

**MONTANA PHOTONICS INDUSTRY ALLIANCE
2014 INDUSTRY SURVEY**

September 9, 2014

I. BACKGROUND

This survey was conducted in the spring and summer of 2014 to better understand the size, composition and needs of the optics/photronics industry in Montana. All of the organizations identified to date as “optics and photronics organizations” are located in the Gallatin Valley.

II. OBJECTIVE

Establish a definition of optics/photronics organizations and estimate the current number of employees and payroll (wages and direct benefits) of these organizations located in Montana.

III. DEFINITION OF OPTICS AND PHOTONICS ORGANIZATIONS

We define Montana optics and photronics organizations to include those that meet one or more of the following criteria:

- a. Manufacture or sell products that rely on optics or photronics technology for a significant portion of their functionality. Examples include companies that manufacture or sell lasers, laser ranging systems, optical spectrometers, or optical materials such as silicon and laser crystals.
- b. Derive a majority of their revenue from products that are sold into the optics or photronics market. Examples include companies that sell laser power supplies and companies that sell cryogenic cooling systems used in photonic research.
- c. Departments and other groups within universities that teach and/or engage in optics or photronics research. Examples include the MSU Physics and EE/Optics programs, the Optical Technology Center, and Spectrum Lab.

IV. MONTANA OPTICS AND PHOTONICS ORGANIZATIONS

The following 25 organizations meet the definition above and are included in the survey.

AdvR, Inc.
Altos Photonics
Bridger Photonics
FLIR/Scientific Materials
Image Labs International
Inrad Optics
Lattice Materials Llc
MicroLab

Montana Instruments
 Montana Molecular
 Montana State University
 New Gate Technologies, Inc.
 New Wave Research
 Newport/ILX Lightwave
 NWB Sensors, Inc.
 Phenix FO
 Quantel USA (formerly Big Sky Laser)
 Quantum Composers
 Resonon, Inc.
 S2 Corporation
 Sensopath Technologies
 Sensory Labs
 Teledyne/Photon-Machines
 Wavelength Electronics
 Yellowstone Scientific Instruments

V. NUMERICAL SURVEY RESULTS

Following are the numerical results of the survey. Estimates for headcount and growth rate have been used for the five companies for which no data was available. It is believed that these estimates result an uncertainty of less than 5% in the headcount and related numbers presented below.

Number of organizations surveyed	25
Number of responses received	20
Number of employees	460*
Forecast headcount growth	6.7%
Number of employees, ex MSU	356
Forecast headcount growth, ex MSU	8.7%
Average pay and benefits per employee	\$60,934
Average pay and benefits per employee, ex MSU	\$71,961**

*Includes approximately 80 students employed in optics or photonics related research at MSU

**Includes results from 12 organizations that provided data

VI. RESULTS OF NARRATIVE SURVEY QUESTIONS

A. What are the three most important things that the MPIA could do to promote the success your organization?

The three most common answers were:

- Promote Montana's photonics industry, both outside and inside the state (28%)
- Provide networking opportunities (17%)
- Provide assistance with recruiting (17%)

B. What are the three most important things that the city/county government could do to promote the success your organization?

The three most common answers were:

- Support the Montana Photonics Industry Alliance (20%)
- Support a campaign to increase awareness the growing Montana photonics industry and the attractiveness of this area for photonics companies and employees (20%)
- Support infrastructure projects such as increased internet bandwidth and better business travel connections (20%)

C. What are the three most important things that the state government could do to promote the success your organization?

The three most common answers were:

- Provide funding to support research, development, and marketing of new products (39%)
- Support a campaign to increase awareness the growing Montana photonics industry and the attractiveness of this area for photonics companies and employees (17%)
- Provide assistance with recruiting (11%)

VII. GOALS SHARED WITH MAIN STREET MONTANA

Governor Steve Bullock initiated the Main Street Montana Project in early 2013 with the overriding objective to write a business plan for Montana, by Montanans. The Main Street Montana Project plan was released in early April 2014. It identifies five Pillars upon which the plan is built. These five pillars along with supporting key goals are listed below.

Many of the key goals of the Main Street Montana plan are closely aligned with the goals of Montana's photonics industry. These key goals are underlined in the summary below and suggest areas for collaborative partnerships between the MPIA and city and state government. Details of the Main Street Montana Project may be found at:

www.mainstreetmontanaproject.com.

Main Street Montana Project Pillars

1. Train and Educate Tomorrow's Workforce Today - The importance of a well-educated, trained and skilled workforce was the most consistent and frequent message heard from all corners and all constituencies.

Key Goals:

- (1) Align educational system with the needs of a changing economy
- (2) Engage private-public partnerships to provide job training, apprenticeship, and professional development opportunities
- (3) Provide a lifetime continuum of quality education from pre-school through adulthood

2. Create a Climate that Attracts, Retains and Grows Business - Montana is a good place to do business, but it can and should be improved.

Key Goals:

- (1) Foster a business-friendly climate through efficient and effective government
- (2) Increase access to capital and resources for Montana businesses
- (3) Coordinate economic development efforts throughout the state

3. Build Upon Montana's Economic Foundation - Montana is known as the Treasure State for good reason. We provide resources that produce energy and wealth, we help feed the nation and world, and we have incredible outdoor opportunities to offer both residents and visitors.

Key Goals:

- (1) Responsibly develop Montana's natural resources for long-term economic growth
- (2) Ensure Montana businesses and communities have efficient and reliable infrastructure
- (3) Protect Montana's quality of life for this and future generations

4. Market Montana - We have a good product in Montana. We believe we can improve it. But we also need to do a better job of marketing it.

Key Goals:

- (1) Strengthen and promote the Montana brand to recruit businesses, workers and tourists
- (2) Increase promotion of Made in Montana products and exports

5. Nurture Emerging Industries and Encourage Innovation - Technology and innovation are increasingly the drivers of economic, job and wage growth across the globe. Montana needs to participate.

Key Goals:

- (1) Strengthen role of universities as technology incubators through research, development and commercialization

- (2) Foster innovation and encourage knowledge-based industries to locate and grow in Montana
- (3) Support entrepreneurs and small businesses to enhance their potential to achieve growth and stability

VIII. CONCLUSIONS

- The photonics industry in Montana encompasses 25 organizations which employed approximately 460 people at the end of 2013. Employment within the industry is expected to grow approximately 7% in 2014.
- Excluding university system faculty and paid student researchers, average pay and benefits within the industry was approximately \$71,000 at the end of 2013.
- Narrative comments from the survey provide insights into opportunities for the MPIA, city, and state government to help the industry grow. (See “Results of Narrative Survey Questions” above.)

APPENDIX

FULL SURVEY NARRATIVE RESPONSES

To preserve anonymity, respondents are identified only by a number. The correspondence between the number and the respondent is recorded in a separate, numerical results worksheet.

I. What are the three most important things that the MPIA could do to promote the success your organization?

1. Contacts. [1]
2. Networking. [1]
3. Help with regulation compliance. [1]
4. Promote Montana's optics/photonics industry [2]
5. Attract high quality employees to the region [2]
6. Promote networking and relationships amongst Montana photonics companies [2]
7. Aid in establishing a technical advisory board by helping identify people in industry who would be a fit for where we're going. [3]
8. Launch and continually improve an ongoing campaign to bring international awareness to the innovative photonics industry in MT. This will help in attracting and hiring the best talent worldwide when our candidates already have some knowledge about our exciting technical community. This will also help in sales as customers gain awareness and recognition of technical authority that MT companies have. Advertise in places such as Photonics Spectra, Review of Scientific Instruments with a professional marketing company to accomplish this. [3]
9. Hire a "technology connector" who works on behalf of the photonics companies represented by MPIA. His/her job is to meet with and understand our respective technologies and direction, and then go out into industry and make connections, find opportunities, do market research, turn-over rocks. This would have to be a very talented person, with a high-level of technical understanding in physics and photonics as well as a business sense and very good communication skills, but if such a person could be found, they could bring tremendous value to our industry. If successful, such a person would find new opportunities, which would cost \$ which leads to 4. [3]
10. Establish a matching dollar fund for new technology that creates new jobs in MT. Give preference to the companies that have a track record for creating products that successfully meet market needs. These are the companies who have the "DNA" for wise use of \$ to create products which create long-term jobs. This would help offset R&D budgets of photonics companies and help us be more aggressive in pursuing new opportunities. Keep the program lean and expect and measure results. Companies who participate could be expected to also participate as "alumni" who give back by fostering growth of new companies in some measurable ways. [3]

11. Intentionally work to create synergistic groups within the University system. For instance, if the U does not have strong component of “new materials characterization and surface science”, what could be done to create that? End result would be synergy with companies developing new technology for areas of new materials characterization and surface science, and graduates who are well positioned to create value for the photonics industry here. [3]
12. Provide a pool of resources for Montana employers in the high tech industry and, an avenue for people (both local and remote) to locate local high tech employment opportunities. [4]
13. Provide a comprehensive library of local companies and what they do; available online. [4]
14. Provide a venue for local company leaders and employees to liaise with local business’s/leaders that would complement the high tech industry, i.e. graphic arts, lawyer services, accounting, industrial design, manufacturing, etc. [4]
15. Networking is helpful - There are a lot of applications for vision. Many people in Bozeman don't know what we do or who we are. Very little of our business is local, but I think we could be more helpful to the local companies and university departments if they knew who we are and what we do. [5]
16. Keeping us current - Keeping up with the trends and the new technology can be a full time job. It is important to me to hear what people are talking about and interested in. There aren't a lot of people at my water cooler, so I am always looking for ways to stay in line with the current technology and especially with like-minded people. [5]
17. Being a resource - From other technical business owners, I have learned information relevant to running a business in Montana both on the technical side and the business side. I appreciate the forum for sharing that information. I also have information about the vision field and the markets that it supports that can be helpful to the optics companies. [5]
18. Continue group events that provide an opportunity to meet the photonics community in the area [6]
19. Provide contacts with local and state government sources [6]
20. A clear path to getting grant money to bring a product to market. [7]
21. Obtain lower cost, better coverage healthcare insurance by consolidating the local industry. [8]
22. Help us encourage support for graduate education and research in the Montana legislature, Regents, ... [9]
23. Help us recruit qualified graduate students for MSU optics programs [9]
24. Help us publicize optics in Montana [9]
25. Hiring, if we were doing that. [11]
26. Promotion, specific. [11]
27. Promotion, general of MPIA and cluster. [11]

28. Assistance in industry specific market research [12]
29. As-needed help in attracting photonics talent to Montana [12]
30. Enhanced exposure for [the company] and Montana within photonics industry and within government programs [12]

II. What are the three most important things that the city/county government could do to promote the success your organization?

1. Help given to the MPIA is appreciated. [1]
2. Do no harm. [1]
3. Support local events such as MPIA socials [2]
4. Launch and continually improve an ongoing campaign to bring international awareness to the innovative photonics industry in MT. This will help in attracting and hiring the best talent worldwide when our candidates already have some knowledge about our exciting technical community. This will also help in sales as customers gain awareness and recognition of technical authority that MT companies have. Advertise in places such as Photonics Spectra, Review of Scientific Instruments with a professional marketing company to accomplish this. [3]
5. Hire a “technology connector” who works on behalf of the photonics companies represented by MPIA. His/her job is to meet with and understand our respective technologies and direction, and then go out into industry and make connections, find opportunities, do market research, turn-over rocks. This would have to be a very talented person, with a high-level of technical understanding in physics and photonics as well as a business sense and very good communication skills, but if such a person could be found, they could bring tremendous value to our industry. If successful, such a person would find new opportunities, which would cost \$ which leads to 4. [3]
6. Establish a matching dollar fund for new technology that creates new jobs in MT. Give preference to the companies that have a track record for creating products that successfully meet market needs. These are the companies who have the “DNA” for wise use of \$ to create products which create long term jobs. This would help offset R&D budgets of photonics companies and help us be more aggressive in pursuing new opportunities. Keep the program lean and expect and measure results. Companies who participate could be expected to also participate as “alumni” who give back by fostering growth of new companies in some measurable ways. [3]
7. Intentionally work to create synergistic groups within the University system. For instance, if the U does not have strong component of “new materials characterization and surface science”, what could be done to create that? End result would be synergy with companies developing new technology for areas of new materials characterization and surface science, and graduates who are well positioned to create value for the photonics industry here. [3]
8. When making local policy always take into account (a) what can we do to make Bozeman more attractive to tech business and draw people here, (b) make sure policies don’t change

what has already been achieved in a. Kind of counterintuitive; don't change what already works but, find out what works and add to it... [4]

9. Strictly enforce existing lighting ordinances & promote better protection of night sky so that our optical sensing research can thrive and produce graduates ready for employment in the optical-sensing-related local industry (the county has been silent on this issue, and our biggest problem currently is car sales lots and bottom-lit billboards that are proliferating in the county). [9]

10. Help us increase understanding that it is almost exclusively graduate education and research that leads to graduates who are qualified to start and lead high-tech companies. [9]

11. Continue helping promote MPIA and related efforts for communication between optics-related industry and university people. [9]

12. City - Support infrastructure projects such as increased bandwidth in Bozeman. [10]

13. City - Promote the region as a "hot" spot for professional to relocate. [10]

14. City - Stay ahead of the "growth curve" learning from other high growth rate cities in regard to social infrastructure (traffic, crime, convenience, etc.) [10]

15. County - Promote better business travel connections for Bozeman. Complex connections to SoCal or the east coast make Bozeman a less attractive site for doing business. It is a real effect for customers and corporate travelers. [10]

16. County - Stay ahead of the "growth curve" learning from other high growth rate cities in regard to social infrastructure (traffic, crime, convenience, etc.) [10]

17. Hiring, if we were doing that. [11]

18. Promotion, specific. [11]

19. Promotion, general of MPIA and cluster. [11]

20. Funding and support for new growth initiatives. [12]

21. Assistance in ITAR regulations and our specific CJ. [12]

22. Control and continued cuts of all taxation. [12]

III. What are the three most important things that the state government could do to promote the success your organization?

1. Be ambassadors. [1]

2. Dollars are always nice! Eg, MBRCT and assistance with travel to trade shows. [1]

3. I've thought more about the angel investor group you mentioned from Arizona. I think it would be interesting to look at starting something like that here in Bozeman. Moreover, I think the state could be convinced to match investor dollars at some level. Clearly this would promote start-ups, investment in local companies, and revenue generation for the state. Also, the state doesn't have to worry so much about evaluating the technologies ... they rely on the fact that the investors are willing to put down their own cash for a start up. This needs some thought, but I think there's something there and I think the state would be into it. [2]

4. Launch and continually improve an ongoing campaign to bring international awareness to the innovative photonics industry in MT. This will help in attracting and hiring the best talent worldwide when our candidates already have some knowledge about our exciting technical community. This will also help in sales as customers gain awareness and recognition of technical authority that MT companies have. Advertise in places such as Photonics Spectra, Review of Scientific Instruments with a professional marketing company to accomplish this. [3]
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7. Intentionally work to create synergistic groups within the University system. For instance, if the U does not have strong component of “new materials characterization and surface science”, what could be done to create that? End result would be synergy with companies developing new technology for areas of new materials characterization and surface science, and graduates who are well positioned to create value for the photonics industry here. [3]
8. There is potential for the state of Montana to grow as a high tech environ throughout the western part of the state. We all know where the current hot spots are. The question is if there is policy that can be implemented to continue this trend? Can MT become the Silicon Valley of the Rockies? The crux is, not the kind of uncontrolled growth that we have seen in CA but, growth with an emphasis on controlled expansion of tech type work that would create a strong state economy yet maintains all that makes MT attractive to people. [4]
9. The matching funds and research grant programs are extremely helpful - continuing/more funding for each. [6]
10. Less expensive access to MSU scanning electron microscope and other instruments. This now cost + \$300 per hour and is not affordable and we have to do without. This is a handicap. [7]
11. A direct clear quick path to grant dollars to bring a product to market. [7]
12. Increase support for the MBRCT program. [8]
13. Support the currently proposed Research Initiative without deflecting funding to Butte. [9]

14. Adopt policies that promote rather than discourage graduate education at MSU. [9]
15. Promote Montana University System and Board of Regents policies that encourage graduate education and research at MSU (the current buzz word is "performance-based funding," but they measure performance almost exclusively through undergraduate metrics. [9]
16. Recruiting Assistance - We continue to face difficulties attracting skilled engineers and career technical professionals. Of particular concern are analog electrical, software/firmware engineers and Product Marketing professionals. Studies continue to show that we are paying in range for Montana but recruits from outside the state bring expectations for 10-30% higher wages. The state should focus efforts on: [10]
 - a) Reaching out to attract individuals that fit the "I will take a lower salary in exchange for the lifestyle".
 - b) Providing financial assistance to employers of high-tech, clean industries for bringing in technical talent. (Relocation assistance; hiring resources; grants; etc.)
 - c) Aggressively promote the "high-tech" prowess of Montana in key geographical areas (Southern California, Denver, Seattle, Boulder, Arizona, Boston, etc.)
 - d) This very well could be the "gating" issue in the growth of Newport in Bozeman.
17. Education [10]
 - a) Support photonics and engineering excellence in Montana higher education: (i.) Recruit the best faculty and research talent to our universities; (ii.) Build a strong "second tier" technology system producing technicians and skilled technical support staff.
 - b) Create programs that encourage K-12 to learn about and be excited by technology careers.
 - c) Help support county and city governments in attracting high-tech businesses. (See key points above)
31. Hiring, if we were doing that. [11]
32. Promotion, specific. [11]
33. Promotion, general of MPIA and cluster. [11]
34. Funding and support for new growth initiatives. [12]
35. Assistance in ITAR regulations and our specific CJ. [12]
36. Control and continued cuts of all taxation. [12]