FROM
IMAGINATION...
TO REAL-TIME
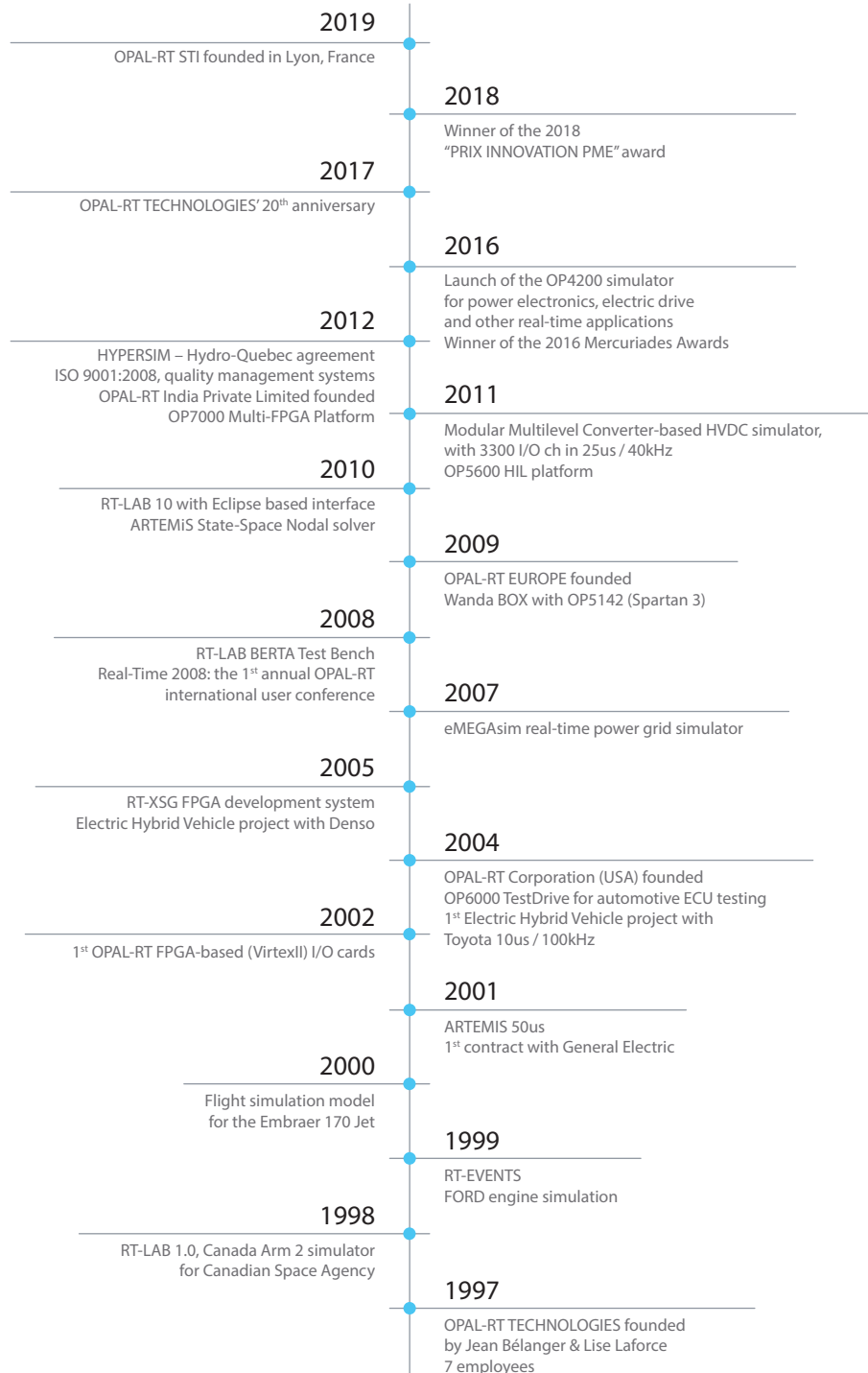
OPAL·RT
TECHNOLOGIES

OPAL·RT TECHNOLOGIES

2019

OPAL-RT STI founded in Lyon, France

2018

Winner of the 2018
"PRIX INNOVATION PME" award

2017

OPAL-RT TECHNOLOGIES' 20th anniversary

2016

Launch of the OP4200 simulator
for power electronics, electric drive
and other real-time applications
Winner of the 2016 Mercuriades Awards

2012

HYPERSIM – Hydro-Quebec agreement
ISO 9001:2008, quality management systems
OPAL-RT India Private Limited founded
OP7000 Multi-FPGA Platform

2011

Modular Multilevel Converter-based HVDC simulator,
with 3300 I/O ch in 25us / 40kHz
OP5600 HIL platform

2010

RT-LAB 10 with Eclipse based interface
ARTEMiS State-Space Nodal solver

2009

OPAL-RT EUROPE founded
Wanda BOX with OP5142 (Spartan 3)

2008

RT-LAB BERTA Test Bench
Real-Time 2008: the 1st annual OPAL-RT
international user conference

2007

eMEGAsim real-time power grid simulator

2005

RT-XSG FPGA development system
Electric Hybrid Vehicle project with Denso

2004

OPAL-RT Corporation (USA) founded
OP6000 TestDrive for automotive ECU testing
1st Electric Hybrid Vehicle project with
Toyota 10us / 100kHz

2002

1st OPAL-RT FPGA-based (VirtexII) I/O cards

2001

ARTEMIS 50us
1st contract with General Electric

2000

Flight simulation model
for the Embraer 170 Jet

1999

RT-EVENTS
FORD engine simulation

1998

RT-LAB 1.0, Canada Arm 2 simulator
for Canadian Space Agency

1997

OPAL-RT TECHNOLOGIES founded
by Jean Bélanger & Lise Laforce
7 employees

Democratize Real-Time Simulation

OPAL-RT's "raison d'être" since its founding
is to democratize real-time simulation.
We continue to work towards that goal today.

FOREWORD BY JEAN BÉLANGER

Our clients perform testing of electric drives, electronic controllers and power distribution networks in a variety of industries including automotive, aerospace, electric ships, power generation, rail, and industrial manufacturing.

Our vision, when Lise Laforce and I founded OPAL-RT in 1997, was that a real-time simulator will be on every engineer's desk due to the rapid progression of commercial processing technologies. We pioneered the use of standard commercial computer and operating systems for real-time simulation and fifteen years later, I am proud to see that this vision is becoming a reality.

The ease of use, combined with costs for the customer, are key in our process of making simulation accessible to all.

We have the ability to assist clients who must design complex and fast dynamic systems by using parallel calculations. In fact, that's how we got the name OPAL-RT: "Ordinateur Parallèle, Applications Logicielles Temps-Réel." Our unique technological approach integrates parallel, distributed computing with commercial-off-the-shelf technologies.

Over the years, OPAL-RT has become a world leader in power electronics real-time simulation used in automotive, aerospace and industrial markets by supplying open and powerful simulation systems that make use of the latest commercial technology.

To maintain this leadership, customers are the center of our concerns. In this sense, OPAL-RT works with them to solve their technology challenges related to the design, prototyping and testing of complex systems, even though these challenges may seem impossible at first sight.

This challenge is represented in our slogan: "From Imagination…to Real-Time." We are working hard toward our vision of providing accurate and affordable simulators so that "imagination will be the only real limit of complex system design".

Jean Bélanger, Co-Founder, CEO of OPAL-RT TECHNOLOGIES

Our Vision

OPAL-RT WAS FOUNDED WITH THE GOAL OF
"DEMOCRATIZING REAL-TIME SIMULATION".

- A real-time simulator will be on every complex dynamic system engineer-designer's desk.
- These simulators will be interconnected and able to work together to design large systems.
- Imagination will be the only real limit to complex system design.

FROM IMAGINATION… TO REAL-TIME

"Our vision and mission are ambitious and require the use of several technologies and highly skilled engineering. We hire the best experts in software, electronics, FPGA and real-time simulation to ensure we reach our goals and achieve the best quality in our products."

LISE LAFORCE, VPE

Our Mission

- Help its customers reduce their costs and delays for complex mechanical and electrical system design, prototyping and testing,
- By providing high-performance simulation systems that are open and easy-to-use, utilizing commercial technology optimized for parallel computing,
- With the ultimate goal of making real-time simulation efficient, precise and accessible to all.

"Real-time simulation is indispensable For engineer-designers. Our mission is to make it accessible to all."

JEAN BÉLANGER, CEO

Our Corporate Values

AT OPAL-RT, WE BELIEVE IN OUR VALUES, HOLD TRUE TO THEM AND ACT ACCORDINGLY. THEY COME FROM OUR PHILOSOPHY ABOUT WHO WE ARE AND WHAT WE DO FOR PEOPLE, BOTH WITHIN AND OUTSIDE OF THE COMPANY.

PERFORMANCE

We give you the freedom to simulate complex systems with ever increasing precision and execution speed by offering open products and our technical and organizational know-how, in combination with products available on the market.

FAST INNOVATION

Our creativity and innovation push us to research and build solutions that meet even the most complex of your needs. We are proactive and always ready to take on challenges that our competitors would turn down.

COOPERATION

We concentrate on solutions that ensure your success by working with you from the beginning to the end of the project. We work as a team to ensure your satisfaction with our win-win approach.

OPENNESS

We are open and so is our equipment. Our flexibility allows us to offer you custom solutions.

What We Do

SIL, RCP, PHIL, Simulation Acceleration and HIL simulation processes let engineers quickly test and iterate their control strategies in order to decrease development costs and time. These processes, used by all industries, allow corrections to be made early in the product development. Thus, mistakes can be corrected and optimizations can be made while they are still inexpensive.
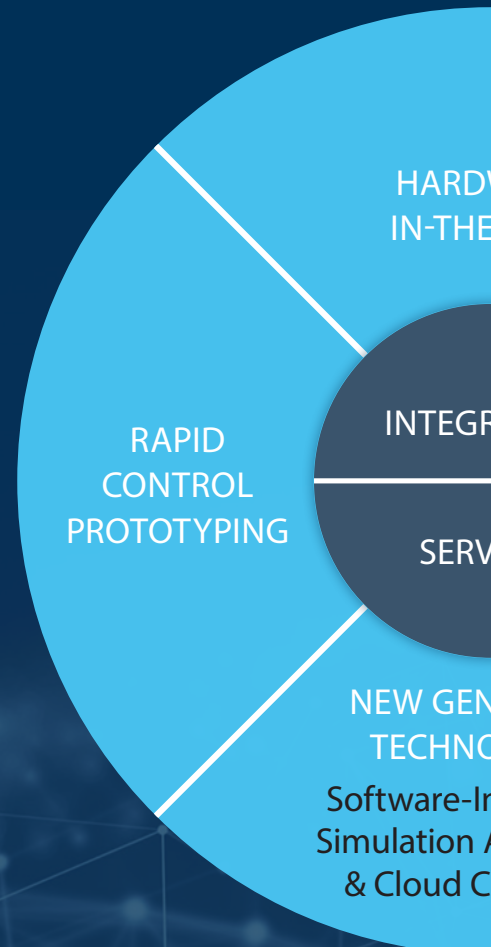
HARDWARE-IN-THE-LOOP

Physical test benches cannot always be used to design and test control systems due to excessive cost, security or simply the unviability of physical models. This is the case for aircraft and large power grid applications in which physical prototypes are replaced by accurate digital real-time simulators, which are interfaced with prototype controllers.

Built using optimized cost and commercial-off-the-shelf components, our solutions are scalable, accurate and powerful. Our added-value lies in our unique simulation models and algorithms optimized for parallel computation on standard multi-core computers as well as on fast field programmable gate array (FPGA) chips to achieve maximum accuracy.

RAPID CONTROL PROTOTYPING

OPAL-RT RCP solutions enable control specialists to implement their control algorithms on powerful real-time computer emulating their final controller hardware. Control algorithms can then be tested by interconnecting the prototype controller hardware to physical test benches, emulating the behavior of actual systems being controlled, like the automotive engine and power electronic motor drives used in several applications.

We provide cost-effective and scalable RCP solutions to all industries including power system and power electronic markets. Because of the versatility of the technology, we can adapt this generic product to specific needs.

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ASSOCIATED SERVICES

INTEGRATION

In engineering, system integration is the bringing together of the component subsystems into one system.

Engineers need a strong partner, like OPAL-RT, that can design and build their fully customized test bench to make sure to make sure our customers can remain focused on the test, and not on building a test bench. We are willing to partner and go the extra mile to ensure success of both parties.

SERVICES

From design to commissioning, consulting, training and maintenance, OPAL-RT can help you all the way through your real-time project, ensuring its success.

We offer professional services to address all levels of engineering, simulation and rapid prototyping challenges in aerospace, automotive design, robotics, advanced control, process control and electromechanical systems.

TEST & MEASUREMENT

Test and measurements help and guide engineers who test, measure, and inspect electronic devices, components, and systems.
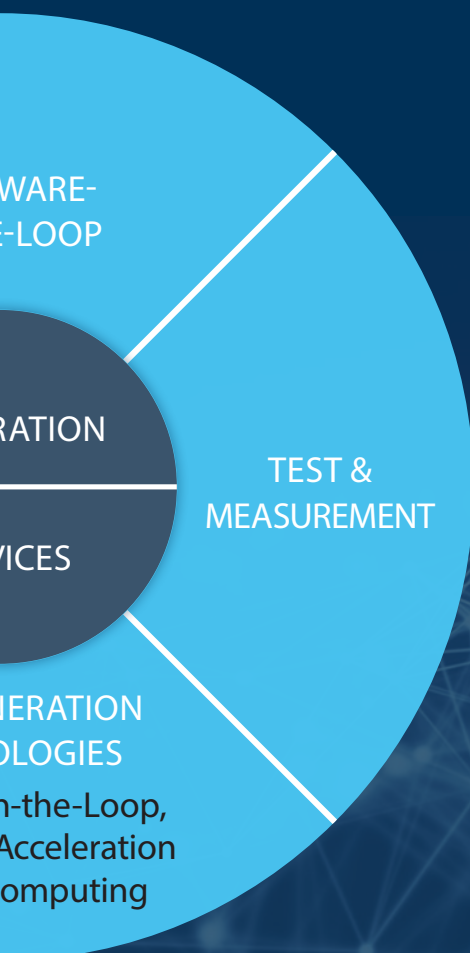
OPAL-RT has been investigating forward-looking concepts for gaining greater value from our measurement tools integrated with our simulators. Our simulators can be used as high-tech and customizable laboratory and portable test systems. Our measurement and control systems are flexible enough to allow special conditioning, signal processing using Simulink and FPGA tools, data recording and test scenarios to ensure continual improvements.

NEW GENERATION TECHNOLOGIES

Software-in-the-Loop simulation (SIL) is the inclusion of compiled production software code into a complete simulation model enabling to optimize and perform tests of the final controller code in full simulation mode prior performing HIL tests with the actual controller hardware and to prepare commissioning tests. Our simulators take advantage of commercial and open technologies to facilitate SIL implementation.

Our simulators offer a natural way to accelerate the simulation of very large and complex systems by using parallel processing on standard multi-core processors or on super computers available in the laboratory or, on cloud systems. Simulation cases requiring several hours of computation can often be simulated in less than a few seconds, which allows more tests to be done in less time, even for large systems.

Cloud computing is Internet-based computing, whereby shared resources, software and information are provided to computers and other devices on demand, like the electricity grid. Several OPAL-RT softwares, such as HYPERSIM, are readily compatible with this technology.

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Acceleration
omputing

TEST & MEASUREMENT

Who We Serve

ELECTRICAL

We offer the most complete, open and high-performance power systems real-time simulation solution on the market. Not only does it cover every need for traditional power grid and power electronics simulation, it also offers an unsurpassed level of scalability to design, simulate and test complex new generation power systems.

APPLICATIONS

Protection system testing, control system testing, large scale simulation, research, training and power grid maintenance.

OUR CLIENTS (partial list)

ABB Schweiz, Alstom Grid UK, Bharat Heavy Electricals Ltd, CEPRI, Delta Electronics, EPGH Singapore, Fraunhofer IWES, GE Energy, GE India Technology Centre, Hitachi, Indian Central Power Research Institute, Hydro-Quebec, MELCO, Mitsubishi, Nari-Relays Electric, Panasonic, Repower System AG, Rockwell Automation Canada, Sandia National Laboratories, TMEIC Japan, XJ Group China.
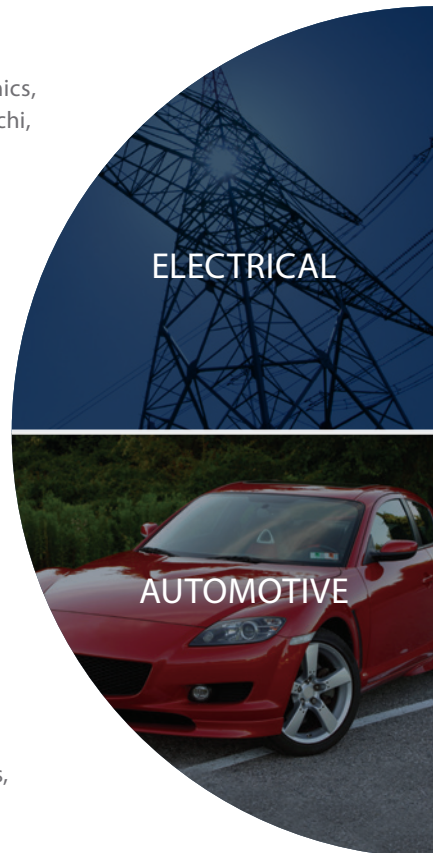
AUTOMOTIVE

We apply pioneering high-fidelity simulation technologies for all types of automotive RCP and HIL simulation projects around the globe. Providing an economical and innovative complement to dynamometer testing, our simulators are deployed at most automotive OEMs and their suppliers, for ECU development of traditional vehicles, off-highway equipment, train traction systems, and in most electrical hybrid vehicles development.

APPLICATIONS

ECU fast prototyping development, ECU Function testing and system testing, electric motor ECU testing, ECU communication testing, research, training and production test validation.

OUR CLIENTS (partial list)

A*Star, AISIN Japan, BYD Auto China, Delphi, EATON, Daimler-Chrysler USA, DENSO, FORD, IAV Automotive Engineering, Jaguar Land Rover, John Deere, General Motors, Hitachi Automotive Systems, HYUNDAI KIA Motors, Mahindra, Mercedez-Benz Hybrid, Peugeot, Renault, Tata Motors, TM4, Toyota, Westport Innovations.

ELECTRICAL

AUTOMOTIVE

THROUGH LEADING-EDGE DEVELOPMENT, backed by the expertise of complex system simulation using parallelism, OPAL-RT continues to lead the way for next-generation real-time simulation solutions accessible to the greatest number of people. At OPAL-RT, we assist customers who have complex and very fast simulation requirements by using parallel computing. Our solutions are customized by industries and provide high performance, scalability and affordability.

AEROSPACE & DEFENSE

We assist avionics system suppliers in testing avionics integration by providing simulators that will allow all parties involved to supply interrelated high-quality, reliable and tested solutions. For sea, land, air and space applications, we provide real-time simulation solutions that deliver ROI, time-saving and quality improvement to the most sophisticated aerospace and defense projects.

APPLICATIONS
Avionics systems development, space and defense system development, large-scale electrical energy generation, distribution and active load control development and integration testing.

OUR CLIENTS (partial list)
ADE, Agency for Defense, Development Korea, ARDE, Canadian Space Agency, DLR, EADS, GE Aviation, Hamilton Sundstrand, Honeywell Aerospace, Liebherr Aerospace, Messier-Bugatti, NASA, NSTL, Pratt & Whitney, RCI India, Safran Electronics, Samsung Techwin, Thales Alenia Space.

AEROSPACE & DEFENSE

ACADEMIC & RESEARCH

ACADEMIC & RESEARCH

We work closely with academia to ensure that teachers and researchers benefit from the most innovative technology on the market. Our equipment is easily scalable, and can thus be reused for multiple projects. We are recognized for our willingness to collaborate with universities as well as contributions to research.

OUR CLIENTS (partial list)
Ecole Polytechnique Montréal, EPFL (Switzerland), HUST (China), Incheon University (Korea), Indian Institute of Technology Jodhpur, KFUPM (Saudi Arabia), KTH Royal Institute of Technology (Sweden), Nagoya Institute of Technology (Japan), National Tsing Hua University (China), UFCG (Brazil), Université de Lille (France), NWPU (China), Ohio State University (USA), University of Alabama (USA), University of Nottingham (UK).

We Democratize
Real-Time Simulation

SOFTWARE

RT-LAB

RT-LAB, fully integrated with MATLAB/Simulink°, is the open real-time simulation software environment that has revolutionized the way model-based design is performed. RT-LAB's flexibility and scalability allow it to be used in virtually any simulation or control system application, and to add computing-power to simulations, where and when it is needed.

POWER SYSTEMS AND POWER ELECTRONICS SIMULATION SYSTEMS

HYPERSIM is the only real-time digital simulator with the ability to simulate and analyze very large-scale power systems with several thousand nodes. It is used for factory acceptance and system integration testing, as well as for R&D work and commissioning tests.

eMEGASIM is the fastest and Simulink-based real-time simulator for developing and testing protection and control systems using hardware-in-the-loop (HIL) simulation.

ePHASORSIM simulates electro-mechanical transient stability phenomen in very large power grids with thousands of buses, generators, transformers, transmission lines, loads and controllers.
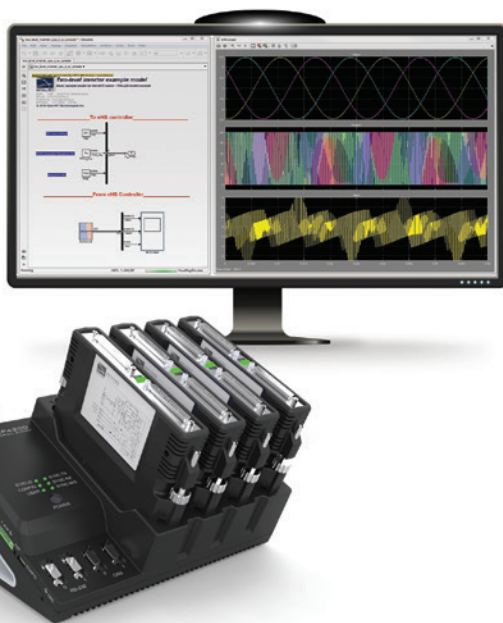
eFPGASIM is an easy-to-use FPGA based-HIL platform for the development and testing of control and protection systems that require sub-microsecond time steps.

HARDWARE

Backed by 16 years of expertise in the development of innovative hardware solutions, OPAL -RT's unique approach integrates parallel, distributed computing with commercial-off-the-shelf technologies, to offer an unmatched combination of performance, openness and affordability. All simulators are based on a modular and flexible design and can be fully customized to meet specific I/O requirements.

OUR PRESENCE WORLDWIDE

OPAL-RT products are also sold and supported by a global network of distributors based in Brazil, Canada, China, Italy, Japan, Korea, Russia, Singapore and Taiwan.

We have technical support centers in Europe (France), USA (Michigan & California) and China (Beijing).

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