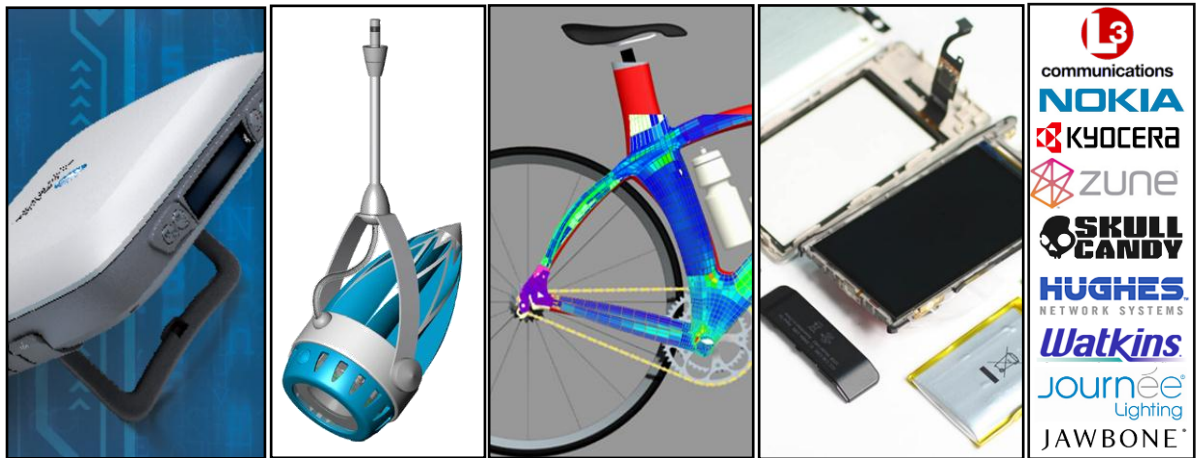


Quartus Engineering Incorporated was founded in 1997 to provide quality advanced engineering services. Quartus specializes in the design and analysis of aerospace and mechanical systems using computer-aided technologies. We are committed to serving the needs of the engineering community in a timely and cost effective manner.



## Quartus Engineering, Product Design

Understanding product requirements and providing quick, cost effective solutions are strengths of Quartus engineers. Whether your project is just starting with a napkin sketch and you need a working prototype or your demanding schedule requires a few extra hands, Quartus can make your product a reality.

Quartus provides 2D and 3D documentation for detailed parts (whether they are molded, machined, turned, formed, stamped, composite layups, weldments) and assemblies. GD&T tolerancing assures that your drawings accurately communicate design intent and meet industry standards. Our engineers are experts in all industry leading CAD packages to help you create models and drawings in your native software to quickly meet your product development timeline.

With experience transforming ideas, requirements, and materials into a manufacturable product, Quartus can turn a bill of materials, a form factor, and a cost target into a product that reliably meets your goals. What sets us apart? Quartus engineers have extensive knowledge in:

- Trade Studies
- Material Selection
- Risk Assessment
- PWB Architecture and layout
- Accessory Interfaces
- Tolerance Analysis

- Tooling Design
- Advanced Surfacing Techniques
- DFMA
- Final Fit and Finish
- Product Qualification
- Global Vendor Selection, Development and Auditing

## Satellite DSL Model

### CHALLENGE

Hughes was contracted by Thuraya to develop a mobile satellite terminal that packs high bandwidth with streaming capability into a package half the size of a laptop computer.

### SOLUTION

#### DESIGN FOR MANUFACTURING

Quartus Engineering was brought onto the Hughes team to develop injection molded plastic parts that safely protected all the electronic components and met form and function needs. Quartus drew upon its experience to negotiate requirements between the industrial designers, electrical engineers, and manufacturers and turn the concept into a viable product. In addition to transforming the bill of materials into a working design, Quartus also selected connectors and other hardware components to meet the changing requirements throughout the design cycle.

#### WITHSTAND SEVERE ENVIRONMENTS

The ThurayaIP must work in the most demanding of conditions that include extreme heat, cold, and rain. Quartus Engineering utilized advanced injection molding packaging techniques to guarantee the product not only survives these environments, but is fully functional and will meet product warranty specifications. Our engineers drew from our relationship with component manufacturers to select the highest quality components capable of meeting these demanding environmental requirements while maintaining Hughes manufacturing cost targets.

### RESULT

The ThurayaIP, built to operate in the most demanding environments, delivers high-quality video and large file transfers throughout Thuraya's satellite coverage footprint in Europe, the Middle East, and Africa.

**HUGHES** Connect to the future.®



## Telecommunication Test Equipment

### CHALLENGE

Tempo wanted to deliver a new and exciting product that met the growing needs of technicians diagnosing and maintaining telecommunication equipment.

### SOLUTION

#### DEVELOPING A PACKAGING PLAN

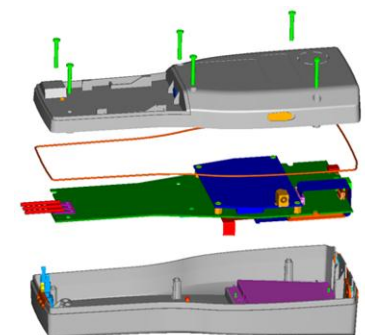
Tempo did not have mechanical engineers staff available for the Sidekick® Plus product and management hired Quartus to deliver a package meeting form and function requirements. The electrical engineering team generated an (electrically) functioning prototype but incorporated nothing to house the components. Quartus needed to turn the bill of materials into a new product that fit the same family look as the Sidekick II. Quartus engineers also needed to design the product to be rugged enough to survive a drop from a telephone pole.

#### COORDINATE DESIGN AND MANUFACTURING

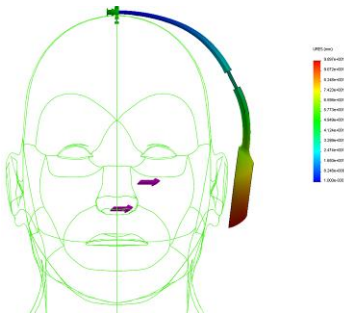
Quartus utilized a rough design concept and generated CAD based industrial designs, catered to their target market, for Tempo® to pick from. Tempo and Quartus worked together to refine the industrial design package and when a look that satisfied all parties was agreed upon, Quartus created a detailed design for manufacturing that safely housed the electronics and appropriately represented the product family image. Quartus acted as the mechanical design team and helped the customer produce parts to prove the design concept.

### RESULT

Tempo® brought their product to market, maintained the product line brand identity, and utilizes a scalable manufacturing production process that will grow with demand.



## Headphone Design



*Quartus took our ID concepts and generated one of the best build packages I have ever seen. No stone was left unturned.*

-Colin Godby  
SkullCandy Engineering Lead

### CHALLENGE

SkullCandy came to Quartus requesting mechanical engineering support for their new product family of 6 headphones. One of the key challenges was to incorporate a design that allowed the earpad/speakers to adjust freely against the user's ears yet keep a slim shape.

### SOLUTION

#### COST EFFECTIVE DESIGN

With only cosmetic sketches in hand, Quartus was able to meet packaging requirements while keeping part count down, reducing manufacturing complexity and remaining true to SkullCandy's industrial design. With a unique combination of snap designs and part breakout definition, Quartus was able to deliver all headphone designs with little or no screws which greatly reduced assembly time.

Quartus also provided analysis reports for all headphones which confirmed a nominal force being applied on one's ears while maintaining enough flexibility to ensure a high quality product that wouldn't break when placing on one's head.

#### SIMPLE MECHANISM WITH HIGH CLASS FEEL

Quartus has decades of experience in packaging electronics for products in a wide variety of industries. Because of this, our engineers were able to design a simple mechanism which was integrated into the speaker housing. It allowed for maximum comfort, no matter the shape of the person's head.

### RESULT

Despite an extremely compressed schedule, Quartus was able to provide production level designs along with part and assembly drawings to proceed with tooling RFQ.

**ENGINEERING TOOLS**

Quartus supports a wide variety of the leading CAD and CAE programs.

DESIGN & PDM	ANALYSIS	SPECIALTY
UGS	Analysis	Matlab™
I-deas™	MSC.NASTRAN™	MathCAD™
Unigraphics™	NX NASTRAN™	NASGRO™
Teamcenter™	ABAQUS™	CompositePRO™
Dassault	LS-Dyna™	Zemax™ (optics)
CATIA™ V5	Zona ZAERO™	I-deas ESC, TMG,
SolidWorks™	Pre- and Post	Mech Dynamics™
Autodesk	I-deas™	CFX™ (CFD)
Inventor™	FEMAP™	MasterCAM™
AutoCAD™	HyperMesh™	LabView™
Pro/ENGINEER™	Patran™	Quartus (CLAS)

**FACILITIES**

Quartus has engineering facilities in San Diego and El Segundo, California and Washington DC. The San Diego office includes multiple secure rooms for sensitive or classified projects plus a laboratory for mechanical system integration. Quartus' prototype development and testing laboratory is located near the San Diego office. The facility includes equipment for prototype construction and provides space for testing of large hardware.

**CONTACTS**

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