

# Enabling Excellence Through Innovation



CoreEL Technologies is a Customer Application Specific Product & Solutions (CASPS) company offering innovative solutions from its diverse portfolio of offerings that include Intellectual Property (IP) cores, system design, prototype development, manufacturing, sustenance, next-gen products, semiconductor solutions, EDA tools, COTS products and technology training.

CoreEL's strength lies in its ability to blend deep domain knowledge with right ingredients across its portfolio of offerings. CoreEL's products and solutions enable its customers to further add value, create innovative and competitive products for their end users. CoreEL is a leading developer of advanced electronic system level products and solutions to three primary markets – Aerospace & Defense, Digital Video Broadcast and Universities & Institutions of higher learning.

CoreEL's unique solutions are crafted with one or more of the following offerings:

- **System Engineering:** Creation of next generation products and technologies; with indigenous talent & resources. CoreEL closely works with the customers all along the product lifecycle; from inception of the idea through the product roll-out.
- **Intellectual Property (IP):** Growing range of Register Transfer Level (RTL), sub-module, module and system Level IP.
- **Products:** Vast portfolio of customized products ranging from complex Digital Beam Former (DBF) system to a miniaturized Audio Video Decoder Module (AVDM) board.
- **Expertise:** System level, sub-system level, FPGA-RTL, DSP, complex boards, Radio Frequency (RF) & mechanical engineering.
- **EDA & Semiconductor Solutions:** Consultancy, demand creation, sales, support and enablement on popular technologies, products and tools.
- **Training & Enablement:** Sandeepani (the training arm of CoreEL) is an institute of higher learning in VLSI and Embedded System Design (ESD) enabling corporates, academicians and students on the emerging technologies and tools in the market.

#### Key Markets:

- Aerospace & Defence
- Digital Video Broadcast
- Universities & Institutions of higher learning

The company was founded in 1999 and is headquartered in Bangalore, India.

#### Quality @ CoreEL:

CoreEL is an **ISO 9001:2008** certified company and is further certified by **CEMILAC** for design, development and testing of avionics systems, subsystems and line-replaceable units(LRU) covering embedded systems for military airborne applications.

## System Engineering

The System Engineering division extends end to end solutions (design to manufacturing) encompassing custom system design, VLSI front-end & FPGA design, SoC & IP verification and manufacturing services. In addition to these, CoreEL also offers customizable products for digital video and ASIC prototyping frameworks.

### Custom System Design

- Hardware design
- Software design
- RTL/FPGA design
- RF module design
- RF over fiber

### VLSI Front-End & FPGA Design

- Turnkey FPGA design
- IP development compliant to standards
- Reengineering of legacy products

### Digital Video (products)

- Video Encoder & Decoder IP cores
- Low cost Audio - Video (AV) Decoder Module
- Stagebox - camera back AV over IP solution
- Typhoon - AV decoder + capture card for live production

### Signal Processing (products)

- FPGA, DSP & processor based computing boards
- 256-point high speed FFT engine
- Serial FPDP transmission cores

### Our proven expertise:

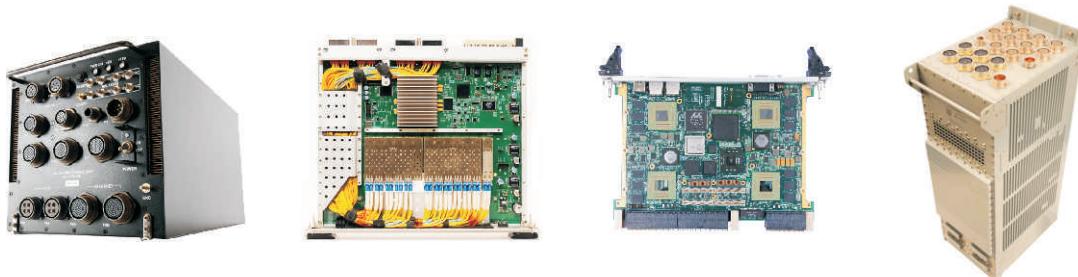
- System level solutions for Electronic Warfare (EW), RADAR & SONAR
- Embedded Solutions for on-board computing applications
- High speed analog front end & RF sub-systems
- Hardware & FPGA based IP development
- Mission critical Audio-Video products

### Why choose CoreEL:

- A diverse portfolio of happy customers
- One stop shop for end-to-end engineering requirements
- Reliable by design; faster time-to-market
- Deep domain knowledge
- ISO 9001:2008 & CEMILAC certified
- Strong industry partnerships

The experts at CoreEL leverage their global engineering experience in technology, processes and quality to deliver reliable & innovative solutions. The dedicated and competent engineering team has architected, designed, developed and delivered several first-time-working products for customers across multiple sectors.

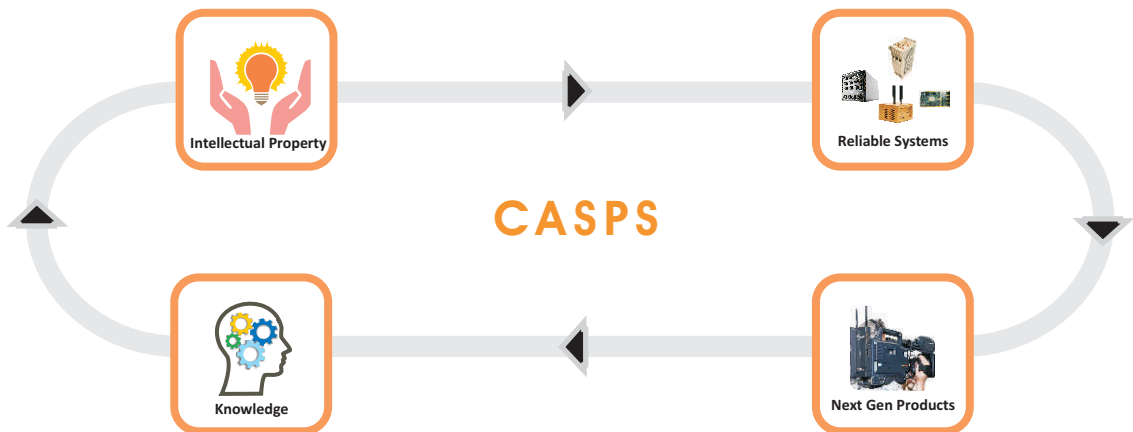
CoreEL is among the first few global companies to be admitted as a Premier Design Services Partner in the Xilinx Alliance Program.



## CASPS Model of Engagement

The success and effectiveness of CoreEL's solutions can best be attributed to the CASPS model of engagement. The best practices of the CASPS model is adopted for every product and solution offered by the company.

<b>Planning</b>	<ul style="list-style-type: none"> <li>● Work closely with customer to identify initial specification</li> <li>● Incorporate and/or develop IP ; leverage domain expertise</li> </ul>
<b>Development</b>	<ul style="list-style-type: none"> <li>● Architecture, algorithms &amp; detailed specifications</li> <li>● Development - system partitioning, board level design, FPGA/RTL development, software development, mechanical design &amp; prototype manufacturing</li> </ul>
<b>Validation</b>	<ul style="list-style-type: none"> <li>● Testing at all stages of design - module, board &amp; system</li> <li>● Comprehensive test scripts for automated &amp; random testing</li> </ul>
<b>Manufacturing</b>	<ul style="list-style-type: none"> <li>● System integration, testing, burn-in &amp; thermal cycling</li> <li>● Established ecosystem for PCB fabrication, AS9100 compliant, ISO 13485 certified assembly houses, component vendors, mechanical fabrication, qualification &amp; certification houses</li> </ul>
<b>Sustenance &amp; Upgrade</b>	<ul style="list-style-type: none"> <li>● Support during the product lifecycle</li> <li>● Enhanced capability made easy with FPGA implementation</li> </ul>
<b>Next-Gen Products</b>	<ul style="list-style-type: none"> <li>● Aligning IP development with customer's future demand</li> <li>● Developing rapid-prototypes for customers to validate market preferences</li> </ul>



The CASPS model has been instrumental for CoreEL in co-creating some of the ground breaking technologies & products in the Indian Aerospace & Defence sector and as well as in the Digital Video Broadcast sector.

## Digital Video Solutions

CoreEL offers a host of proven Digital Video IP cores and products optimized for high quality and performance. These solutions have been deployed by world's leading broadcast & professional video equipment vendors.

CoreEL has the following digital video products in its portfolio:

### IP Cores

#### AVC 4K Codec:

- H.264 4K 4:2:2, 10-bit Codec
- Supports resolutions up to QFHD (3840 x 2160p60) and True 4K (4096x2160p60)
- H.264 4K Intra Frame Encoder & Long GOP Decoder
- Single 4K image solution
- Support for XAVC and AVC-Ultra

#### H.264 I-Frame Codec (AVC Intra 50/100/200)

- Simultaneous Encode Decode - Single Chip Solution
- Up to Full HD (1080p60) decode
- 4:2:0 / 4:2:2, 8 to 10-bit
- Sub 10 millisecond latency
- Option for Mathematically Lossless Encoding
- Option for Dual Pass Encoding
- Bitrate support up to 600 Mbps (CAVLC) & 100 Mbps(CABAC)

#### H.264 & MPEG-2 Long GOP Decoder

- Up to Full HD (1080p60) decode with scalability to 4K resolution
- 4:2:2, 10-bit support for H.264
- 4:2:2, 8-bit support for MPEG-2
- Bitrate support up to 160 Mbps for H.264 & 100 Mbps for MPEG-2
- Simultaneous Multichannel Decode
- Super Low Latency solution

### Products

#### Stagebox - camera back AV over IP solution

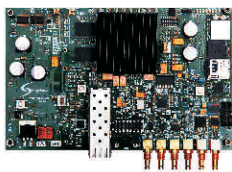
- Simplified production workflows
- Portable and easier editing
- Reduced Infrastructure costs
- Elimination of bulky cables
- Low Latency
- High Quality

#### Typhoon - AV decoder + capture card for live production

- Professional grade decoder card for studio applications
- Supports Industry standard H.264 AVC video format
- Portable and easy for editing
- Simple hardware with multiple IP input streams and gives compressed & uncompressed video and audio over PCIe interface
- Optional support for uncompressed video over SDI interface
- Works seamlessly with COTS post production equipments
- Low latency

#### Low Cost 10-bit AV Decoder Module

- H.264 Hi422P 10-bit 1080p30
- MPEG-2 422P@HL 1080p30
- MPEG-1 Layer II, MPEG-2/4 AAC-LC and HE-AAC
- Optional Dolby Digital, Dolby E & Dolby Digital Plus
- TS input over DVB-ASI and IP
- HD-SDI output with embedded audio and VBI
- Resolution from SD to 1080P30
- Customizable form factor and connector type
- Optional support for HDMI and Analog AV output



## CoreEL University Program (CUP)

CUP is a one stop source for all infrastructure requirements, solutions, training and consultancy in VLSI and Embedded System technologies. CUP has been strategic partners to the Indian academia for over a decade now.

CUP strives to drive excellence in teaching-learning experience through setting up world class laboratory infrastructure and enabling the teaching staff and students on the latest tools, technologies and methodologies.

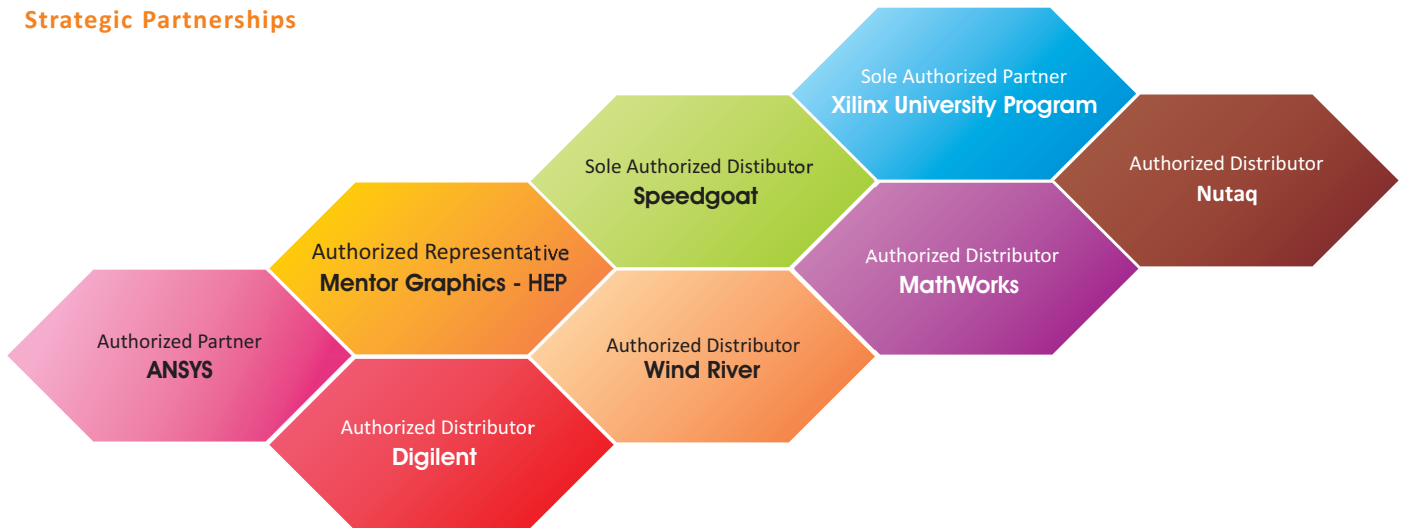
### Enriched teaching-learning experience

- World - class laboratory infrastructure to complement
  - Course curriculum (UG/PG level)
  - On - Campus R&D activities
- Faculty Development Programs (FDP) on tools and methodologies
- Centre of Excellence (CoE) - VLSI & Embedded System Design
- Student programs (Hardware Design Contest / Workshops)

CUP currently works with over 2,500 academic institutions across India.

The portfolio of offerings spans Product Sales & Support, consultancy, FDP, Student Programs and other academic activities across multiple disciplines of engineering such as ECE, EEE, TCE, CSE, Instrumentation & Medical Electronics.

### Strategic Partnerships



## Sandeepani – School of Embedded System Design

Sandeepani is a premier institute for higher learning enabling faculty members, students and corporates on specific tools, techniques and methodologies related to embedded systems and VLSI technologies across Xilinx, Mentor Graphics & Wind River tools/products.

### Authorized Training Provider (ATP)



### Offerings:

- **Professional Development Course (PDC)** for students
- **Corporate Trainings** for working professionals
- **Faculty Development Programs (FDP)** for academicians

Sandeepani has over 10 years of experience in training startup companies, captive MNCs, design centers, defense & aerospace companies and academicians.

## Technology Solutions

**Semiconductor Solutions:** CoreEL leverages its longstanding partnerships with the leading industry corporations to build effective & optimal solutions.



- Manufacturer Representative
- Sole Authorized Distributor



- Manufacturer Representative

*Finisar*

- Manufacturer Representative



- Representatives



- Manufacturer Representative
- Sole Authorized Distributor

**Electronic Design Automation (EDA) Solutions:** CoreEL caters to the popular EDA tools, products and training in the EDA sector.



- Authorized Distributor and Authorized Training Provider in India



- Authorized Distributor for products & solutions in India



- Authorized Distributor for the range of products & solutions in India



- Authorized Distributor



- Authorized Distributor

**Commercial Off-The-Shelf (COTS) Solutions :** CoreEL brings to you some of the popular & effective COTS products from across the world that meets your unique requirements. These components can significantly reduce costs in system-development cycle as well as accelerate the time-to-market of the overall product.



**Computer Aided Engineering (CAE) Solutions :** We partner with ANSYS to bring simulation software that enables organizations to confidently predict how their products will operate in the real world. The ANSYS comprehensive software suite spans the entire range of physics, providing access to virtually any field of engineering simulation that a design process requires.



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