



HARDWARE PRODUCT ENGINEERING

HCL ENGINEERING AND R&D SERVICES

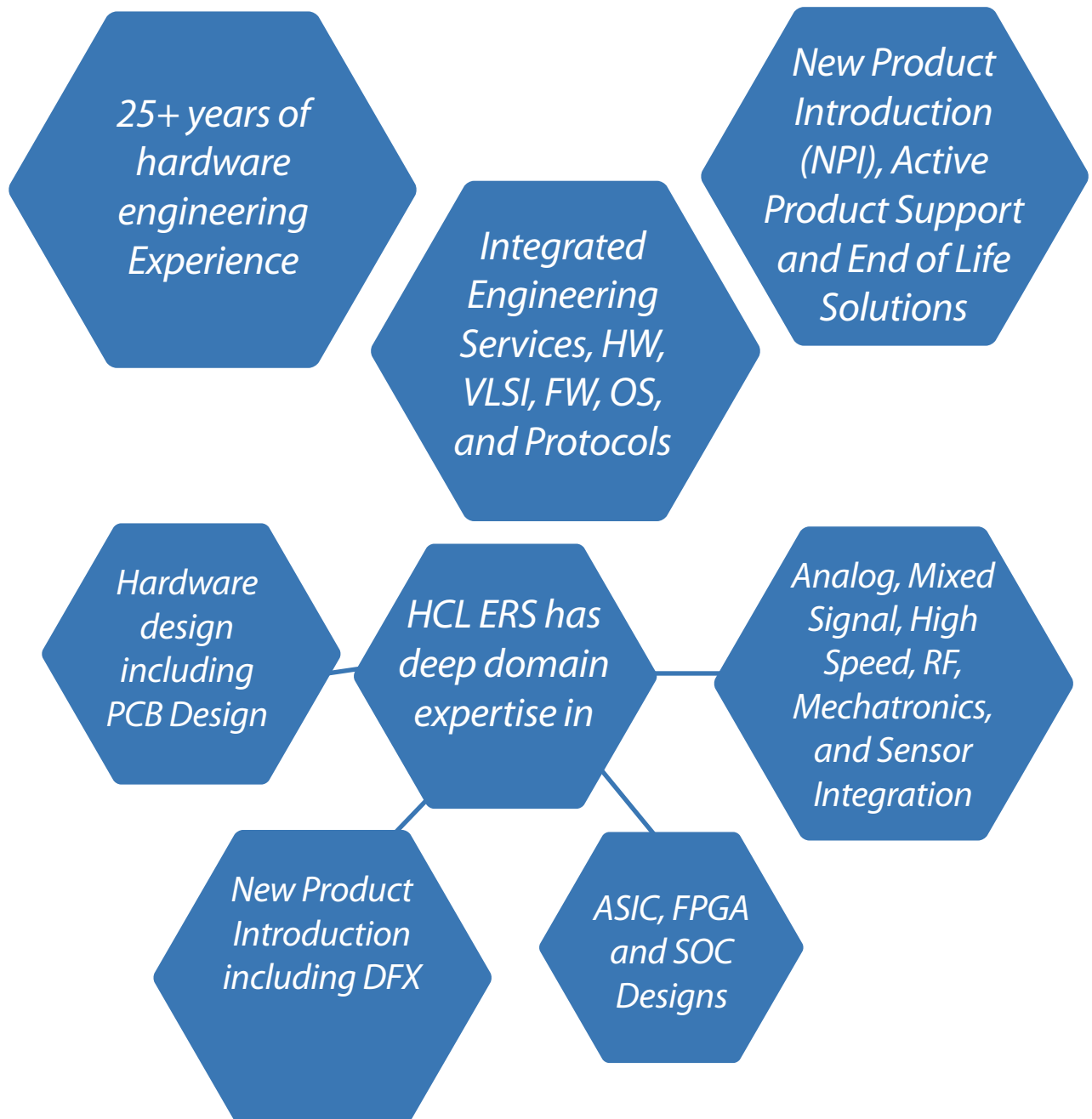
Hardware Product Engineering at HCL

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.

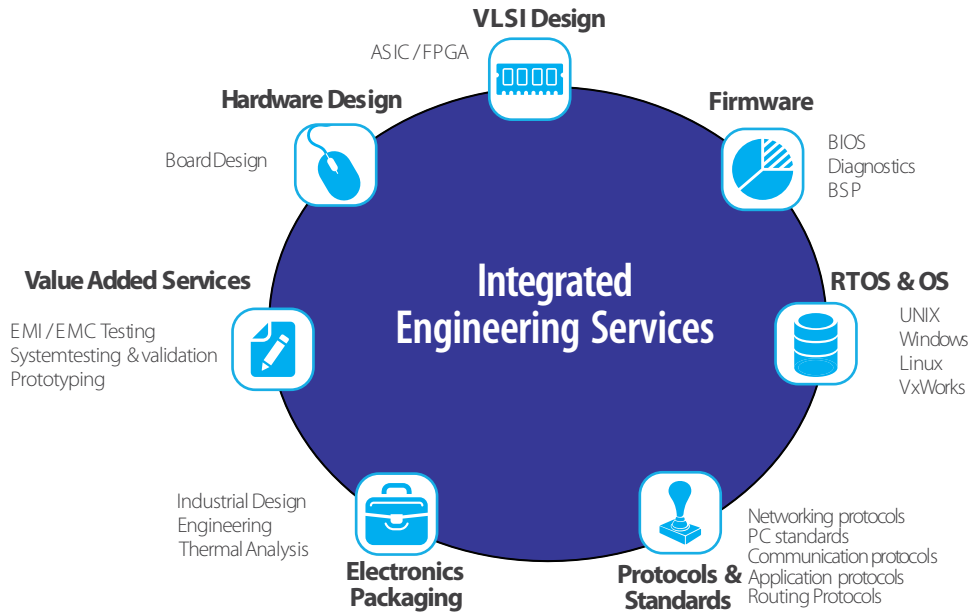
HCL's hardware design capabilities have been built and refined over the decades and enriched with specialist partnerships to provide spec to silicon engineering services to OEMs and component manufacturers in verticals like aerospace, automotive, hi-tech, medical electronics, consumer electronics, computer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

HCL currently works with customers across all the stages in the product life cycle including over 10 customers in helping them build over 25 products end-to-end. HCL also prides itself in its ability to work proactively with the customer including various business models including work with over 5 customers where we are investing in the success of the products.

HCL has developed end to end products in various domains, including Professional Grade Cameras, Networking and Telecom Products, Multi-Function Printers, HVDC Gate Electronics, Flight Control Systems, In-Flight Entertainment, Class II and Class III Medical Devices, Automotive Active Safety Systems, and Automatic Test Solutions.



Integrated Engineering Services



Product Engineering Service Matrix

New Product Development & Launch				Active Product Support	End-of-Life Products	
Concept /Idea Generation	Design & Development	NPI Implementation Manufacturing				
Market Requirements	Architecture Design	Design to SCM Integration	Transfer of Technology	Sustenance	Re-engineering	
Functional Specs	H/W Design	PCB Layout & DFX	In-house Low Volume Mfg	L1/2/3 Technical Support	Value Engineering	
Feature Benchmarking	S/W Design	Diagnostics	EMS tie-ups for Medium & High volume mfg	Field Implementation & Training	Porting	
Mock-ups	Electronic Packaging	Component Engg	Manufacturing IT and Factory Automation services	Engineering Change Management	Migration	
Preliminary Proof-of-Concept	Full Design Implementation	Test Engineering		Engineering Change Management	Globalization / Localization	Modernization
	Verification & Validation	Reliability & Risk Analysis		Globalization / Localization	Regulatory Compliance (RoHS/WEEE)	End-Customer Support
	Hardware & Software Integration	Industrial Design, Engineering, Analysis and Prototyping				
	System Bring-up	Environmental Screening				

■ Unique Propositions

HW Board Design & PCB Expertise

Hardware Design Skills

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

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

21ST CENTURY TECHNOLOGIES

~\$ 50 Billion product revenue enabled over last ten years for our customers

Industry leading recognition by Gartner, Forrester, IDC, TBR and Frost & Sullivan

1250+ patents filed, 20+ Engineering Out of the Box Solutions

Delivery Expertise across 4 continents and 100+ development centres

#1 ESO provider from India, fastest growing, 500 basis point market share gain in 3 years

Experiences Engineered for our customers

- 1 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 High Speed Digital: Sensor based driver assistance system (LDW, IHC, SOD, GIS), License Plate recognition
- 3 RF Circuit Design: Path planning of UAVs, Aerial surveillance, Automatic target detection, terrain measurement
- 4 Sensors and instrumentation circuits: Flame/Smoke Detectors, 4~20mA loop, BLDC Motor Controller, Ni-MH/ Li-ion Battery Chargers



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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