

## Industrial Physics and Its Role

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### Perspective

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### PERSPECTIVE

"Industrial physics is that the application of physics knowledge and principles to the planning and manufacturing of products and services," said Steven Lambert, APS Industrial Physics Program Manager. "The success of recent technology is made upon a foundation of innovations in physics. Sometimes that's done directly or indirectly, but industrial physicists are the catalysts for creating this happen."

Industrial physics contributes to the US economy in several key ways, consistent with the report. This includes not only physicists with degrees who are working in industry as researchers, product designers, managers, research directors and entrepreneurs, but also engineers, chemists, materials scientists, technicians and other scientists and technologists who use experimental or theoretical physical principles within their professions.

Another way industrial physics contributes is thru the utilization of fundamental physical principles-the laws governing the electronic, nuclear, mechanical, electrical, magnetic, acoustic, heat and radiation behaviour of physical substances to conceptualize, design and manufacture physical products and systems, including understanding their use and impact.

"We expected to seek out that industrial physics is vital to the US economy, but we were surprised at the dimensions of the contribution: 12.6 percent of the US GDP and 6 percent of direct employment," said John Rumble, of R&R Data Services and a member of the APS Industrial Physics planning board. "This reflects the increasingly technological basis of our economy and is one reason that the U.S. continues to be the leading economy within the world."

Among the reports other key findings about the industry's impact on the US economy:

- 11.5 million People were employed in physics-based industries in 2016
- Approximately 70,000 degree physicists joined industry from 2003-2016, quite 58 percent of the entire number of U.S. physics graduates
- U.S. exports by physics-based sectors accounted for about \$1.1 trillion in 2016
- U.S. physics-based companies invested \$150 billion in internal R&D in 2015
- More than 340,000 physics patents were granted to U.S. companies from 2010-2016

One highlight from the report: "Since the top of war II, physics discoveries of the 20th century are transformed by industrial physicists into incredible products and services. Examples include consumer electronics, personal computers, cell phones, GPS, MRI scanners, digital everything, and therefore the Information Revolution that creates life today virtually unrecognizable to someone who lived 70 years ago. The flow of physics into industry is neither stopping, nor even slowing down, as new disruptive products and services still emerge."

The report concludes that for industrial physics to still thrive, it needs support from the whole physics community industry, academia, government, and physics societies to still support industrial physics in order that it can still thrive. It cautions that the 21<sup>st</sup> century industry will need new physics and a far better understanding of our physical world, a goal that needs the U.S. to take care of its leadership in physics R&D.

"US industry needs the creativity and knowledge of commercial physicists to continue the pace of technology development that we have seen during the past 50 years," said Bob Doering of Texas Instruments and chair of the APS Industrial Physics planning board. "Physics training fosters the creativity and technical skills that are essential for this pursuit."