

GOING BACK IN TIME: THE WORKFORCE OF THE FUTURE



AN IYRS GUIDE

imag·ine verb \i-'ma-jDn\
: to think of or create (something that is not real) in your mind

A HERITAGE OF WORKING WITH OUR HANDS

There was once a time in America when ‘thinking through your hands’ was one of the most valued skills. In the early years, we were hunters and gatherers and we needed our hands and instincts to survive. We began to shape tools, create things, and evolved our abilities to “make stuff” and progress. Then we had an industrial revolution which sparked a major turning point in our history. Some may believe the mystique and discovery of this evolution is long lost, but in reality we are approaching a brand new evolution which sees us going back in time to educate the workforce of the future.

Look around you...that cabinet, that brick façade, the airplane flying overhead, that sailboat cutting through the wind; in each case someone with a rare talent had to create each and every part of those objects. Every man-made item you see today has a pair of hands (often many working together) behind it.

Often times the conversation can quickly turn to technology, and how technological evolution has changed “making,” and in many industries it has. However, one thing is for sure, technology is simply an enabler to more efficient and productive work; most technology is worthless without human assistance. We mustn’t lose site of the fact that though technology is the enabler, the human should always guide the technology to proper and efficient progress.



ENDURING SKILLS

Some skills are absorbed into the economy. Once upon a time being “good at computers” was a marketable ability. Not long ago, building a website required the height of technical knowledge. Today, with a few keystrokes, almost anyone can create an e-commerce site and be running their own business worldwide. Working with your hands endures.

Technology continues to evolve, creating room for innovation and more productivity. Yet, even as that pace continues to pick up and the importance of being tech savvy grows, the blend of experience, intuition, artistry, strength and problem-solving never seem to go out of style. **The world will always need those who can ‘do.’**

grit noun \ˈgrɪt\
: mental toughness

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WHAT IS A KNOWLEDGE WORKER, ANYWAY?

Knowledge worker, it's a popular term that pundits throw around when it comes to describing the changing world economy of the 21st century. Defined as a worker whose main capital is what they know, it is often related to white-collar positions such as software developers, social media consultants and doctors.

In many cases it only tells half the story. Of course what you know is important, but what you do with it is even more vital. A knowledge worker may "think for a living." Yet, anyone who has ever tried to fix an engine, build a custom bookcase or diagnose a leaky pipe knows they also think for a living, and often at a faster pace and under more immediate pressure. Interpreting information, understanding the latest technology, identifying trends, making connections; these skills also form the basis of marketable talents of those who work with their hands.

CREATING YOUR OWN FUTURE: GROWING INDUSTRIES

With the rise of the internet, information is no longer at a premium. Almost any fact is but a few keystrokes away. It's truly the ability to put that information to practical real-world use that is valuable. Thus, the future is bright for those who like to roll up their sleeves and are willing to go out and secure the skills now, that tomorrow's jobs will require. Best of all, those skills are transferable across a wide array of growing industries.

in·no·va·tion noun \i-nō-'vō-shōn\
: the act or process of introducing new ideas, devices, or methods

CONSTRUCTION: FROM BRICK TO TECH

Construction-related industries are among the fastest growing in the U.S.¹ As the economy continues its climb past pre-recession levels, the outlook for construction jobs will continue to improve. For example, Bureau of Labor and Statistics says, "Employment of carpenters is projected to grow 24 percent from 2012 to 2022, much faster than the average for all occupations. Increased levels of new home building and remodeling activity will require more carpenters²."

As we will see, this stat is just one of many that illustrates a growing need for workers. Already, skills such as project management, woodworking, labor estimating, and even on the job communication are in short supply. Even more so when you consider many roles require a blend of both these physical and technical skills.

Career Outlook

Careers in construction can evolve and grow at a rapid rate. You may move through the ranks as a craft professional, foreman, project superintendent, project manager or even own a company. Build Your Future shows average salaries in the professions hovering around \$52,000. Check out the Build Your Future Career Path tool to map out a career journey in this industry³.

JOBS IN THE CONSTRUCTION INDUSTRY

-  **COMMERCIAL, RESIDENTIAL, INDUSTRIAL CONTRACTOR**
-  **CIVIL ENGINEERING**
-  **CARPENTRY**
-  **PAINTING**
-  **PLUMBING**
-  **ELECTRICAL WORK**
-  **MAINTENANCE/OPERATIONS**



de-sign verb \di-'zɪn

: to plan and make decisions about something that is being built

DESIGN: IMAGINATION MEETS EXECUTION

From today's most elegant handmade object to an industrial product, the meeting of function and form has never been so important. Their lasting value to individuals and companies is predicated on it. Plus, today's manufacturing sector requires more than being able to execute a repeatable task. Cutting edge businesses require the capacity to think creatively, designing new tools and new parts as well as being able to work with computer-aided-design programs. It's all about problem solving across a wide spectrum.

Designers must not only be creative but they need to see the larger picture, gain an understanding of advanced materials and work collaboratively to remain in tune with the builders and technicians who are going to complete the actual build of their designs.

They say knowledge is power, and the more a designer understands and considers the actual materials builders use, the more they can use this knowledge to take a designer to the next level. Today's most creative design professionals must understand the entire process, and often times it is up to architecture and engineering schools to work collaboratively with hands-on schools to create information-sharing between students, ultimately creating opportunities for collaborative peer learning and educational opportunities.

IYRS INSIGHTS!

Working together to bridge the gap between theoretical and practical, IYRS School of Composites Technology students regularly collaborate with future leaders of design from Harvard Graduate School of Design, MIT and Stevens Institute of Technology to create a think-tank between those who design and those who bring the designs to life!



Career Outlook

A career in design can take you in so many exciting directions! The emergence of 3D Printing has opened new doors; learning computer-aided-design software is a logical step towards a career in design.

Product design, furniture design, toy design, industrial design, all of these careers allow you to merge your creative mind with technical skills.

An industrial designer works to imagine how a consumer may use a product when it is created and designed. An average salary is around \$59,610/year⁴.

tal-ent noun \ˈta-lɪnt\
: a special ability that allows someone to do something well

AUTOMOTIVE: THE ROAD AHEAD

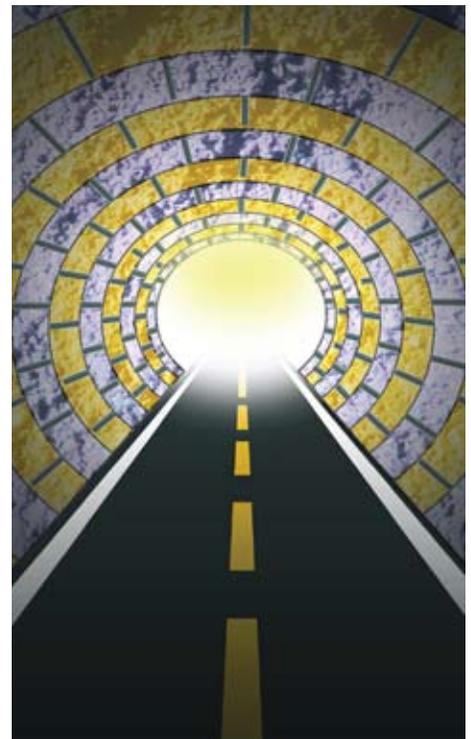
Every year, the automotive industry becomes more sophisticated. When Volkswagen closed their Westmoreland Assembly Plant in 1988, the automaker's role was much different then when they opened their state-of-the-art Chattanooga Assembly Plant in May 2011. Featuring elements that include a body shop, a paint shop and assembly facility, this facility required employees to possess a host of new skill-sets. As auto making continues to grow, there is a need for expertise in everything from material planning to green technologies to assembly operations.

And that is just when the cars are being created, one small segment of the industry. From the design to prototyping, all the way to the talents mechanic, and of course the maintenance and repair, today's autoworkers need a blend of problem solving, technical and for the most ambitious, communication abilities. The term "unskilled laborer" no longer applies⁵. Today's autoworkers are highly skilled employees in every sense.

FAST FACTS

FROM THE ALLIANCE OF AUTOMOBILE MANUFACTURERS

-  The auto industry directly employs over 1.7 million people across job functions such as design, engineering, manufacturing and supplying parts and components.
-  The auto industry contributes 3 - 3.5 % of America's total gross domestic product historically.
-  The auto industry invests billions of dollars every year in research and development.
-  One-in-17 private sector jobs is dependent on the auto industry.



Career Outlook

Only a few countries have the resources to produce a car from start to finish. The U.S. automotive industry offers an array of options, including designers, mechanics, engineers, auto electricians, vehicle builders and body repairers.

Top States for Auto Manufacturing Jobs: Alabama, Tennessee, Indiana, Kentucky, Ohio, Michigan, South Carolina, Georgia, Texas and Mississippi.

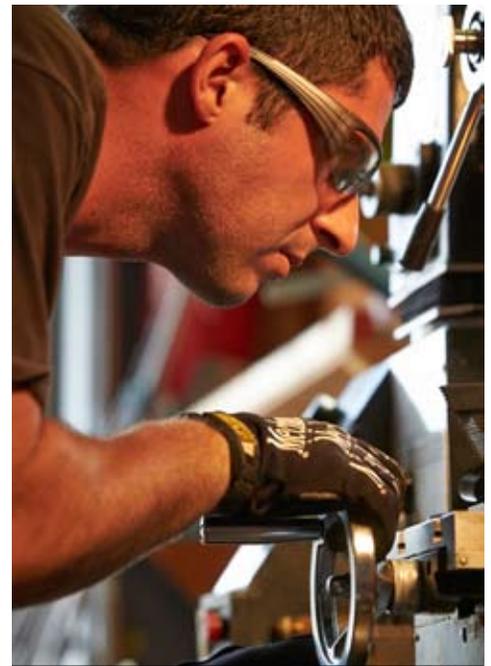
skill noun

: the ability to do something that comes from training, experience, or practice

THE RETURN: MANUFACTURING

It's an all too familiar story. The local factory closes and an entire town loses their jobs. The for-sale sign goes up and storefronts remain vacant. For many, this tale is simply a fact of life in America. However, the tide has begun to turn. Since 2010, hundreds of companies have brought back production they had sent out of the country⁶. Though jobs are returning, a critical problem has developed: many manufacturing employees from the past can't find work because of advances in materials, processes and technology. These workers, among many others looking for hands-on careers, require short-term training programs to help meet the skills demand that comes with the return of domestic manufacturing.

And it only gets better. Though you may regard manufacturing as the work done in factories and mills, companies and individuals that create new products by hand also fall into this key jobs category and they are driving their share of the comeback. As the United States share of exports continues to grow faster than other modern countries, a host of new career paths has begun to unfold. A Bureau of Labor and Statistics article says, "employers are having trouble filling jobs for machinists and maintenance technicians, among other skilled trades⁷." For those interested in this type of career, the law of supply and demand is finally beginning to work in their favor.



IN-DEMAND SKILLS

▶▶▶ **COMPUTER-AIDED-DRAFTING | DESIGN (CAD)**

▶▶▶ **PROGRAMMABLE LOGIC CONTROLLER (PLC) PROGRAMMING**

▶▶▶ **SCHEMATIC DIAGRAMS**

The Skills Gap in Production Roles, Burning Glass Report

Career Outlook

For those looking to start their own businesses, the development of sites such as Etsy.com, which allows you to sell your work directly to customers, bodes well. The Maker Movement, highlighted in books such as *Makers: The New Industrial Revolution* by Chris Anderson speak to the changing landscape of manufacturing and making. Manufacturers are actively seeking skilled craftspeople as the "skills-gap" has been widely documented.

tech-nol-o-gy noun \tek-'nä-lŏ-jŏ\
: the use of science in industry, engineering, etc., to invent useful things or to solve problems

AIMING HIGHER: AEROSPACE AND AVIATION

Aerospace; it's still a term that conjures up the grand achievements of the Apollo Space Program that put the first humans on the moon. Along with the brave astronauts, NASA employed over 35,000 people. Each member of this vast team had their own job to do, with a variety of skill-sets needed. Since before the Wright Brothers first took flight, this industry has attracted those who like to see their work in action.

Make no mistake - the aerospace and aviation industries both go far beyond astronauts and pilots. Planes are being built bigger, stronger and faster, requiring new materials and build processes. Satellites for weather, defense, commercial and many other uses must be built to withstand whatever conditions they may experience tens of thousands of miles high, while performing optimally and accurately. Because of the dedicated craftspeople who thought-out, planned and built these items, the weather you get on you iphone is accurate and the plane you travel in performs better than ever in history.

JOB SPOTLIGHT: AVIATION MECHANIC

Typical Role:

Diagnose, adjust, repair, or overhaul aircraft engines and assemblies, such as hydraulic and pneumatic systems. Includes helicopter and aircraft engine specialists.

Average Salary:

\$27.70 per hour, \$57,610/Year

Popular Locations for this Job:

Texas, California, Florida, Georgia, North Carolina.



Career Outlook

This vast field continues to evolve rapidly, especially as air travel continues to bounce back and space travel becomes more accesible (it's coming quicker than you think!). The Boeing company employs over 170,000 individuals worldwide, NASA and B/E Aerospace are also large employers in this field. Many jobs require at least four years of college study.

know-how noun \ 'nD-,hau \
: knowledge of how to do something well

GOING GREEN: CLEAN BUILDING AND ENERGY

“Solar panels don’t install themselves. Wind turbines don’t manufacture themselves. Homes and buildings don’t retrofit or weatherize themselves. In our industrial society, trees don’t even PLANT themselves, anymore. Real people must do all of that work.”⁷ Those are the words of Van Jones, former Special Advisor for Green Jobs and one of Time’s most 100 influential people.

It seems everywhere you look you can see the “Go Green” movement in effect. Residential building, commercial building and local businesses, even the U.S. government; when something impacts mainstream thinking so quickly, often times new job opportunities come with it. A recent Wall Street Journal story predicted the sharp rise of green building, projecting a 29-38% rise by 2016⁹.

The U.S. Green Building Council has done a great job of spearheading this movement; their Leadership in Energy and Environmental Design (LEED) program has certified more than 54,000 buildings for their leadership in green building. Individuals can capitalize on this by educating themselves on small-scale green building practices such as solar panel installation, using non-toxic materials in modeling or painting, installing weatherproof windows and doors, and utilizing energy efficient and environmentally friendly lighting. Whether you are working as a part of a large company and team or are a self contractor, green building adds a whole new layer of opportunity to your business.

29-38%
**Projected rise of
green building by
2016**

Wind Energy

Solar Power

Biomass

Land Fill Gas

Ocean Energy

Recycling

Remanufacturing

Municipal Solid Waste

LEED Certification

Hydropower

Career Outlook

A report from the nonprofit, nonpartisan business group Environmental Entrepreneurs (E2) shows that more than 12,500 clean energy and clean transportation jobs were announced in the second quarter of this year (2014) – more than double the number of jobs announced in the first quarter⁹. The opportunity is so great in this field that the U.S. Green Building Council goes so far as to predict that a “commitment to green building has the potential to generate 2.5 million jobs¹¹.”

art noun \ˈärt\
: something that is created with imagination and skill and that is beautiful or that expresses important ideas or feelings

SET SAIL: MARINE INDUSTRY

Early on in school, kids learn that over 70% of the world is water. All across the world, boats large and small, wooden, fiberglass, aluminum, carbon fiber, etc. are used for more functions than you may realize; commercial, recreation, leisure/travel, law enforcement and military, fishing, sports, transportation, research, the list goes on and on. Assuming you do not live in the desert, there is likely a strong market for working in the marine industry where you live.

Just about every coastal state, or a state near the water in the U.S. has a marine trades organization which promote the stability and growth of working on or around the water. In Rhode Island, an epicenter for marine trades, the Rhode Island Marine Trades Association reported in 2014 that the marine trades enterprise state-wide contributed \$2.6 billion to the economy which helps support 14,700 full time employment jobs in the smallest state in the country¹².

NEAL HARRELL, BROOKS MARINE GROUP

ON WHY THE MARINE INDUSTRY IS BOUNCING BACK:

We saw retail revenue from boat and engine sales rise 11%. Outboard fiberglass boats from 11 to 40 feet had a sales gain of 9.1%. We saw brokerage boat price increases in the U.S. and North American imports of sailboats over 20 feet were up 55%, compared to 2012. So the numbers were in our favor in 2013, and that trend is continuing in 2014.



ON THE NEED FOR TALENT WITHIN THE MARINE INDUSTRY:

Trades talent typically isn't hanging out on LinkedIn, so you really have to think hard and ask yourself, how am I going to get my opportunity in front of this audience? Maybe the answer is partnering with your local High School and trade schools. Or looking at what types of institutions are producing the type of talent you might be looking for. Can you borrow that talent from other industries? Can a guy who was a diesel mechanic on Humvees in the Army in Afghanistan be a diesel mechanic on boats, at least at an entry level? You have to think outside the box today on how you find talent--especially trades talent.

Career Outlook

Job functions in the marine trades vary greatly, though those who choose to gain expertise and skill to build a career in the marine trades are enjoying a comfortable salary as well as a quality of life that many individuals who work in "desk-jobs" do not get to enjoy. Job prospects are strong whether individuals are fixing boats, building boats, racing boats, maintaining boats or going into the commercial or business side of the industry. A fulfilling career in the marine trades can send an individual all across the world, and present the opportunity to work with or on wooden boats, modern fiberglass or carbon fiber boats, mega yachts, cruise ships or commercial and cargo boats.

“I skate to where the puck is going to be, not where it has been.”
- *Wayne Gretzky*

SUMMARY: GOING WHERE OTHERS ARE NOT

Throughout this eBook we have discussed how the workforce is changing. Skills that once formed the backbone of the economy are once again returning to the forefront. Across a wealth of new and resurgent industries, those with the ability and drive to work with their hands are in command of their careers.

Successful car companies are already working to recruit more skilled talent. Manufacturing has returned to American shores bringing with it the tangible satisfaction that comes with producing something. The limitless fields of clean energy and building continue to develop, offering opportunity for those anticipating the needs of future employers. The artistic, theoretical and practical are coming together like never before in design, changing the way people think about even the most common objects. NASA's recently announced their new Orion program that someday will take men and women to Mars has helped kick off another boom in the aerospace sector. Demand for impressive carpentry skills is expected to enjoy continued growth. Airplanes and automobiles are using advanced materials and processes to strengthen structural parts, while showing off impressive style and design.

We may not know exactly what the future holds, and few can fully envision what the next wave of jobs will look like, but one thing we know is that tomorrow's leaders and innovators are those who set out to acquire the skills that set the stage to take on those jobs.

ABOUT IYRS SCHOOL OF TECHNOLOGY AND TRADES

IYRS is a world-class experiential learning school in Rhode Island with a hands-on education model dedicated to teaching highly technical and deeply craft-oriented career skills. IYRS currently has three accredited schools, School of Composites Technology, School of Boatbuilding & Restoration and School of Marine Systems. Additionally, IYRS regularly collaborates with post-secondary schools of architecture, preservation, industrial design and engineering through short-term classes, including recently with MIT, Harvard, RISD, Roger Williams and others.

The skills acquired in these programs are transferrable across industries and applications, from digital manufacturing to traditional making and restoration fields. With campuses in Newport and Bristol, RI, IYRS offers an extraordinarily attractive location to study.

Learn More at <http://www.IYRS.edu>.

GET INSPIRED: COMPANIES TO WATCH

Vintage Industrial Furniture

Started in a garage, this company builds furniture with an eye on design and materials that can last centuries. Working in many mediums, the Vintage Industrial Furniture team is changing how people look at furniture.

www.retro.net

SPACEX

SpaceX designs, manufactures and even launches advanced rockets and spacecraft. The company was founded in 2002 to revolutionize space technology, with the ultimate goal of enabling people to live on other planets.

www.spacex.com

GE

GE, whose tagline is “imagination at work,” has been around since 1878 when Thomas Edison founded what was then Edison Electric Light Company. Today, it remains one of the world’s most innovative companies, working across a variety of fields. From advanced aviation to wind turbines to diesel marine engines, GE seems to be everywhere. It’s an American classic.

www.ge.com

Tesla Motors

A team of Silicon Valley engineers founded this inspiring automaker. Named for the famed inventor, Tesla has “set out to prove that electric vehicles could be awesome.” By combing the use of advance materials with a spirit of innovation and love of design, they are changing an entire industry.

www.teslamotors.com

The Renzo Piano Building Workshop

Don’t let the name throw you off, (RPBW) is actually international architectural practice. Their work includes the Shard, a new London landmark skyscraper and the New York Times headquarters. Using a blend of old school and cutting edge materials and construction techniques their creations provide unique opportunities for modern craftsmen and women.

<http://www.rpbw.com>

Boeing

Boeing employs more than 170,000 individuals on 5 continents across 70 countries. With bounceback growth for air travel on passenger, cargo, military and commercial aircraft expected, Boeing is poised for continued growth. The company also designs and manufactures a host of other aerospace products.

www.boeing.com

GET INSPIRED: COMPANIES TO WATCH

Exelis, Inc.

Exelis is a company specializing in a variety of technologies and services which support many branches of the U.S. government and U.S. Military. A core piece of their business is designing and manufacturing lightweight composite aerospace structures and components.

www.exelisinc.com

Etsy

Etsy is “reimagining commerce” by creating an open marketplace for users to purchase or sell handmade or vintage items. The worldwide virtual marketplace allows creative and talented individuals to show off their skills and abilities in a profitable fashion. Etsy had over 22 million members as of 2013.

www.etsy.com

Siemens

Siemens is a leader in the fields of electrification, automation and digitization and healthcare solutions. They are leading a charge “to optimize the interplay of materials, people, machines and profitability” and have around 362,000 employees.

www.siemens.com

TPI Composites

TPI Composites is a growing operation of over 2,000 employees who operate within the wind energy, military and transportation industries. TPI offers “high quality, cost effective composites solutions through long-term partnerships with the wind industry’s leading manufacturers including G.E. Energy and Mitsubishi.”

www.tpicomposites.com

L-3 Communications

In less than twenty years, L-3 has built themselves into a \$12.6 billion company with approximately 48,000 employees worldwide. L-3 is a prime contractor in aerospace systems and national security solutions

www.l-3com.com

Battelle

Battelle is the world’s largest nonprofit research and development organization, with over 22,000 employees at more than 60 locations globally. In laboratories around the world, Battelle employees are applying science, technology, designing and manufacturing to create products which help solve critical problems for government and commercial customers.

www.Battelle.org

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