Rayce brings together innovation and excellence

Present worldwide, Rayce, the ARaymond’s center of expertise, has companies in the UNITED STATES, EUROPE and soon in ASIA.

4 laboratories
MECHATRONICS.
PHYSICAL MEASUREMENT EQUIPMENT.
CHEMICAL RESEARCH.
ENVIRONMENTAL STUDIES.

29 permanent researchers joined by many R&D specialists, providing their expertise on specific advanced engineering projects. « When an opportunity is identified, it is forwarded to Rayce’s Idea Managers and experts who assess the project’s feasibility, its inherent risks and its compliance with market trends ».

A human and technological capital to offer specific solutions to its customers
Vision and Strategy for Rayce

Raymation → Strategy of the AR Network since 2008

Long-term Vision & Commitment → 2025

- Innovation
  “We want to be recognized as the most capable company to bring value through innovation”

- Diversification
  “We want to reduce the risks and the dependence on the automotive market using our expertise in new market fields”

- Transparency
  “We commit to uphold and practice the ARaymond Values & to be transparent of our activities.”
Innovation Inputs and Agenda

- Technology Intelligence
  - Emerging technologies & technological discontinuities

- Competitive Intelligence
  - Products and services in development or available in lead markets

- Environment Foresight
  - Assessment of economic & political environment

- Customer Foresight
  - Identification, assessment & anticipation of customer needs and industry trends

Relevance:
- Early identification of technology trends & potential changes in the market
- Preparation of strategic decisions
- Making use of upcoming opportunities & preparing for potential risks

2025
New R&D Headquarters...

- **Concentrated Network of Expertise**
  - Interdisciplinary & International Teams Dedicated to Advanced Engineering
  - Network Projects with Customers, Universities and Suppliers
  - Participation in Government-promoted Research Projects

- **Green Building**
  - Geothermal Heating & Cooling
  - Integrated PV Solar Flexible Film into Roof

- **State-of-the-Art Laboratories**
  - Mechatronics
  - Physical
  - Chemical
  - Environmental

- **Pilot Plant for Product/Process Prototyping**
- **Benchmarking Garage & Showroom**
  - Full Vehicle Lift

- **Large Climate-controlled Vibration Test System**

- **Creative Office Design to Inspire Innovation**
Rayce in Figures...

3 Locations
38 Employees

- 9 American
- 17 French
- 12 German

- 94 Released Ideas
- 17 Realized Concepts
- 15 Ideas on-going:

- 12 Realized Developments
- 5 Realized Prototypes
- 11 Transferred Project

32% of Projects based on AR Network Ideas / Needs

Budget of 7 Million € for 2012
Over 600 Visitors Customers & Sponsors Globally
9 Fields of Expertise
30 Patents Filed
Fields of Expertise

- Solar Developments
- Fluid Handling
- New Fastening Technology
- Process Developments
- Material Developments
- Electronic Integration
- Lightweight Design
- Assembly Detection
- Thermal Management
- New Fastening Technology

9 Fields of Expertise
Additive Manufacturing

RayCE Americas purchased an Objet Connex 500.

- Model material is built up layer by layer (16micron or 0.016mm).
- Objet Polyjet Technology: liquid photopolymer cured with UV lights.
- Droplets of liquid polymer are deposited and cured one layer at a time.
- Ability to print mixed materials (soft/rigid) at same time.
- Print speeds increased because of “Polyjet” compare to an Ink Jet printer.
- Supports Raymotion 2.0 >> “Reduce Time to Market For Innovation” <<
- “Design for Function” versus “Design for Manufacture”.
  - Ability to make parts that are outside current manufacturing methods.
Additive Manufacturing Video
Assembly Detection

- **Assembly Quality Control for Fluid Attachments**
  - The technology is based on detecting a change to a pre-determined resonant frequency via Radio Frequency (RF):
    
    \[ F_R = \frac{1}{2\pi\sqrt{LC}} \]

    By changing the Inductance (L) or the Capacitance (C), the resonance frequency shifts.
  - This concept has been realized by creating an integrated plastic & copper inductor spring. The spring is compressed upon connection which changes the inductance.
  - Detecting the frequency clearly shows the state: **Connected** or **Not Connected**

- Current Development: Quick Connectors for Hidden Assemblies
- Sponsor: Rayconnect
Induction Welding with Ferrimagnetic Polymers
- The advanced process is realized by locally generating a magnetic field, which creates a hysteresis heating effect caused by repeated magnetic distortions of the ferrimagnetic material.
- The ferrimagnetic polymer material has been developed by Rayce.
- The process control system ensures optimum quality.
- Adaptable to various polymers.

Current Development: Quick Connector to Polyamide Tube Assembly
Sponsor: Rayconnect
Potential Opportunities: Panel Fastening → Carbon Fiber Body Panels
Energy Autonomous Sensing & System Monitoring

- Using existing thermal energy (heat), we supply usable electrical energy to any ultra-low power sensor in combination with a wireless communication system.
  - No Batteries or Wires
  - Hermetically Sealed Packaging for any Environment
  - No Maintenance

Current Concept: Fluidic & Surface-mounted Temperature Sensor

Other Known Ultra-low Power Sensors available:
- Pressure, Flow, Acceleration, Optical & Chemical

Potential Market Applications:
- Radiator Valves (Building)
- Greenhouse Monitoring (Agriculture)
Sensor Integration

- **Energy Efficiency via Sensor Integration**
  - Energy efficiency is achieved by better system understanding - the more information you receive, the more you can control.
  - By integrating sensors into connection fasteners, value is added:
    - Cost & Weight Reduction
    - Less Interfaces & Complexity
    - Reduction of Assembly Time at the Customer
    - Reduction of Packaging Size

- **Current Research Fields:**
  - Integrated Flow Sensors
  - Integrated Ethanol Sensors
  - Integrated Temperature Sensors
  - Integrated Gas Detection Sensors

- **Current Serial Application:** End-cap QC with Integrated Pressure Sensor
Traceability & Information Storage

- **RFID Integration**
  - Integration of passive RFID tags, which are powered by the electromagnetic fields used to read the information, into plastic components - enabling hermetically sealed information storage systems.
  - Reading distance capable of 2 meters, depending on the frequency band.

- **Current Serial Applications:**
  - Animal Tagging & Traceability
  - Sewer Plate Data Storage
  - Train Axel Indentification & Traceability
Ongoing Projects

- Fastening Technologies for Reinforced Fiber Composites
- Lightweight Fasteners
- Powder Injection Molding
- Bio Materials
- Smart Materials
- ... & More
Supporting Developments

- **Plastic Material Development**
  - To reduce dependency on our material supply chain, we research and develop our own formulas. Currently evaluating the following fields:
    - Functionalization of Polymers
    - Added Functionality
    - Recyclability
    - Smart Materials

- **Simulation @ Rayce**
  - Development of New Simulation Methods. Currently evaluating:
    - Multiphysical
    - Metal Processing (Stamping/Bending)
Supporting Services (Validation, Research & Prototyping)

- **Environmental Testing**
  - Vibration Testing → Peak Loads Capable of 15 kN
  - Weathering & Climate Change Testing → Sun, Rain, etc.
  - Salt Spray Testing
  - Temperature Shock Testing (for fluids)

- **Physical Testing**
  - Tensile Testing → Capable of 50 kN
  - Differential Scanning Calorimetry (DSC) → Plastic Characterization
  - Rheometry Testing → Sheer-Modulus
  - Digital 3D Microscope (Keyence)

- **Electrical Testing**
  - Digital Storage Oscilloscope
  - Inductance, Capacitance & Resistance (LCR) Testing
  - Infrared (IR) Camera

- **Benchmarking**
  - A2MAC1 Investigations & Support (Automotive)
  - In-house or Outside Strategy Support

- **Rapid Prototyping**
  - Objet Printer → Additive Manufacturing
Thank you very much!
... it’s more than Engineering!

Questions are welcome...

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