Teledyne DALSA

Our People, Technology, and Products

TELEDYNE DALSA
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Our Parent Company, Teledyne Technologies

- Teledyne is a US-based leading provider of sophisticated electronic subsystems, instrumentation and communication products, engineered systems, and energy and power generation systems
- Headquarters in Thousand Oaks, CA
- Revenue of $2.4 billion in 2014

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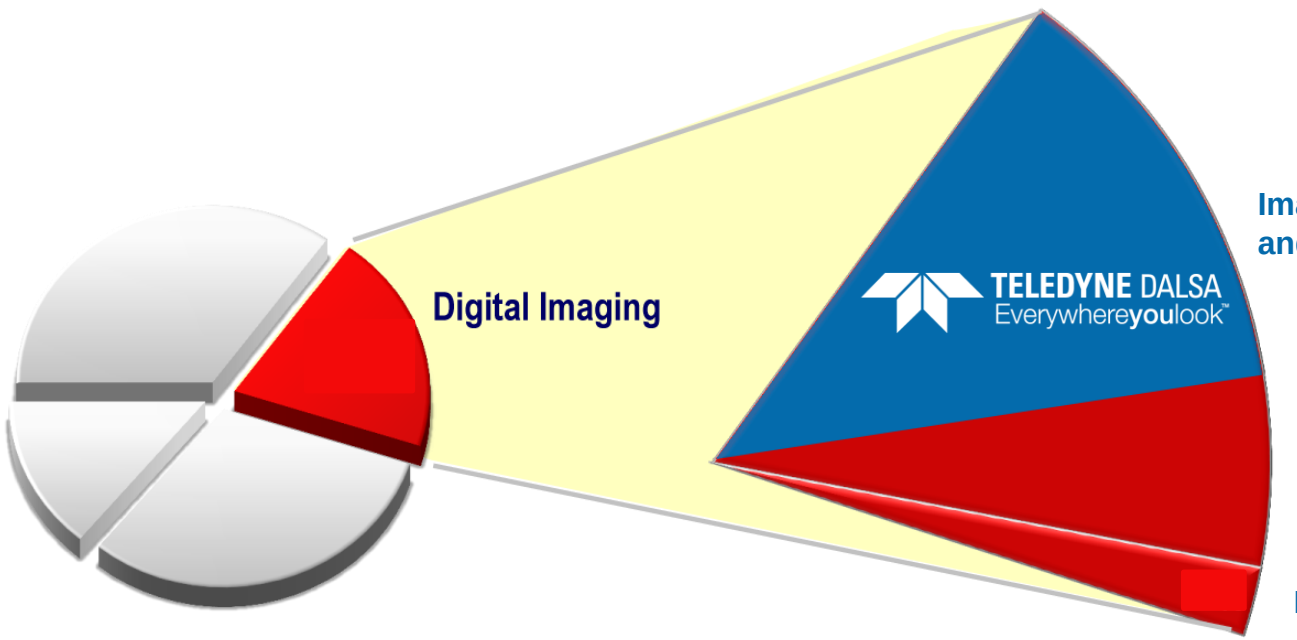
Where We Fit In



2014 Digital Imaging Segment Overview:

- **Sales: $404M | 16.8% of total**

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Teledyne DALSA at a Glance

- Provider of high performance digital imaging and semiconductor solutions
- Operations based in Canada, US and Netherlands
- Sales and customer support offices world-wide
- 962 employees world-wide

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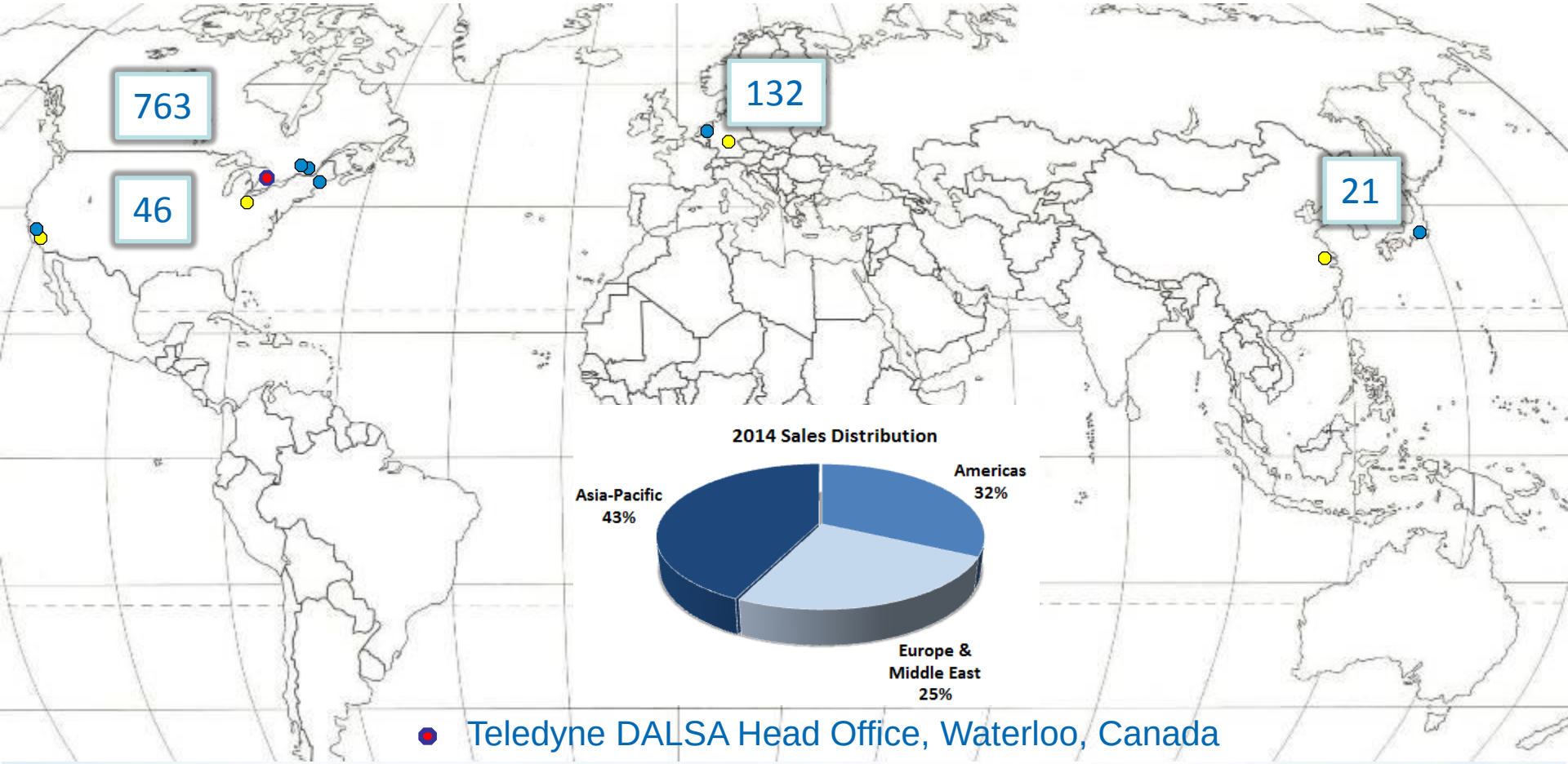
Worldwide Operations; 97% Exports



- Teledyne DALSA Head Office, Waterloo, Canada
- Teledyne DALSA Operating Locations (Canada, US, NL)
- Teledyne DALSA Sales and Technical Customer Support (Canada, US East, Central, West, Munich, Tokyo, Shanghai)

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Two Sides of the Business

Digital Imaging

Leading supplier of high performance digital imaging components

Semiconductor

Leading MEMS wafer foundry

Internal supplier of CCD image sensor wafers

Our Organization

Robert Mehrabian
Chairman, President, and CEO
Teledyne Technologies Incorporated

Rex Geveden
Executive Vice President
Digital Imaging and Engineered Systems
President
Teledyne DALSA

Aldo (Al) Pichelli
Executive Vice President
Instrumentation and Aerospace and Defense Electronics

Human Resources
Information Systems and Technology

Semiconductor Foundry Services
Claude Jean
Executive VP and GM
(Bromont)

Professional Imaging
Guido Aelbers
Executive VP and GM
(Eindhoven)

Asia Pacific
Keith Reuben
Executive VP – Sales
Imaging products

Digital Imaging
Gareth Ingram
Executive VP and GM
(Waterloo)

Corporate Finance
Silvio Favrin
Executive VP Finance

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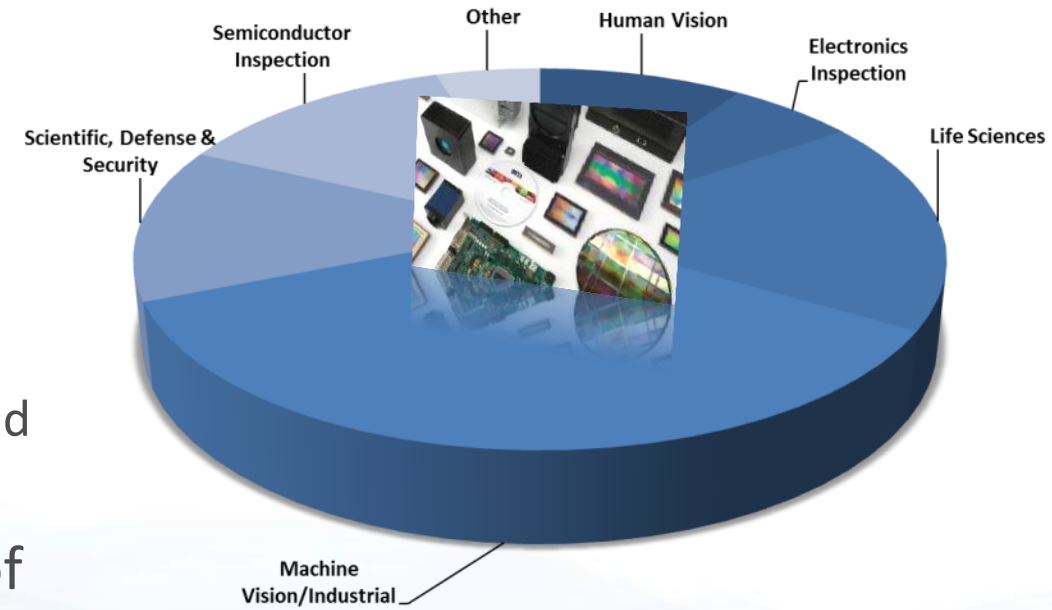
Our Digital Imaging Business

- Teledyne DALSA supplies digital imaging components for diverse applications
  - Machine vision / industrial inspection
  - Life sciences
  - Human Vision
  - Space imaging / Defense and Security
- We are a majority owner of Optech, a Canadian leader of LIDAR based imaging systems

Breakdown of Digital Imaging Revenue
By End Market Application



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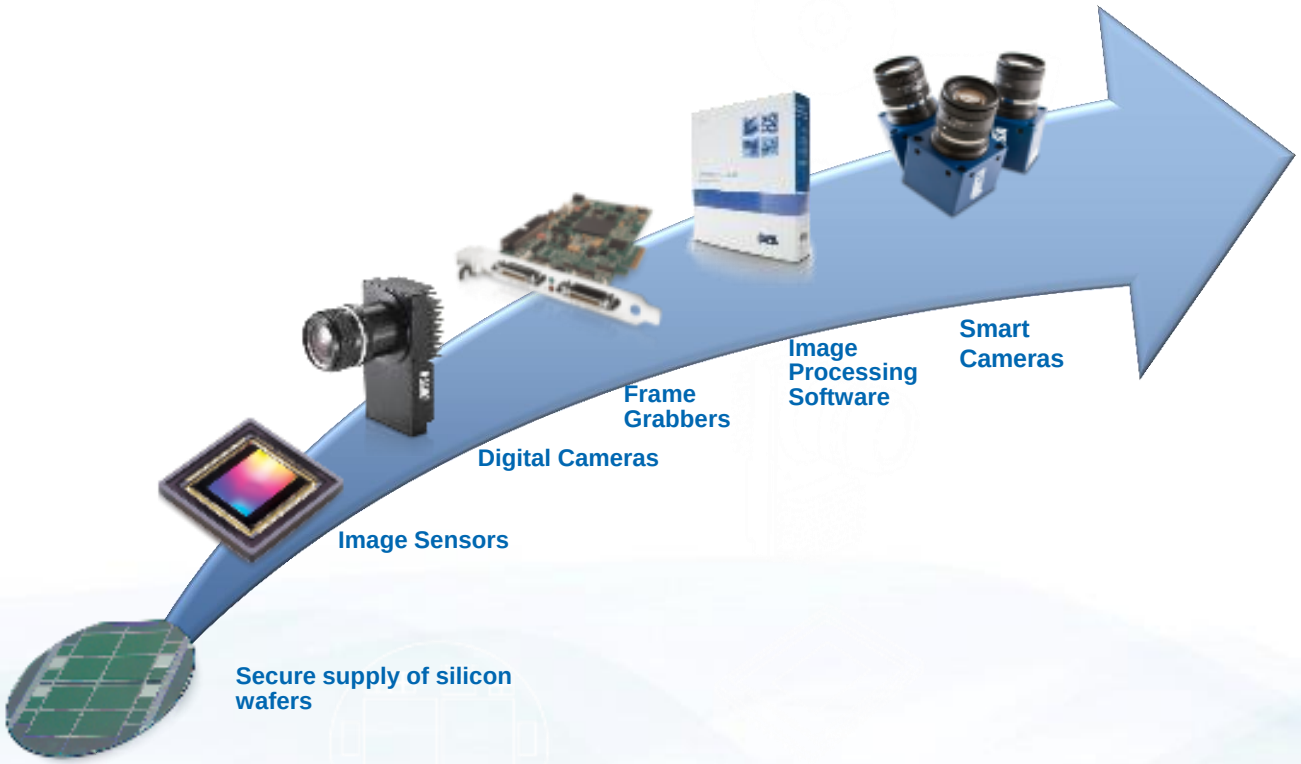
We are a Vertically Integrated Supplier

- We are the digital imaging industry's only completely vertically integrated supplier, offering "Silicon to Smart Cameras"



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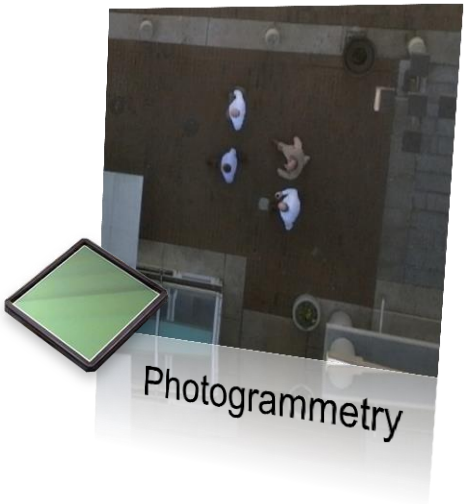
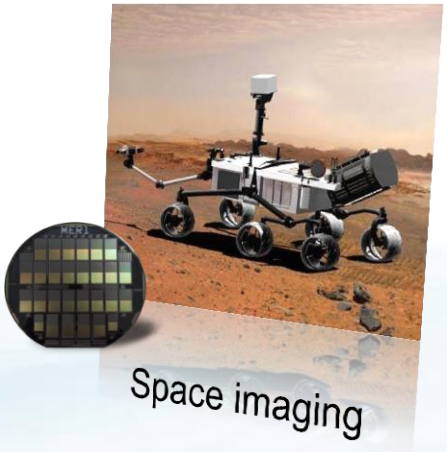
Examples of our Technology at Work

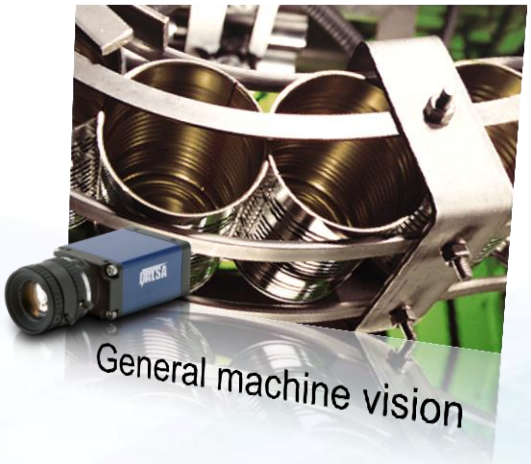

Flat panel inspection


Photogrammetry


Postal/parcel inspection


Space imaging


Medical x-ray imaging


General machine vision

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Our Semiconductor Business

- Specialized semiconductor wafer manufacturer
  - One of the world's leading MEMS foundries
  - A strategic supply of CCD semiconductor wafers and advanced WLP capability to the rest of Teledyne DALSA's business

TELEDYNE DALSA SEMICONDUCTOR FOUNDRY HISTORY

1976 – 2002	Fab run by MITEL to manufacture its telecommunication CMOS chips on 75mm-100mm-150mm
2002	Fab acquired by DALSA to manufacture CCD image sensors as well as start doing MEMS foundry
2004	Fab4 (12,000 sq ft expansion for 150mm MEMS wafers) along with CCD BST facility built
2009	200mm MEMS wafer expansion
2011	Acquisition of DALSA by Teledyne Technologies
2012	Collaborative Center for MiQro Innovation (C2MI) start of operation – Achieved top pure play MEMS foundry
2014	Exceeded $40M MEMS sales for the first time

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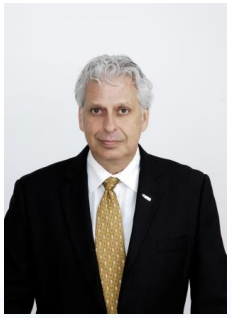
TELEDYNE DALSA SEMICONDUCTOR ORGANIZATION

Claude Jean
Executive VP & GM



Luc Ouellet
VP manuf tech dev

Marc Faucher
Dir product solution

Stéphane Blain
Dir of operations

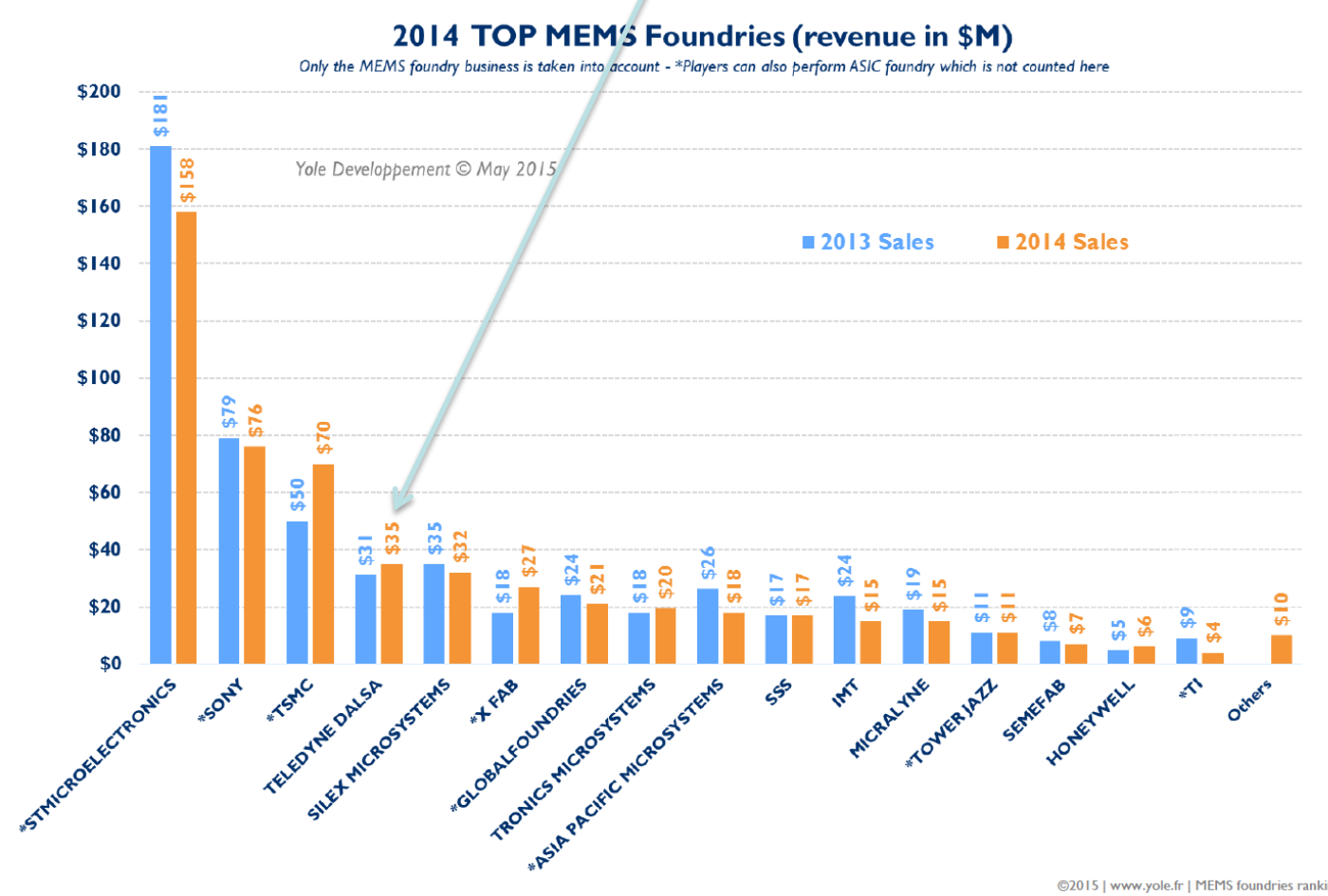
Claude Jean
Acting Dir quality-environment

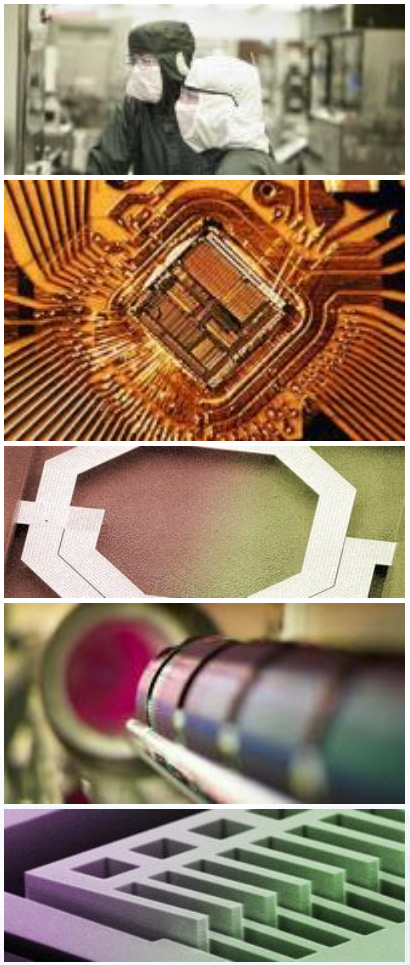
Donald Robert
VP sales & marketing

Judith Brunelle
Dir HR

Julie Morneau
Dir finance

TELEDYNE DALSA SEMICONDUCTOR
A LEADING PURE PLAY MEMS FOUNDRY





TELEDYNE DALSA SEMICONDUCTOR MEMS and CCD sensors are Everywhere You Look !

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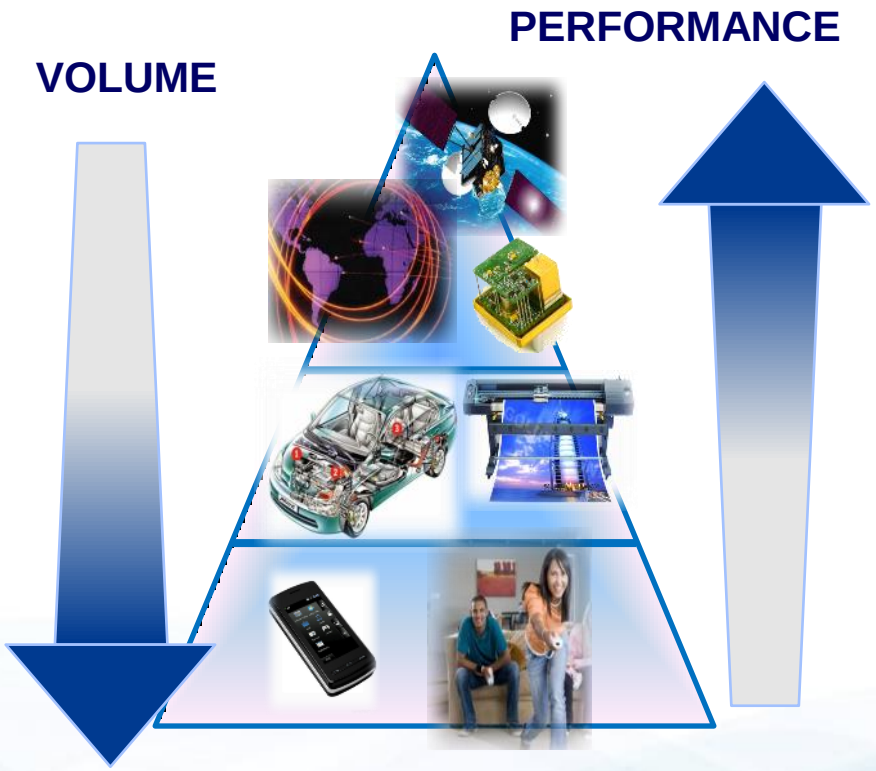
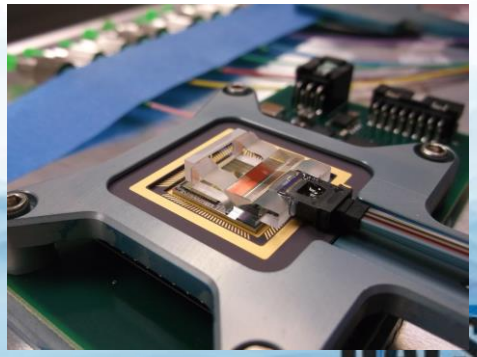
TELEDYNE DALSA SEMICONDUCTOR FOUNDRY BUSINESS MODEL

- Combine in the same fab consumer/automotive high volume products + industrial/scientific/medical high value added products
  - High volumes products require an expensive, high throughput set of equipment but can provide the margins to fully pay for it
  - High value added products need performance that usually comes with an expensive and highly automated set of equipment but cannot pay for it by itself
  - Both combined = model that works



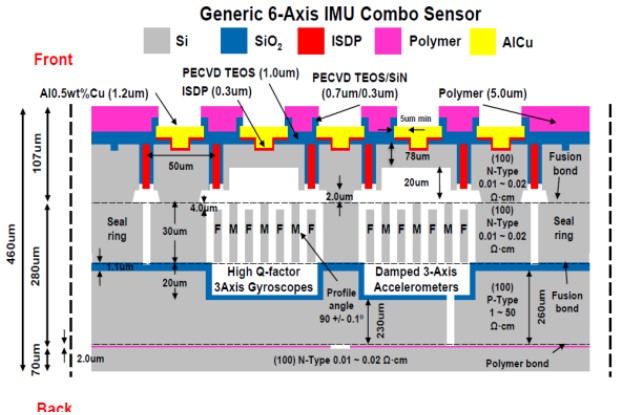
Typical applications & markets served

- Microphones for consumer products
- Pressure, flow and Temp sensors for industrial products
- Pressure sensors for automotive
- Micromirrors for fiber optic switching
- BioMEMS for research
- Nozzle plates for industrial printers



MEMS CURRENTLY IN DEVELOPMENT AT TELEDYNE DALSA SEMICONDUCTOR

- Gyroscopes, accelerometers & IMU based on MIDIS™ standard technology platform
- Microbolometers + WLP
- Microphones
- MOEMS
- Resonators
- Pressure sensors



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Engagement model

1. **If customer is looking to transfer to TDSI an existing MEMS, then 2 options:**

   a) Copy exact of the process flow in TDSI fab to implement customer design.

   b) Adaptation of the process flow with TDSI technologies to implement customer design as is or with some design modifications.

   Both options a) or b) can be done on 150mm or 200mm depending on volumes and technologies. Some process steps can be done at C2MI if not available at TDSI

Engagement model

2. **If customer is looking at developing a new MEMS process and design with TDSI:**

   a) **Customer have capability to design the MEMS ?**

   YES: joint design and process flow development between customer and TDSI. TDSI provide design assistance, simulation and modelisation services, DRC, etc…

   NO: Customer/TDSI need to identify a design partner

   b) **High volume application ?**

   YES: Process flow developed in C2MI on 200mm. Process qualification, customer sampling and low volume production can be done in C2MI. TDSI transfer the process flow in its fab when volumes justify the investment

   NO: Process flow can be developed on TDSI 150mm line. If required technologies are not available on TDSI 150mm, PF can be developed in C2MI and remain at C2MI for the whole product lifetime if volumes remain low.

   In any engagement model, collaboration is always key. MEMS development require close collaboration between all partners

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TDSI QUALITY SYSTEM

- TS16949 & ISO14001 Registered
- Qualified automotive supplier; audited by major auto makers in recent years
- Reliability testing and monitoring
- Reverse engineering and failure analysis services
- End-to-end traceability
- Quality System for medical implantable devices – traceability to wafer level / data logging and storage for 25 years
- RoHS compliant
- Root Cause Analysis through 8D

LET US BUILD YOUR SENSORS !

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