JABIL OPTICS OVERVIEW
Through strategic investments, Jabil has become a world-class manufacturing partner in optics.
COMPUTATIONAL CAMERAS

Advanced optics encode visual information for next-generation applications

PROJECTION SYSTEMS

Miniaturized projection systems for RGB image projector modules and IR pattern projector modules
“The growth of the market is propelled by the exponential growth in the consumer electronics application market; especially owing to the growing demand for devices such as cameras, smartphones, and tablets.”

Source, Markets and Markets Global Forecast 2014 - 2020

Note: CAGR is calculated for the period between 2015 and 2020.
Source: Secondary Literature, Experts’ Interviews and Markets and Markets Analysis
GROWING MARKET:
COMPUTATIONAL CAMERAS

“Mobile Devices Will Either Have 3D Sensors or Suffer Flat Sales…”
TechCrunch, September 9, 2015

Mobile Camera TAM w/ Computational Camera Adoption

- Smartphone w/ Computational Camera
- Smartphone

Tiles

2013 2014 2015 2016 2017
0 500 1,000 1,500 2,000 2,500 3,000
(M) units

Jabil Proprietary & Confidential
KEY MARKETS DRIVE ADOPTION

- PC / LAPTOP
- ROBOTICS
- MEDICAL
- MOBILE PHONE
- AUTOMOTIVE
- SECURITY & SURVEILLANCE
GROWING NUMBER OF CONSUMER USE CASES FOR 3D IMAGING

AVATAR PERSONALIZATION

3D SELFIE

E-COMMERCE SCANNING FOR THE PERFECT FIT

3D PRINTING
SECURITY APPLICATIONS FOR 3D SENSING

- **MOBILE BANKING**
  (Ex: facial recognition/authorization)

- **OBJECT DETECTION CONNECTED HOME**
  (Ex: reducing false positives)

- **OBJECT PLACEMENT IN PUBLIC SPACES**
  (Ex: backpack left behind)

- **WALK-THROUGH SECURITY SCANNING**
  (Ex: detect presence, position, volume)
AUTOMOTIVE 3D SENSOR/LIDAR APPLICATIONS

DISTRACTED/FATIGUED DRIVER DETECTION
SITUATIONAL AWARENESS
SECURITY & AUTHENTICATION
SEAT & AIR BAG ADJUSTMENTS
SMART HEADLAMPS
HEAD-UP DISPLAY
GESTURE RECOGNITION
ACTIVE ALIGNMENT FOR MINIATURIZATION

Maximum precision for better performance and yield.

TECHNOLOGY DEMANDS

• New devices more difficult to manufacture
• Lens must be closer to active device
• Larger aperture lens required
• Decreasing pixel pitch
• Multi-lenses (array, 3D)
• Vision analysis requirements
• Clean manufacturing environment
• CMs and OEMs must differentiate to increase margins
VALUE OF THE PLATFORM

By partnering with leaders across the ecosystem, Jabil Optics is part of a comprehensive platform strategy.
Contributes a major value to the overall price of the camera module.

SOURCE: MARKETS AND MARKETS 2015
D3 – DESIGN, DEVELOPMENT, & DEPLOYMENT

**DESIGN**
Optical, mechanical, and electronic parts design and validation

**DEVELOPMENT**
Process development and validation to assemble designed parts

**DEPLOYMENT**
Lean Six Sigma-based manufacturing of designed and developed solutions

**FASTER TIME TO MARKET**
**INCREASED YIELD**
**MAXIMUM PRECISION**
# Broad Scope of Customer Experience

**Jabil Has Provided**

- **Full Product Design**
- **Opto-Mechanical Design**
- **Development & Integration**
- **Industrialization Deployment**
- **Mass / Serial Production, High Precision Assembly Deployment**

**For**

- **Camera Modules** including ultra-compact, high res
- **Projectors**
- **3D Sensors**
- **Scanners** including thermal, bar code
- **AR & VR** including compact wearables
GLOBAL OPERATIONS
FOR INNOVATION, DESIGN, & EXCELLENCE

San Jose, USA

Burlington, USA

Jena, Germany

Haifa, Israel

Huangpu, China

PROCESS DEVELOPMENT

• Advanced process solutions
• Optimal material and component selection
• Customized adhesive solutions
• Equipment guidance and selection

ACTIVE ALIGNMENT

• Active alignment
• Precision Components Placement
• Lens assemblies
• Gluing technologies
• Chip-on-board, Chip-on-flex,
• Chip-on-stiffener, FlipChip
• Wire-bonding and ACF bonding
• Assembly Automation

PRODUCT DESIGN

• World class optics design
• Electrical engineering
• Design for high-volume manufacturing
• Design to cost

MANUFACTURING ENGINEERING

• Design & procurement of optical lens assemblies and sub-assemblies
• New product introduction
• High-volume production of optical solutions
• Final goods assembly
• Test
• Pack-out

Opening in September 2017
THANK YOU

Jabil Optics — Building the vision with embedded optical solutions.