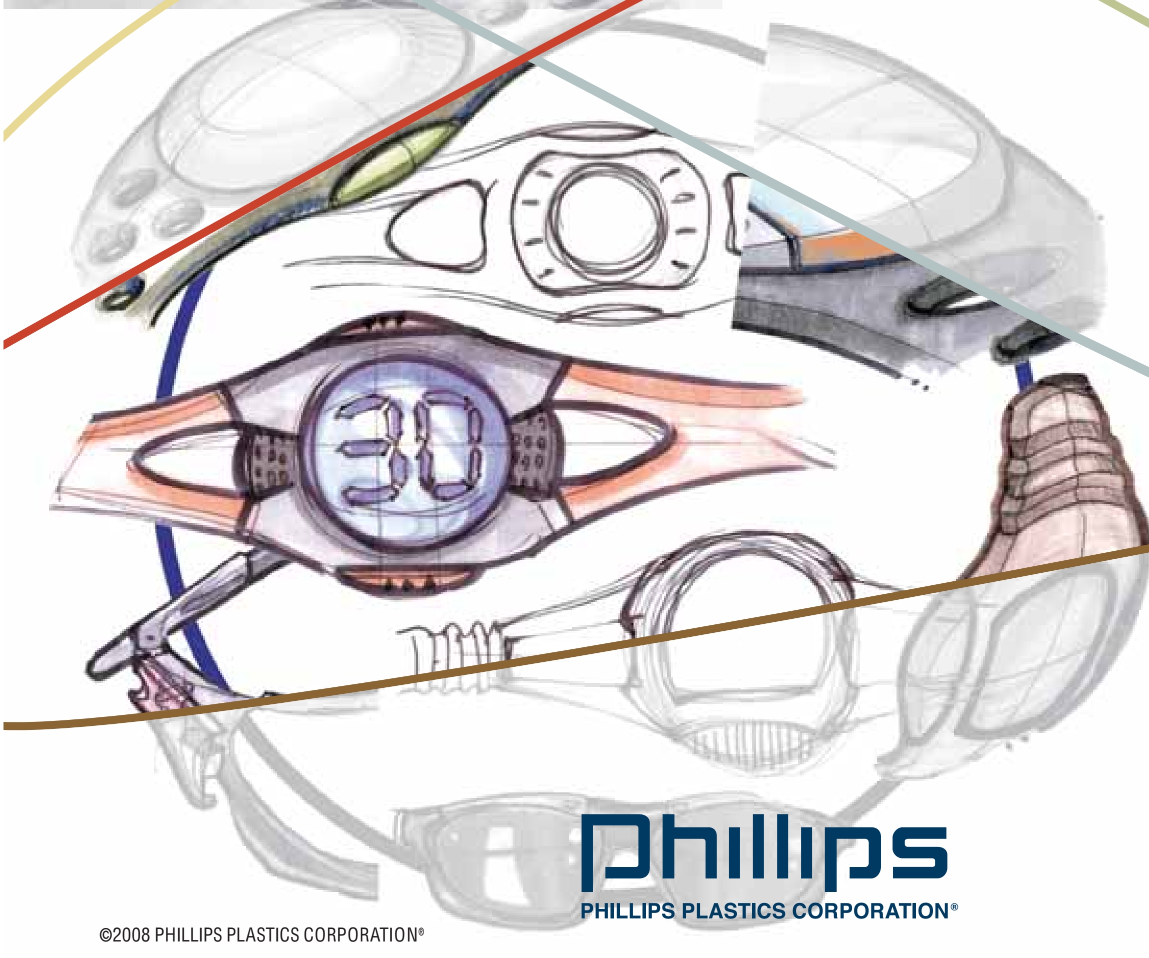
877.508.0257

phillipsplastics.com





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