

Mechanical Contracting Education and Research Foundation

Five Key Trends for the Future of the Mechanical Contracting Industry

Between now and the year 2020, the Mechanical Contracting Industry will face the pressures of significant change. Marketplace, societal, and technological trends will create challenges and opportunities for the entire industry. Actions and decisions made today will shape the overall success and profitability of the industry over the next 15 years. This report provides a summary of five key trends that will impact the industry and action steps that can be taken today to prepare for the future.

"Let him who would enjoy a good future, waste none of his present."

- Roger Babson
(American statistician, business forecaster, and author)

Introduction

Technological advances, scientific breakthroughs, and changing social structures are accelerating the pace of change at an ever-increasing rate. In the building trades, end-user expectations have created the pressure for rapid-cycle construction. Five hundred television channels, millions (if not billions) of Internet sites, never-ending spam messages, pages, beepers, cell phones...we are being overrun with information. And yet in the midst of this *data storm*, we must make wise decisions quickly that we know will impact the future.

The Mechanical Contracting Education and Research Foundation (MCERF) commissioned futurist Atul Dighe to conduct this study. Dighe is Principal & Senior Futurist with the consulting firm Social Technologies, LLC. Dighe utilized his vast trends database, knowledge of the construction industry gained through studies with other construction associations, and a series of future focus groups with mechanical contractors, service contractors, and manufacturers to gather data. This report summarizes the results of this yearlong study.

Today, mechanical contractors face tremendous pressures:

- Where will my future labor pool come from?
- How will direct purchasing of equipment decrease my bottom line?
- Why does it seem like I am doing the work of the General Contractor (GC) without the pay?
- Will it be possible to satisfy my service customers who now have little to no tolerance for downtime?
- How can I operate a profitable business in an environment of rapid-cycle construction?

This list could continue on for page after page. However, smart mechanical contractors realize that as the industry changes, they are left with 2 options—complain and see profits (and market share) continue to decline OR change and adjust and seek new and perhaps more lucrative ways of doing business.

External Trends = Opportunities

Sensor Technology Materials Sciences Era of Rebuilding



Internal Trends = Challenges

Workforce 2020 Evolving Value-Chain



This report identifies 5 key trends that will impact the mechanical contracting industry between now and the year 2020. Two trends are occurring from within the industry and should be considered challenges that will have to be faced in the future:

Workforce 2020—how will the industry attract talented workers?

Evolving Value-Chain—how will new revenue models be identified?

Three trends are occurring from outside the industry and should be considered opportunities:

Era of Rebuilding—how will the industry help rebuild America's infrastructure?

Sensor Technology—how will sensors change the entire nature of the mechanical contracting business?

Materials Science—how will new material technology revolutionize construction?

Each trend contains implications and recommended action steps. While all five trends may not be immediately relevant to every contractor, this report lists a number of significant impacts that will affect every MCAA member's way of doing business.

The overall success of the industry is dependant upon the collective abilities of its contractors to handle the changes that will be wrought by these trends and how they, in turn, adapt to a dynamic, opportunity-filled future.

Workforce 2020

- Growing Ethnic Diversity
- The Millennials are Rising
- Union-Contractor Relationship



Key Questions:

How will the mechanical contracting industry attract youth and minorities to its ranks?

In what ways will the contractor-labor relationship evolve and change over the next 20 years?

Observations & Forecasts

According to the 2000 Census, Hispanics are the largest minority group in the US. Their influence and impact on all aspects of society will only increase over the next 20 years. Furthermore, 50% of the population of Mexico is under the age of 25 and could comprise the next large wave of workers into the US, especially as the average age of Americans increases. The 2004 Bush Immigration Plan allowing over 8 million undocumented immigrants renewable three-year visas will immediately impact the construction industry by creating a large labor pool. By 2010, Hispanics will be the single largest population group in the prospective labor pool for the construction industry.

The Baby Boomer generation has redefined every life-stage in its history. The traditional retirement years will be no different. Boomers can expect to live longer, healthier lives than previous generations of Americans. In 2020, the Baby Boomer population will be in their 60s and 70s. Their attitude towards retirement and passing-on/letting go of the leadership reigns of their mechanical contracting companies will go a long way towards determining the strength of the industry in 2020.

Children born between 1980 and the year 2000 comprise a generation called the Wired or Millennial Generation. Millennials have grown-up in an era of high technology, group interaction (soccer, group projects at school), and racial integration/blending. By 2010, Millennials will start to enter the workforce en masse and will expect to find similar qualities in their job environment. The employers and industries that embrace these values best will attract the best and brightest of the Millennials.

Recruiting and retaining and training talent will be the most significant key to any industry's growth over the next 15 years. For union mechanical contractors, fostering a strong collaborative relationship with their union counterparts will be crucial in determining the industry's ability to successfully take advantage of all of the emerging market opportunities. A unified message of growth, flexible training, opportunity for advancement and entrepreneurship will be vital for the viability of union mechanical construction over the next 20 years.

Areas for Further Research

- How to partner with the UA on addressing and avoiding future labor shortfalls
- Forecasts for demand for labor over the next 20 years
- How to attract larger numbers of minorities to the industry
- How to increase the industry’s presence on college campuses*
- Developing leadership and entrepreneurial traits for company executives**

*Several strong programs already underway funded by MCREF

**MCAA’s Advanced Leadership Institute is a good example of this idea

Implications	Recommended Action Steps
<p>MCAA and UA will need to consider how they can cooperate better to address and avoid future labor shortfall and training issues</p>	<p>Partner with the UA to add a focus on minority (especially Hispanic) recruitment and training systems that relate more to Millennials (e.g. multi-media/ game based)</p>
<p>New labor sources need to be cultivated to avoid labor shortages (the 8 million new legal workers under the Bush 2004 immigration plan may be a starting point)</p>	<p>Work with the UA to develop a unified message of growth, flexible training, opportunity for advancement and entrepreneurship for the industry</p>
<p>The worker of tomorrow may look and have different expectations than the worker of today</p>	<p>Develop intern programs for high school, junior college, and college students</p>
<p>Recruiting and retaining talent is vital to continued growth and success</p>	<p>Plan for a Spanish speaking workforce by hiring/training Spanish speaking supervisors and consider hiring a Hispanic or fluent Spanish speaker to be responsible for community, professional, and labor outreach</p>
<p>The nature of training will evolve as new workers join the industry</p>	<p>Create your succession plan for passing ownership/control to the next generation</p>
<p>There will be a significant increase in the number of non-English literate installers/service professionals</p>	
<p>Baby Boomers (especially those in leadership positions) will need to consider their roles in their organizations in the year 2020 and begin to plan accordingly</p>	

Evolving Value-Chain

- Specialty Contractors' Roles Overlapping
- Reverse Auctions, Direct Purchases and New Ways of Doing Business
- Advent of the Virtual GC



Key Questions:

What stands in the way of Mechanical Contractors becoming the recognized lead specialty contractor on the job site?

How can new revenue models be identified as old ones go away?

Observations & Forecasts

Over the past decade the answer to the question, "Who does what on the job site?" has gotten more muddled. Overlapping roles and skill sets among mechanical, electrical, and sheet metal contractors have created a blurring of the boundaries that separate these specialty contractors. As systems, materials, and building processes continue to evolve and change over the next decade, the overlapping roles of specialty contractors will continue to increase. By 2020, the distinctions among electrical, mechanical, and sheet metal contractors will be tough to make.

Reverse auctions and direct purchases of equipment by the end-user will increase over the next 10 years. Successful mechanical contractors will need to identify their unique features and services more clearly to the marketplace. By 2020, profit will be based largely on customer service, reliability, and the ability to coordinate and lead other specialty contractors.

The design-build contractor often takes on many job roles previously performed by the general contractor. With an increasing complexity of building methods and materials and a growing demand for rapid-cycle construction, a well-coordinated set of specialty contractors could replace the role currently being played by general contractors. By 2020, "virtual GCs", comprised of specialty contractors working together, will manage the majority of construction projects.

Areas for Further Research

- Identify new profit centers for mechanical contractors
- Create methods for improving efficiencies in the supply-chain
- Develop a strategic plan and models for creating the virtual GC

Implications	Recommended Action Steps
<p>The roles of specialty contractors will continue to blur together</p> <p>Current profit centers such as equipment purchases may not exist in the same form in the future</p> <p>An individual's as well as a company's coordination and cooperation skills will be highly valued by the marketplace and will serve as a key competitive advantage for mechanical contractors</p> <p>The role (and revenue) of the GC could be assumed by a set of specialty contractors, or "virtual GC's"</p>	<p>Identify areas and activities that give your organization a competitive advantage in the marketplace (i.e. D/B, Design/Assist, Fast Track approaches)</p> <p>Identify and partner with other specialty contractors on project bids or expanding your capabilities into other areas</p> <p>Expand your range and mix of services to be ready to play your part in the "virtual GC" concept</p>

Era of Rebuilding

- Inner City/Urban Renewal
- Many Buildings/Infrastructure from 1960s reaching end of lifespan
- Changing needs of people
- Transfer of Wealth to Baby Boomers (\$2T)



Key Questions:
Is this trend about renovation or rebuilding?

What new kinds of buildings will the end-user desire in 2020?

Observations & Forecasts

Already today, manufacturing facilities oriented around the high technology or biotechnology industries will require “clean” buildings. Telecommuting employees and a service sector economy changes the assumptions about commercial office space and home design. Over the next 20 years, people’s changing needs for buildings will create new market opportunities for the construction industry.

The building boom of the 1960s created much of the public infrastructure of America. Many of those buildings are now entering the final years of their originally intended life span. Furthermore, the neglect of our municipal facilities has also created a strong market in the reconstruction of water and wastewater treatment facilities. Over the next 10 years, the demand for renovation and updating of 1960s era public buildings and infrastructure will comprise a large portion of the commercial construction market.

The last 10 years has seen a renewed effort at downtown area revitalization by adding new commercial as well as residential space. Cities such as Washington, DC, Cleveland, OH, and Houston, TX, have seen a strong demand for inner city housing. Many of these projects will include rebuilding commercial property into residential property. This increase in new urban dwellers will create a related need for additional commercial services (such as office, retail, and restaurant space) thereby creating a need for new or revitalized commercial properties and/or facilities. Over the next 15 years, the demand for downtown residential and related commercial construction will dramatically increase.

As the World War II GI Generation and the Silent Generation age into their 80s and 90s and pass away, the Baby Boomer Generation is positioned to inherit about \$2 trillion. While some of this wealth transfer will occur in liquid assets, much will come in the form of property. The choices Baby Boomers make in regards to how this wealth is spent will drive the direction of the US economy over the next 20 years. Between now and the year 2020, Baby Boomers may choose to renovate older homes, construct new homes or second homes on inherited property, or sell undeveloped property to commercial or residential developers.

Areas for Further Research

- Reassess the residential market potential for mechanical contractors
- Conduct a companion study investigating the kinds of commercial opportunities the above factors could generate
- Conduct a study on the potential uses of buildings in 2020 (purpose, size, special needs)—what the end user will want in their buildings in the year 2020
- Identify the key factors for successful downtown revitalization projects

Implications	Recommended Action Steps
<p>Increased demand for retrofit/rebuilt construction (especially residential and related commercial structures)</p> <p>Greater and more specific end-user demands for air quality, construction methods, materials, and specifications</p> <p>Growth of market opportunities in inner city projects</p> <p>Increased demand for new construction and rebuilding public projects</p> <p>The Baby Boomer Generation will decide how to spend the \$2T they stand to inherit over the next 20 years—real estate (commercial and residential) may be likely investment options</p>	<p>Develop a set of product offerings for the retrofit/rebuilding commercial and residential markets in revitalized urban centers</p> <p>Become actively involved in local dialog about downtown and inner city revitalization efforts</p> <p>Create a public projects strategy for rebuilding/updating schools, hospitals, municipal buildings, and water/sewage infrastructures</p>

Sensor Technology



- Ubiquitous Sensor Technology
- RFIDs on All Materials/Tools
- Living “Smart” Buildings

Key Questions:

What happens when service contractors are only providing preventive maintenance?

Could the name/nature of the industry change to the Mechanical & Communications Coordinators Contractors?

Observations & Forecasts

Sensor technology is at once getting more powerful, more portable, more disposable, and more pervasive. Even today, sensors are able to monitor and alert us to a variety of factors including temperature, air and water quality, location, frequency of use and wear and tear of mechanical systems. By 2015, sensor technologies built into all mechanical systems will be able to self-diagnose system problems, forewarn of potential failures, and in some cases fix the problem. As a result, by 2015, the majority of mechanical systems servicing work will be scheduled preventive maintenance—there will be increasingly fewer unforeseen system problems or emergencies.

By 2005, Wal-Mart, the world's largest retailer (and company) will require every product on its shelves to be equipped with radio frequency identification tags (RFIDs). RFIDs will provide invaluable knowledge about consumer behavior and enable the manufacturer to move further towards a just-in-time production and delivery model. By 2010, all parts and components used in mechanical systems will have integrated RFIDs, revolutionizing inventory management and the ordering process (i.e. the supply chain).

In a world filled with sensors gathering billions, if not trillions, of bits of data on a daily basis, coordination and communication skills become crucial. The ability to determine which piece of information gets communicated to which system will be a highly sought after skill. By 2010, the specialty contractor who masters the skills of coordination and communications among sensor-enabled "smart" systems and people will be the first among equals of the specialty contractors.

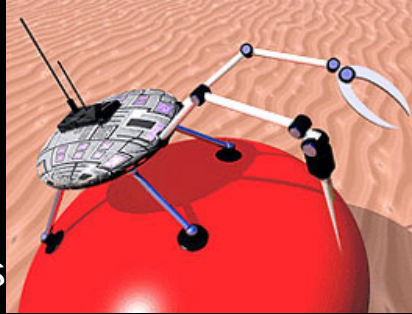
Areas for Further Research

- Development of RFID standards for the mechanical contracting industry
- Determine the impact of sensors in HVAC and other mechanical systems in commercial buildings
- Conduct an analysis of the market potential for the increased use of sensor technology in all aspects of construction

Implications	Recommended Action Steps
<p>RFIDs will have significant impacts on parts ordering and tracking as well as inventory control</p> <p>Contractors will be able to take a just-in-time approach to their parts inventory</p> <p>Sensor enabled “smart” systems will be able to alert service contractors of impending system problems</p> <p>Increased consumer demand for “smart” systems, healthy systems, secure systems</p> <p>Greater emphasis on communication and coordination skills</p>	<p>Consult with your manufacturers/ suppliers on their plans to migrate to RFIDs and establish protocols and standards for RFIDs in the industry and in your business</p> <p>Service contractors must continue to shift (or accelerate) their mindset from reactive problem solver to proactive preventive maintenance</p> <p>Consider integrating your parts/supplies inventory management systems with those of your suppliers/distributors</p> <p>Develop your communication/ coordination skills</p> <p>Fund R&D efforts on commercial applications of smart sensor technology; participate in these efforts where possible</p> <p>Consider adding sensors in products to test and validate their value in healthy building monitoring</p>

Materials Sciences

- Nanotechnology—Atomic Level Construction
- Lighter, Stronger Materials
- Self-Healing/Repairing Materials



Key Questions:

What is the role of a Mechanical Contractor in atomic level construction?

What happens to the role of service contractors in a time of self-healing/repairing systems?

Observations & Forecasts

Nanotechnology is the ability to manipulate individual atoms to create new materials. While nanotechnology has strong commercial potential in industries such as pharmaceuticals and health, no industry could be more impacted by nanotechnology than construction. By 2020, nanotechnology will change the paradigm of construction from valve by valve, unit by unit, to atom by atom.

Breakthroughs in materials sciences including nanotechnology, synthetics, alloys, and plastics will create a whole new suite of lighter, stronger construction materials. By 2020, the materials used in all phases of construction (exterior, interior, and systems) will be significantly different than those used today.

The phrase “all construction is local” could take on a whole new meaning over the next 20 years. Using the principles of nanotechnology, just-in-time inventory management, and mass customization, many of the materials needed for a given job could be manufactured on-site, on an as-needed basis. By 2020, the first thing built on every job-site, could be a materials factory that will produce some or all the materials needed for that particular job.

“Smart” materials that combine nanotechnology and sensing nanorobots could create self-healing materials and systems by 2015. The service contractor’s “technician” of the future could be a microscopic, versatile robot that can continually monitor and repair systems and materials.

Areas for Further Research

- Impact of nanotechnology on the industry
- How distributed manufacturing and on-site production of materials could change the industry
- Programs to systematically monitor technological advances and educate the entire industry including the UA on potential impacts

Implications	Recommended Action Steps
New types of materials will have a large impact on the entire construction industry	Work with industry partners to increase R&D activities on new materials and their uses
Self-healing/repairing materials could dramatically change what constitutes a “service contractor”	Monitor progress in materials development made by the US military and academic institutions
On-site, customized construction of materials could significantly impact the current supplier/distribution chain	Develop a dialog with the UA about advances in materials science technologies and how these advances are going to change the industry
The success of the industry will be impacted by how MCAA’s partnership with the UA will respond to the challenges posed by new materials	

Conclusion

The mechanical contracting industry faces many decisions, challenges, and opportunities over the next several years. Rapid-cycle construction and information overload has made thoughtful decision-making about the future difficult. The five trends presented in this report are intended to provide the mechanical contracting and services industries guidance for making decisions about how to best pursue the myriad of opportunities that lie before the industry.

This report is intended to be the beginning of our journey into tomorrow. On this journey lie many golden opportunities as well as several critical challenges. This study begins to create a roadmap for the future of the mechanical contracting industry. However, the nature and destination of that journey will be greatly influenced by the attitude and preparation with which mechanical contractors confront the question, "What kind of industry do we want to create for the year 2020?"

The MCERF Mission Statement

The Mechanical Contracting Education & Research Foundation (MCERF) articulates and funds the mechanical contracting industry's most critical human resource and research needs. MCERF cultivates and supports activities that allow professionals in the mechanical contracting industry to succeed in their businesses.

If you would like to participate in the research activities of the Mechanical Contracting Education & Research Foundation
or
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