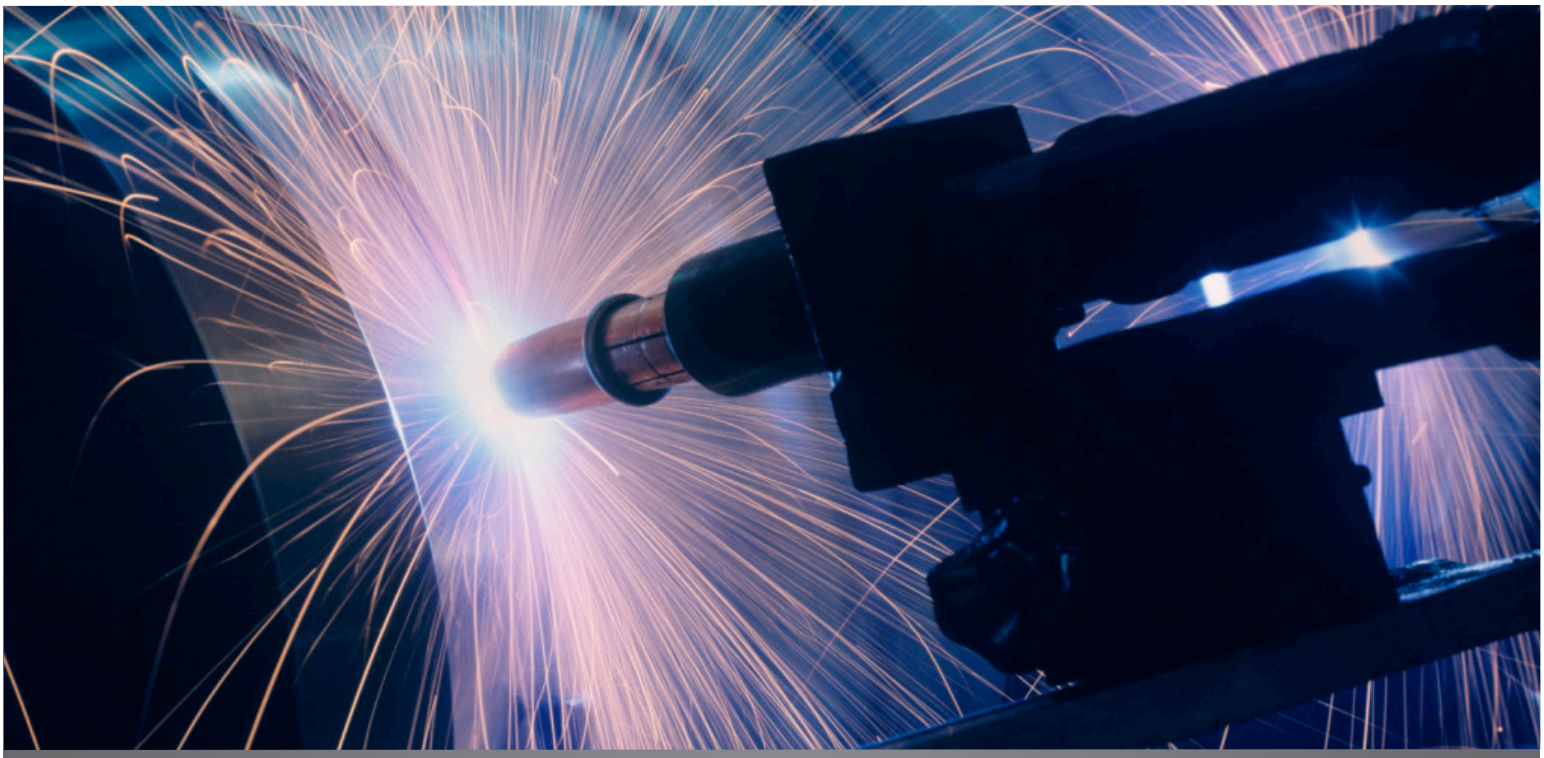

Where We Are Finding Growth
Industrial Process Innovation

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Insights

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Where We Are Finding Growth—Industrial Process Innovation

Artisan Partners Growth Team is committed to finding accelerating profit cycles around the world and investing in reasonably valued companies that are positioned for long-term growth. The team's experience and broad knowledge of the global economy are key attributes that help them identify growth opportunities, wherever they occur, for the three portfolios it manages—Artisan Global Opportunities Strategy, Artisan Global Discovery Strategy, Artisan U.S. Mid-Cap Growth Strategy and Artisan U.S. Small-Cap Growth Strategy.

Currently, the team has identified a number of compelling secular trends that it believes are catalysts for profit acceleration and that will drive growth for some time to come. In this article, the team discusses one of those trends—industrial process innovation.

The Opportunity

A relatively slower capital expenditure cycle is often cited as one factor behind the current tepid expansion in many developed markets. However, we believe this top-down point of view obscures a fairly healthy albeit different sort of capex cycle—one that is more technology-driven and focused on efficiency and margin improvements.

Rather than making large expenditures on traditional fixed equipment to drive volume, firms globally seem to be focused on reducing labor costs while increasing throughput and innovating faster via software-driven automation. The goal: bigger and more lasting competitive advantages. In our view, this trend of increased industrial process innovation is durable and has the potential to drive significant profit acceleration for firms that can execute well.

Automation has long been commonplace on manufacturing factory floors, in logistics, packaging and so on. However, a differentiating factor we see now is the rise of "smart" automation and instrumentation—software overlaying traditional automation equipment, allowing machine tools and programmable industrial robots to perform increasingly intricate tasks with minimal human intervention.

For example, next-generation machine-vision systems allow robots and scanners to "see" and improve quality control at every step of the manufacturing process, rather than just examining the final product—reducing waste-related costs. Automated warehouses integrated with supply chain management software can speed fulfillment and delivery times—increasing the availability of same-day delivery. The autonomous car is quickly becoming more possibility than science fiction thanks to more sophisticated instrumentation. And smart, programmable robots are even being used in biotechnology research—in some cases performing as many lab tests in one week as it would take human lab technicians to complete in 12 years.

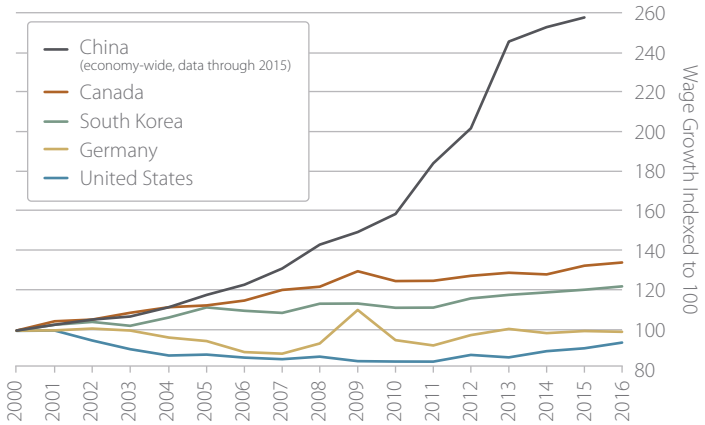
Driving the Need for Industrial Process Innovation

Underpinning the drive for increased industrial process innovation—and therefore profit-acceleration potential in this area—are several factors we believe should continue for some time.

Wage Inflation in Emerging Markets

Outsourcing, often to emerging markets, has been one common way firms have lowered labor costs. Though there are concerns now of moderating emerging markets growth, the prior decade or so of fairly vibrant economic growth has also resulted in high and persistent wage inflation. China wages have more than doubled between 2000 and 2015, while developed-world wages have grown much more slowly—or, in the US's case, have actually modestly fallen (Exhibit 1). In China and other parts of the developing world, these inflation pressures remain largely unchanged despite expectations of more modest top-line economic growth.

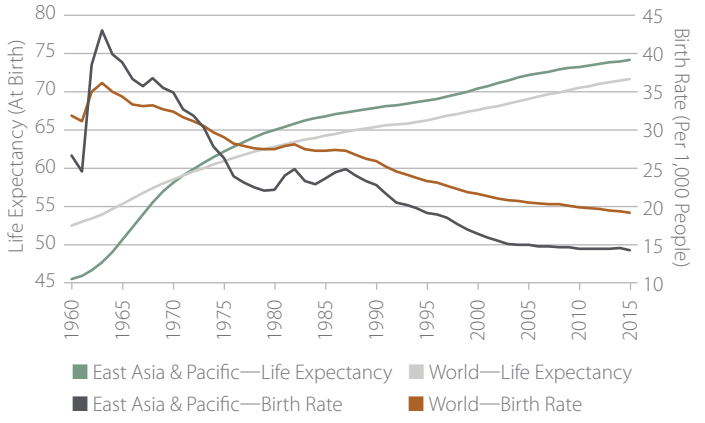
Exhibit 1: Fifteen Years of Global Wage Inflation



Source: Economics and Statistics Administration analysis of data from Bureau of Labor Statistics, International Labor Comparisons program and National Bureau of Statistics of China.

Adding to the impact of wage inflation, aging populations and falling fertility rates in Asia are limiting labor supply and putting additional upward pressure on wages (Exhibit 2).

Exhibit 2: Longevity Versus Birth Rate



Source: The World Bank, as of 31 Dec 2015.

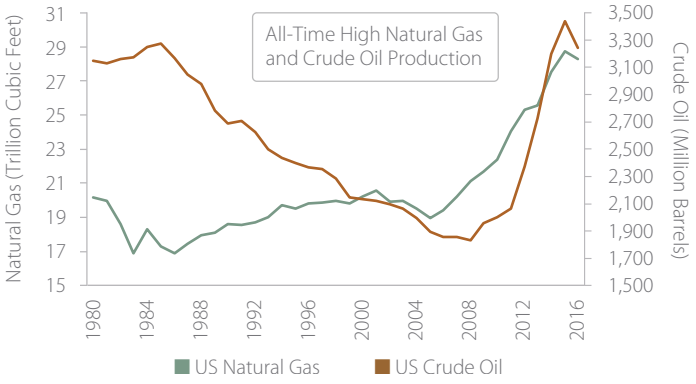
As wages go higher, the payback period for automation equipment gets compressed, increasing incentives to invest in equipment rather than labor.

Cost Containment and Operational Flexibility

Labor is one key cost firms aim to control by innovating on industrial processes. However, automation gives firms increased flexibility to manage a range of costs since operations need not necessarily be close to a large, manufacturing-based labor pool. Other factors—including local taxes and regulations, existing infrastructure and the political environment—may be as important in deciding where to build manufacturing facilities, increasing demand for automation equipment globally.

Shipping costs are another key factor to consider. Manufacturers often source components from multiple locations, then send finished products to customers across the globe. North America is enjoying an energy renaissance stemming from the fracking boom. Despite the recent fall in commodity prices, US natural gas and crude production remain near all-time highs (Exhibit 3). Though lower prices have curtailed some production, the capacity for the US to produce higher volumes at lower rates remains. A firm might find putting a next-generation automation facility closer to its large North American customer base means shorter shipping distances in addition to increased efficiency and lower labor costs—giving it an opportunity to compete with the emerging-Asia manufacturing cost base.

Exhibit 3: Resurging US Energy Production



Source: Energy Information Administration, as of 31 Dec 2016.

These factors are behind the recent trend of manufacturing "near-shoring" to Mexico. For example, Mexico is poised to overtake Canada and Japan as the number-one source of car imports to the US—in fact, as of the end of 2015, Mexico is now producing nearly one of every nine light vehicles bought by US consumers. Global automakers have been building state-of-the-art manufacturing centers in Mexico, attracted in part by wages cheaper than in the US and Canada. However, also providing a big draw are the proximity to America's massive car market, the free-trade agreement which reduces cross-border transaction costs and an educated work force that can manage a complex, automated operation. (Over 110,000 engineering students graduate from Mexican universities each year.) Further, the Mexican government has been welcoming to development of high-tech automation centers.

Increased Demand for Precision and Quality

Globally, consumers are demanding improved quality and safety profiles in the goods they buy. This is true in the developed world, and increasingly so in emerging markets as growing wealth correlates with demand for higher quality. From cars to power tools to children's toys to baby formula and other packaged foodstuffs—product failure and/or tampering can cause an immediate and lasting, even terminal, backlash for a firm.

Even when not terminal, recalls, lawsuits and brand damage can be costly. Firms wanting to avoid costs related to product failures or even imperfections can invest in industrial innovation, including robots to improve precision and minimize defects, vision systems to manage quality control, and automated packaging and fulfillment systems to mitigate contamination and/or tampering.

Consumers are demanding higher quality, but many governments are making it a legal requirement as well via more rigorous safety regulations and product specifications—a trend we would be surprised to see slow.

Government-Directed Initiatives

As the world's largest command economy overseeing $11.2 trillion of GDP, China can, at times, wield tremendous power in influencing certain sectors. In 2015, it announced its "Made in China 2025" initiative—which is aimed at transforming the country into a global manufacturing power—not only in terms of volume, but also in terms of efficiency and sophistication. Premier Li Keqiang has identified several priority sectors, including next-generation information technology, aerospace and aviation, agricultural machinery and new energy vehicles. "Made in China" seeks to enhance that focus by increasing China's innovative capability, quality efficiency and integration of industrialization and information technology. These aims were recently reemphasized in China's 13th five-year economic plan, which was announced in March 2016.

As part of its 13th five-year plan, which was announced in 2016, China plans to build on its Made in China 2025 initiative, making key investments in the priority sectors it has previously outlined. Its goal is building on its progress toward becoming a leading global manufacturer, creating a favorable economic environment for new strategic industries and optimizing modern industrial systems.

While China has not traditionally been transparent about progress on its five-year plans, the intensive focus on these areas, combined with any spending the government commits now or in the future, should add materially to demand for next-generation automation systems, instruments and components. China's heightened focus on robotics and high-tech industries lies at the core of the industrial process innovation trend—and will impact not only China's manufacturing sector, but also its aerospace, power equipment and automotive industries.

How Can Investors Benefit?

Benefits from increased industrial process innovation are fairly broad-based and potentially touch any industry employing automation or sophisticated instrumentation to some degree—from heavy equipment to manufacturing to e-commerce fulfillment to food processing to personal products packaging. However, from an investing standpoint, we believe there are several interesting opportunities that benefit most directly from this trend.

First, we are finding opportunities in traditional industrial equipment manufacturers that have shifted to become hardware/software fused—for example, firms producing industrial robots or machine tools overlaid with next-generation instrumentation and smart automation.

We are also finding opportunities among components designers and manufacturers—for example, firms designing infrared componentry, advanced sensors or advanced location devices used to improve precision and efficiency of heavy equipment. Investing in components providers allows us to invest in the broader trend of more sophisticated instruments without selecting which software platform ultimately wins.

Managing Risks

We are mindful of inherent risks that could derail the profit-acceleration potential from this trend. For example, competition from lower-cost start-ups, particularly from emerging markets, can eat into profit margins. Also, profit growth could be tempered by a potential slower pace in artificial intelligence which could limit the dexterity that can be achieved by industrial robots.

To mitigate those risks, we start where we always start: By confirming the franchise, identifying and understanding the growth drivers and aiming to invest at reasonable valuations. Then, we will add to our position in concert with our conviction in each firm's profit-acceleration cycle.

Specific to stocks potentially benefiting from this trend, we look for firms with characteristics such as a large and powerful installed base of hardware with existing clients. A dominant market share can give firms an effectively locked-in audience, aiding in future profits from product-replacement cycles, upgrades and cross-selling.

We also prefer firms willing to invest heavily in research and development now. Such investments do impact margins; however, investing strategically is one way to fend off lower-cost upstarts and amplify scale advantages.

We are also finding good opportunities among firms with scientific research-driven backgrounds. These firms often develop products and/or software for extreme situations and can alter them for more common applications—giving them a technological head start over competitors and/or a low-cost advantage.

The following stocks are sample holdings in each of the portfolios Artisan Partners Growth Team manages, highlighting investment opportunities the team believes should benefit from the secular trend of increasing industrial process innovation.	Global Opportunities	Global Discovery	U.S. Mid-Cap Growth	U.S. Small-Cap Growth
Holding	**Competitive Advantage**			
Fortive is a leading, diversified industrial growth company focused on professional instrumentation, automation, sensing and transportation technologies.	With a capable management team and a solid balance sheet, Fortive is well-positioned to expand into new verticals, thereby increasing its exposure to recurring revenue streams and allowing it to drive a compelling profit cycle.	■		■	
Keyence develops, manufactures and sells industrial automation and inspection equipment, with products and services focused primarily on refinements and solving bottlenecks.	We believe Keyence is well positioned to capitalize on secular automation trends, including wage inflation, which is driving a heightened focus on quality and productivity. With most of its sales currently in Japan, Keyence has an attractive opportunity to expand into foreign markets as well.	■			
Cognex, the leader in machine vision systems used to ensure product quality.	Cognex is the clear leader in machine vision systems—which are a blend of software and hardware allowing computers to "see" objects moving at speeds faster than the human eye can process. Effectively an asset-light software model, Cognex's leading market share is bolstered by its significant patents.				■
Teledyne Technology, a supplier of ultra-sensitive components and sensors to equipment manufacturers serving the deep water oil and gas market, oceanographic research, air and water quality management, factory automation and medical imaging.	Teledyne's R&D laboratories have their roots in advanced defense research projects. Yet commercial applications now account for more than 80% of the business, with the international mix growing fastest.		■		■

Investment Process Highlights

We seek to invest in companies with franchise characteristics that are benefiting from an accelerating profit cycle and are trading at a discount to private market value.

Security Selection

We seek to identify companies with franchise characteristics that are selling at attractive valuations and are benefiting from an accelerating profit cycle. We look for companies that are well positioned for long-term growth, driven by demand for their products and services, at an early enough stage in their profit cycle to benefit from the increased cash flows produced by the emerging profit cycle.

Capital Allocation

Based on our fundamental analysis of a company's profit cycle, we divide the portfolio into three parts. Garden℠ investments are small positions in the early part of their profit cycle that will warrant a more sizeable allocation once their profit cycle accelerates. Crop℠ investments are positions that are being increased to a full weight because they are moving through the strongest part of their profit cycle. Harvest℠ investments are positions that are being reduced as they near our estimate of full valuation or their profit cycle begins to decelerate. We believe that adhering to this process increases the likelihood of delivering upside participation with downside protection.

Broad Knowledge

We overlay security selection and capital allocation with the capability to invest opportunistically across the entire global equity spectrum. It is our goal to have broad knowledge of the global economy to ensure that we are able to find growth wherever it occurs. This capability extends from the design of our team, which leverages the broad experience of the portfolio managers and the deep expertise of the analysts on the team.

Team Overview

We believe deep industry expertise, broad investment knowledge, a highly collaborative decision-making process and individual accountability are a powerful combination. Since the inception of the team in 1997, we have been committed to building a team of growth investors that retains these attributes and is solely dedicated to our process and approach.

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International investments involve special risks, including currency fluctuation, lower liquidity, different accounting methods and economic and political systems, and higher transaction costs. These risks typically are greater in emerging markets. Securities of small- and medium-sized companies tend to have a shorter history of operations, be more volatile and less liquid and may have underperformed securities of large companies during some periods. Growth securities may underperform other asset types during a given period. Investments will rise and fall with market fluctuations and investor capital is at risk. Investors investing in strategies denominated in non-local currency should be aware of the risk of currency exchange fluctuations that may cause a loss of principal. These risks, among others, are further described in Artisan Partners Form ADV, which is available upon request.

This commentary represents the views of the portfolio managers as of 31 Mar 2018, which will fluctuate and those views are subject to change without notice. While the information contained herein is believed to be reliable, there no guarantee to the accuracy or completeness of any statement in the discussion. This material is for informational purposes only and should not be considered as investment advice or a recommendation of any investment service, product or individual security. Any forecasts contained herein are for illustrative purposes only and are not to be relied upon as advice or interpreted as a recommendation.

For the purpose of determining portfolio holdings, securities of the same issuer are aggregated to determine the weight in the portfolio. The holdings mentioned above comprise the following percentages of a representative account within the Composite's total net assets as of 30 Sep 2018: Artisan Global Opportunities Strategy — Fortive Corp 0.8%, Keyence Corp 1.2%. Artisan Global Discovery Strategy — Teledyne Technologies Inc 5.5%. Artisan U.S. Mid-Cap Growth Strategy — Fortive Corp 0.5%. Artisan U.S. Small-Cap Growth Strategy — Cognex Corp 0.9%, Teledyne Technologies Inc 4.1%. Securities named in the Commentary, but not listed here are not held in the portfolio as of the date of this report. Portfolio holdings are subject to change without notice and are not intended as recommendations of individual securities. All information in this report, unless otherwise indicated, as of the date shown. This material does not constitute investment advice.

The Artisan Partner's Growth Team's capital allocation process is designed to build position size according to its conviction. Portfolio holdings develop through three stages: Garden℠, Crop℠ and Harvest℠. Garden℠ investments are situations where the team believes it is right, but there is not clear evidence that the profit cycle has taken hold, so positions are small. Crop℠ investments are holdings where the team has gained conviction in the company's profit cycle, so positions are larger. Harvest℠ investments are holdings that have exceeded the team's estimate of intrinsic value or holdings where there is a deceleration in the company's profit cycle. Harvest℠ investments are generally being reduced or sold from the portfolios.

R&D stands for research and development.

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