

HARDWARE PRODUCT ENGINEERING

HCL ENGINEERING AND R&D SERVICES

Innovation Simplified

HCL offers domain-specific hardware engineering and design services in VLSI ASIC, FPGA, and SoC engineering, board design, embedded software, mechanical engineering, and design, prototyping, and value-added engineering services such as compliance engineering, independent verification and validation and low volume manufacturing. We offer these services for partial lifecycle product engineering and for full lifecycle solutions.

HCL's hardware design capabilities have been built and refined over the decades and enriched with specialist partnerships to provide spec to silicon engineering services to OEMs and component manufacturers in verticals like aerospace, automotive, hi-tech, medical electronics, consumer electronics, computer architecture, networking, and storage.

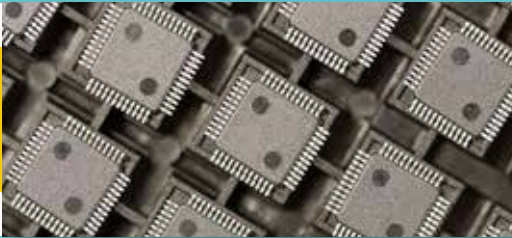
HCL has developed end to end products in various domains, including consumer handheld products such as Tablet, IP Phone, consumer home appliances, Video Cameras, Networking and Telecom products such as Routers / Switches, Convergence Gateways, Industrial products such as Multi-function printers, Automotive Infotainment systems, Class II and Class II Medical Devices, and Avionics Systems.

Integrated Engineering Services



Value Added Services

- Board Design



VLSI Design

- BIOS
- Diagnostics
- BSP



RTOS & OS

- Networking protocols
- Communication protocols
- Routing Protocols
- PC standards
- Application protocols



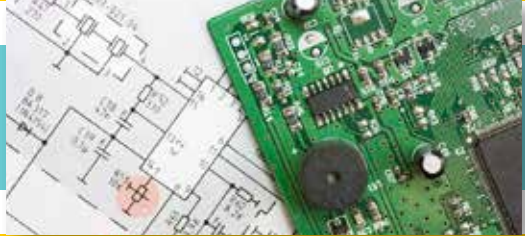
Electronics Packaging

• EMI / EMC Testing

• Systemtesting & validation

• Prototyping

Hardware Design



• ASIC / FPGA

Firmware



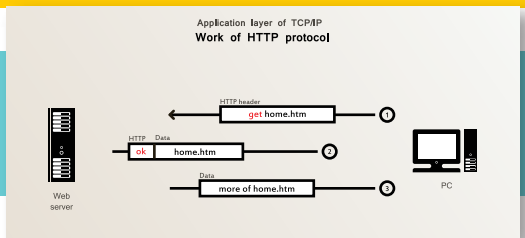
• UNIX

• Windows

• Linux

• VxWorks

Protocols & Standards



• Industrial Design

• Engineering

• Thermal Analysis

Product Engineering Service Matrix

	New Product Development &	
Front-end of Product Engg.	Design & Development	Implementation &
Concept/ Idea Generation	Product Testing	
Market Requirements	Architecture Design	Design to SCM Integration
Functional Specs	H/W Design	PCB Layout & DFX
Feature Benchmarking	S/W Design	Diagnostics
Mock-ups	Electronic Packaging	Component Engg
Preliminary Proof-of-Concept	Full Design Implementation	Test Engineering
	Verification & Validation	Reliability & Risk Analysis
	Hardware & Software Integration	Industrial Design, Engineering, Analysis and Prototyping
	System Bring-up	
		Environmental Screening

Launch

Manufacturing

Design Optimization

Support &
Sustenance

VAVE

Transfer of
Technology

Sustenance

Re-engineering

In-house Low
Volume Mfg

L1/2/3 Technical
Support

Value Engineering

EMS tie-ups for
Medium & High
volume mfg.

Field Implementation
& Training

Porting

Engineering Change
Management

Migration

Manufacturing IT
and Factory
Automation
services

Globalization/
Localization

Modernization

Regulatory Compliance
(RoHS/WEEE)

End-Customer
Support

HW Board Design & PCB Expertise



Hardware Design Skills

- Single / multi processors designs
- High Speed Digital
- Analog & Mixed Signal circuit design
- RF Circuit Design
- Mechatronics Circuit Design
- Sensors and instrumentation circuits

PCB Design & Tools

- PCB Layout
- DFX Analysis
- SI Analysis

Design Tools

- Schematic Tools
- CAM Tools
- Timing Analysis
- Circuit Simulation
- PCB Layout Tools
- Signal Integrity
- Design Aid Tools



Hardware Product Engineering at HCL



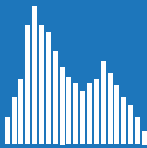
*Analog, Mixed
Signal, High
Speed, RF,
Mechatronics, and
Sensor Integration*



*Hardware
design
including
PCB Design*

*HCL ERS has
deep domain
expertise in*

*ASIC, FPGA
and SOC
Designs*



*New Product
Introduction
including DFX*



*25+ years of
hardware
engineering
Experience*

*Integrated
Engineering
Services, HW,
VLSI, FW, OS,
and Protocols*

*New Product
Introduction (NPI),
Active Product
Support and End of
Life Solutions*

Experiences Engineered for our customers (Case Studies)

1 For a leading Semi Major, HCL setup customer specific labs and clean rooms for autonomy of projects and established a collaborative engagement model with customer's India captive center - Cost savings of \$150M in 12 years

2 For a satellite phone manufacturer, HCL did Low- power verification, assertions, fully automated random verification environment, System Verilog/ VMM based methodology, and complete SOC verification & HW-SW co- simulations

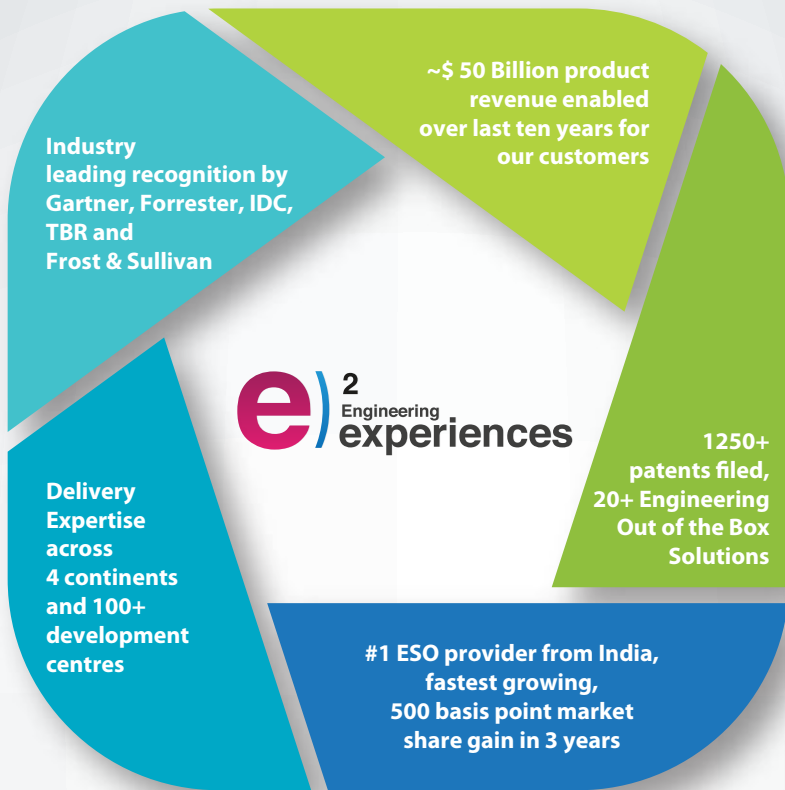
3 For a Semi-chip manufacturer, HCL took on Co-ownership of SoC development for a professional movie camera chip set, driver development, custom boards design and development, functional Validation and Low-power design validation

4 For a wireless major, HCL did Entire ASIC deign & verification, SV/UVM based flow using HCL base classes, Validation Suite/Driver development, supporting Palladium emulation, verification at block, cluster and chip, and PCIe, CPRI compliance testing



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Hello, I'm from HCL's Engineering and R&D Services. We enable technology led organizations to go to market with innovative products and solutions. We partner with our customers in building world class products and creating associated solution delivery ecosystems to help bring market leadership. We develop engineering products, solutions and platforms across Aerospace and Defense, Automotive, Consumer Electronics, Software, Online, Industrial Manufacturing, Medical Devices, Networking and Telecom, Office Automation, Semiconductor and Servers & Storage for our customers.

For more details contact: ers.info@hcl.com

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