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Leveraging R&D Tax Credits

Process intensification (PI) is the development of new technologies that dramatically improve manufacturing processes. It can involve innovating existing processes and/or creating totally new ones, and it increasingly leverages big data, artificial intelligence, additive manufacturing, and other advanced manufacturing concepts. Inherent to PI is the need for innovation and research and development (R&D). However, this can be extremely expensive and time-consuming. In addition, many innovations fail at or before the pilot stage and/or require numerous modifications or revisions that may produce little or no return on investment.

To offset some of the risk, as well as to reward companies for assuming these sometimes-difficult R&D projects, the U.S. federal government and many state governments provide economic relief in the form of incentives. These financial incentives help foster innovation and technological prowess, as well as help to create jobs, drive local and regional economic development, and increase global competitiveness.

The Rapid Advancement in Process Intensification Deployment (RAPID) Manufacturing Institute encourages its members — large and small — to review R&D tax credit provisions to ensure that they are maximizing their potential benefits.

First enacted in 1981, the federal R&D Tax Credit (also known as the Research and Experimentation (R&E) Tax Credit) initially had limited applicability and deployment. President Obama expanded the program when he signed into law the Protecting Americans from Tax Hikes (PATH) Act in 2015. This legislation revived and made permanent certain expired tax provisions for businesses and individuals, including aspects of the R&D tax credit, and it addressed limitations regarding small businesses and startup companies. As of 2016, the R&D tax credit can be used to offset the Alternative Minimum Tax (AMT), and startup businesses can use the credit against $250,000 in yearly payroll taxes. While the credit allows up to 13% of eligible spending to focus on new products or trade processes, it also applies to manufacturing process improvements that enhance functionality, reliability, performance, and/or quality.

To qualify for the R&D tax credit, companies should consult with their tax advisors and answer the following questions:

- Have we developed new or improved products, processes, or software?
- Are the developments technological in nature?
- Has our research eliminated uncertainty about design or methodology?
- Have we designed, developed, and implemented new processes in either equipment or technology and proven that these processes are better than the alternatives?

According to Charles Goulding of R&D Tax Savers, "Eligible costs include employee wages, cost of supplies, cost of testing, contract research expenses, and costs associated with developing a patent. Due to the cutting-edge nature of research conducted within RAPID's scope, there is a considerable probability that patents will be pursued." Goulding adds, "Although the R&D tax credit is available for an assortment of expenses that are unrelated to patents (*i.e.,* improving or modifying an existing product or improving a manufacturing process, making a product cleaner, quicker, greener, less expensive, etc.), companies that seek patents are usually very strong candidates for the credit. Additionally, certain expenses in connection with the production or perfection of a patent can themselves count towards the tax credit."

Additive manufacturing, and specifically 3D printing with higher alloy metals, is an important opportunity for PI and modular chemical process intensification (MCPI); 3D printing may also offer some companies the opportunity to use the R&D tax credit. 3D printing often lowers costs, speeds turnaround of equipment prototyping, and creates uniquely structured designs in a variety of materials. In fact, the 2017 European Federation of Chemical Engineering (EFCE) Process Intensification Award for Industrial Innovation was an important acknowledgment of the importance of additive manufacturing. The award was presented to Air Liquide for the design and fabrication of a 3D-printed, milli-structured heat exchanger reactor. This reimagined reactor improved the efficiency of hydrogen production via steam reforming of natural gas — reducing operating costs by 20% and CO_2 emissions by 12%.

RAPID is funding projects that hold promise to deliver similar improvements in yield, energy efficiency, and greenhouse gas emissions. RAPID members Oregon State Univ. (OSU) and Pacific Northwest National Laboratory (PNNL), in collaboration with other industry partners, are experimenting with additive manufacturing techniques to design and build microchannel chemical reactors and heat exchangers that are as small as one-tenth the size and weight of traditional designs and more energy efficient, as well as offer better yields than current technologies.

For RAPID members involved in developing new PI and modular process technologies, understanding and leveraging the R&D tax credit can help to make investment in innovation less risky and more profitable. CEP