Introduction to RocketMEMS™

AMFITZGERALD
& ASSOCIATES

RocketMEMS is a new era in MEMS development

- **MEMS solutions for OEMs and system integrators**
  - **Standardized processes**
  - **ISO 9001, 13485 certified foundries**
  - **Cost-effective multi project wafer runs**
- **Don’t reinvent the wheel! Leverage a library of generic sensor architectures**
- **First run: pressure sensors, Q2 2013, at Silex Microsystems**
- **More sensors and more foundries in the future…**

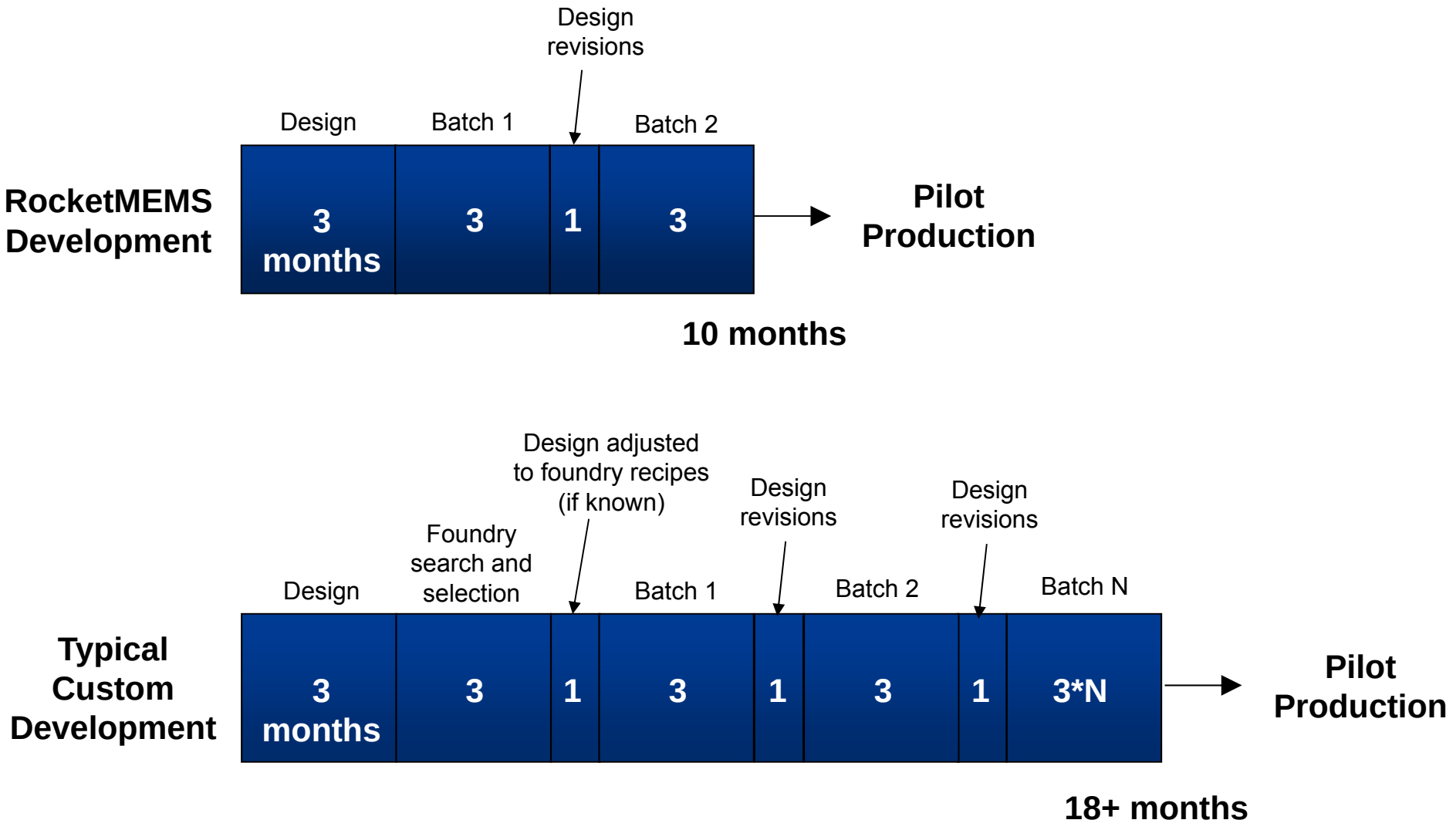
Is RocketMEMS the right solution for you?

- **If you have:**
  - **A well-defined sensor specification**
  - **Not been able to find what you need off-the-shelf**
  - **A need for MEMS prototypes to support system integration**
  - **Low volume production need: < 50,000 sensors per year**

- **If you value:**
  - **Getting working silicon as fast as possible**
  - **Certainty of a proven fabrication process**
  - **ISO-certified manufacturing facilities**
  - **Lower development risks and costs**

RocketMEMS will likely meet your MEMS needs

RocketMEMS reduces time, money and risk of development



How it works

- **Customer supplies sensor specification**
- **Starting with our generic architecture, we tailor a sensor design to your specification**
- **We aggregate multiple customers' designs into a single wafer run**
  - **"Multi-project Wafer" runs or MPW (a.k.a. shuttle runs) keep costs low**
- **Tapeout to ISO-certified foundry**
  - **Foundry standard processes**
  - **Chips ready in ~3 months**

Q2 2013: Pressure sensor examples

Industry	Medical	Consumer Electronics	Industrial or Aerospace
Pressure range, gage or absolute (atm)	0.05 - 0.5 (38-380 mmHg)	0.1 – 2	1 – 7 (15-105 psi)
Resistor value (KΩ)	0.5 – 10	0.5 – 10	0.5 – 10
Edge length (mm)	1 – 4	1 – 4	1 – 6
Thickness (mm)	0.050 - 0.65	0.65	0.65

Pressure sensor applications – some examples

Medical	Consumer	Industrial or Aerospace
Blood pressure cuff Spirometer CPAP machine Catheters Endoscopes Infusion pumps Flow measurement Physical therapy	Altimeter (height) Weather Kitchen appliances Wristwatches Sports equipment	Hydraulic systems Pitot tubes Fuel gage Engine control Exhaust management HVAC systems Monitors

About the pressure sensor

- Doped polysilicon piezoresistor sensor
  - Good linearity and sensitivity
- Single crystal silicon membrane formed in SOI wafer
  - Precise membrane thickness, less variability
  - High burst pressure
- Simple Wheatstone bridge readout
  - Low cost electronics
  - Easy calibration

Pricing

- **Bare die delivered on tape or in gel packs**

Chip quantity	Price
Base (250 chips minimum)	$150,000
Next 250 chips	+ 25,000
Next 500 chips	+ 25,000
More?	Please inquire

Additional details

- **Bare die will be delivered**

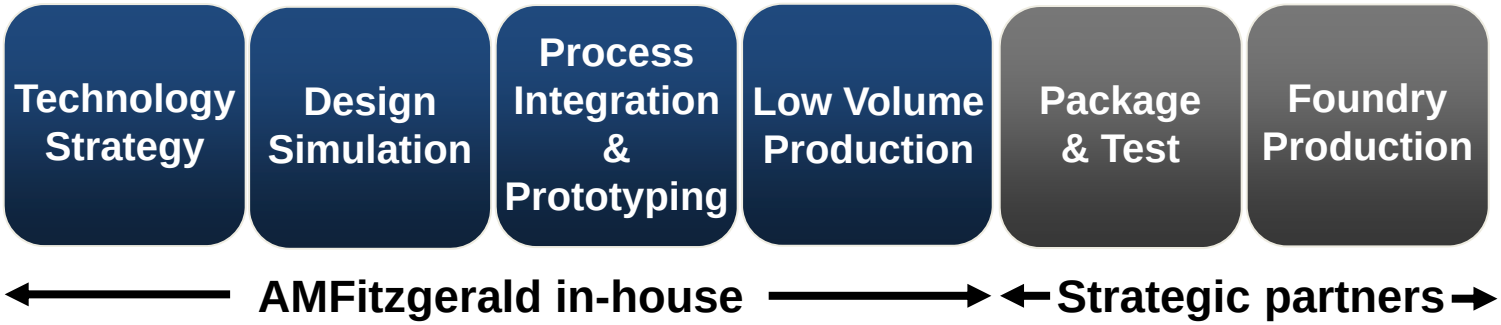
- **Available at extra cost:**
  - **Packaging and calibration**
  - **Engineering services and system integration**

AMFitzgerald company background

- **MEMS product development firm with global clientele**
- **Founded 2003**
- **Burlingame, CA: near SFO and Silicon Valley**
- **Consistent growth**
  - **Over 110 clients served to date, startups to Fortune 100 companies**
- **Active member of the MEMS Industry Group**

Headquarters in Burlingame, CA

AMFitzgerald: complete solutions from concept to production



- Make vs. buy decisions; technology roadmaps
- R&D management, multi-disciplinary engineering team
- Design and process integration for volume production
- In-house prototype fabrication (150 mm wafers) by our engineers, not operators
- Smooth transition to production partners

Solutions beyond R&D

A menu of production options for different customer needs

Full custom low volume

AMFITZGERALD

Open search for foundry partner

Full custom high volume

Open search for foundry partner

Fast time to market with foundry-specific design

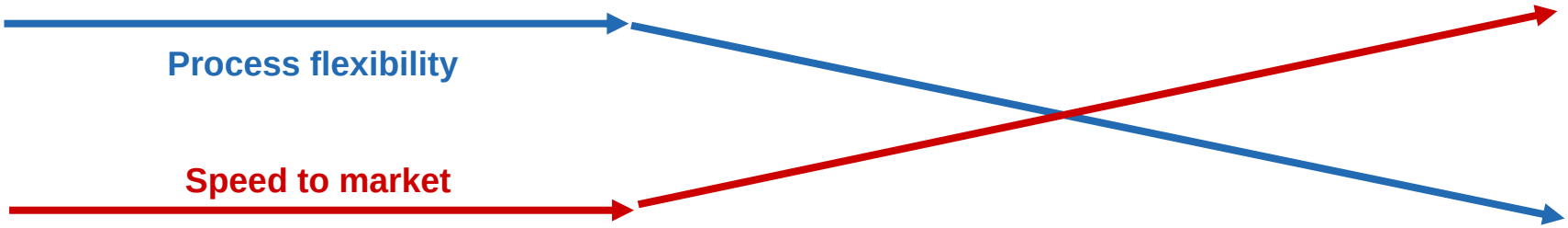
micralyne

silex MICROSYSTEMS

Faster time to market with semi-custom sensors

Fastest time to market with standardized 200mm process

InvenSense
Innovation in MEMS



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