

Mechanical Contracting: An Industry Overview

THE MECHANICAL CONTRACTORS ASSOCIATION: MEMBERSHIP

The MCAA is a national association, with more than 2600-member contractor companies. All members are Union contractors, and all work in the mechanical industry. Beyond those commonalities, they vary widely in both size and type of work performed (sort of like post-secondary institutions, in that respect).

Mechanical construction is broadly divided into two categories: Construction (new builds or retrofits) and Service (servicing existing mechanical systems). Some companies perform only one or the other, but many have both construction and service divisions. Some larger companies may also have divisions outside the Mechanical scope: Electrical, or Controls.

Companies may do anywhere from <\$1M to +2B\$ of work annually. Some are family-owned local businesses, others are national conglomerates with separate business units in many states. They often have different specialties: commercial; industrial; process piping (e.g. medical); or residential. Some CEOs came up through the trades themselves (e.g. as a Plumber), others have come from a college/business background. Some do small, quick-turnaround projects; others are involved in multi-year builds on giant projects. MCAA is invested in best practices for a very broad range of companies doing similar but different things.

COMPANY STRUCTURE

Mechanical Contractors do not function under a single roof. On most projects there is a 'jobsite trailer,' which is functionally a pop-up satellite office that exists for the duration of the project. Pre-fabrication of components (racks of preassembled pipe; modular bathrooms or kitchen systems; etc.) has been transforming the industry and improving efficiency for the past 10-15 years. Company fab shops may be remote, and generally have their own leadership. Depending upon the geographic area in which they do work, companies may have multiple offices. Consequently, company leadership must oversee teams with whom they do not come into regular contact.

Coordination of these various teams (Field, Project Management in the office, Fab Shop, Estimating, Billing, etc.) is critical. For a project to succeed, groups cannot work in silos – Leadership must provide oversight and facilitate coordination.

CONTRACTING: THE MULTI-PARTY STRUCTURE OF WORK

Construction projects require the involvement of multiple companies who are contracted to build the specialized systems within a building or series of buildings.

The Owner – the entity which contracts the job – may fall into a broad number of categories: industrial (auto plants); commercial (office buildings; restaurants); government (local, state, or federal); sports (a football team); medical (a hospital); educational (a school or university) or residential (a development group building apartment complexes).

The entity to which the Owner awards a contract is most often a General Contractor (GC), or sometimes a Construction Management firm (CM). The GC or CM subcontracts other companies to complete the various types of work required on the project: excavating; pouring concrete; structural steel; framing, roofing, and enclosing the structure; installing electrical and mechanical systems; flooring; drywalling; and so on.

"Mechanical systems" is where we come in. The Mechanical trade is responsible for plumbing and water systems; sheet metal (things like hoods in industrial kitchens); heating and cooling systems (HVAC); and various specialized piping systems for things like medical gas and chemicals under pressure or vacuum (referred to as 'process piping').

The Mechanical Contractor is generally a 'sub' to the General Contractor. In turn, the Mechanical Contractor will generally have their own subcontractors which may include Insulators (to keep those pipes protected and at stable temperature); Test & Balancing (to make sure that the mechanical systems are functioning within parameters in terms of airflow, heat transfer, and other considerations that impact the efficiency of the system); and Controls (who are responsible for the systems that control things like airflow units or chillers in HVAC). Sometimes, the GC will contract an "MEP Coordinator," who is responsible for overseeing the mechanical, electrical, and plumbing elements of a project, as these three systems are generally the most complex in any build. (Note: both mechanical and plumbing work fall under the Mechanical Contracting scope.) In these cases, the Mechanical Contractor will usually report primarily to

the MEP Coordinator for day-to-day issues, although the GC and 'Owner's Rep' will sometimes become involved if large issues arise.

The General Contractor sets the overall schedule for the project (referred to as the GC or Prime Schedule), based upon their contract with the Owner. The Mechanical schedule is dependent upon that and developed with reference to milestone dates set by the GC. And... so are all the other subcontractors, who are – in theory – building their own schedules based on those milestones.

All of the various subcontractors (often referred to simply as 'trades') are working in the same space, often concurrently. They may or may not have previously worked together and may or may not have previously worked for the GC or the Owner. As you can imagine, developing good relationships is essential and coordination is critical (it's pretty hard to install a rack of piping if someone has put a wall in your way). If another trade is behind – or ahead! – of schedule, this can adversely affect the Mechanical Contractors ability to get their work done as planned.

GETTING WORK: RFPS & CONTRACT TYPES

The vast majority of mechanical contractors have to compete for at least 90% of their work. There are a couple of ways in which a contract may be awarded, but by far the most common is by bidding on a Request for Proposal. Initial RFPs come from the Owner to a General Contractor, and the General Contractor then issues RFPs for the mechanical work (and that of other subcontractors, separately).

Design-Bid-Build: Traditionally, the Owner would generally have an Engineer/Architect design the project, and then release that design as an RFP. It may be an open call for proposals, or the Owner may selectively approach General Contractors with whom they have worked before to submit a bid. Either way, bids represent a GC's best price for the project, and the project is usually awarded to the lowest bidder.

Design-Build: This type of project is becoming more common: it eliminates the Engineer/Architect, and the Owner's RFP includes the design component. It's increasingly popular because this allows the Owner to transfer risk associated with the design process down to the GC, who has taken on the design work. The same risk transfer 'trickles down' when the GC contracts the Mechanical Contractor to be involved in the design aspect of the mechanical systems.

Design-Build-Assist or 'Design Assist': Subcontractors (e.g. Mechanical, Electrical) are hired by the GC to assist with the development of the project design documents and provide input before the project begins – they do not do the design themselves, but provide input and collaborate with all other parties about how the construction process will take place. This can result in a more efficient project with fewer delays and 'clashes', but also increases risk in that it pushes some of the design responsibility to the Mechanical Contractor.

With all of these contract types, the RFP process from GC to sub (in our case, Mechanical) generally results in the contract being awarded to the lowest bidder. So, while you are pleased to have been awarded the project, you know that you were the one who agreed to take on the greatest degree of risk for the least amount of money.

FINANCIALS

Margins are narrow in the Construction sector: the average US net margin is 1.81% (as compared to 28.40% in Electronics, and 61% in Software, and 67.35% in Pharmaceuticals).¹ It's a risky business, and strong leadership can make the difference between whether a job ends up in the black... or doesn't. For context's sake, that net margin is equivalent to twelve minutes per worker per day: efficiency is critical, and leadership's potential impact on that cannot be overstated.

Budgets & Estimating

Budgets are established in the bid submission process. Any increase in materials cost (e.g. supply chain issues and availability) or increase in labor cost (e.g. those due to schedule delays, or coordination problems with other trades) can have a serious negative impact on that margin. No matter how good the Estimating Department, there are a multitude of dependencies that may impact budgeted costs. There is a formal submission process for requests for additional compensation for increased cost resulting from such changes (these are called "Change Orders," and are one of the thorniest parts of contracting). However, because any Change Order payment comes out of the GC's bottom line, you can imagine that there are challenges having these requests approved. The more changes, the more risk – because certainly, not all Change Orders will be approved.

One of the highest risks when it comes to Estimating a project is Labor. You can use past data to determine an average of how much pipe one journeyman can lay in a day: but averages often differ significantly from real-world conditions. Factors impacting labor efficiency are almost innumerable: from the experience and work ethic of the individual; to site congestion (a bunch of different tradespeople working in tight quarters slow each other down, naturally); to project delays (where perhaps your crew is standing around waiting for another crew to finish critical work); to efficiency loss due to working overtime (people are less productive after 8 hours) or nightshift when racing to beat deadlines (fatigue: people are less productive when their circadian rhythms are disrupted).

Billing & Payment

Work is subject to 'Progress Billing' – you can only bill for the percentage of work completed by each given billing date. Contractors must pay upfront for costs (materials, labor, equipment, their own subcontractors), and then bill the contracting entity (re: GC) for them. Cash flow is a real challenge: there is a 30–90-day lag on payment (sometimes longer), so contractors are often paying out of pocket for three months of work or more. Moreover, contractors are subject to Retainage, whereby the client withholds (retains) a percentage of total payment across the project (usually 5-10%) until the project is complete. All mechanical projects begin 'in the red' and the majority of them remain there for most of the project. Enough delayed or disputed payments from clients can bankrupt a Mechanical Contractor – even if they have done the work.

A company's success is dependent upon having a series of jobs in progress, so that those which have finally become cash positive can support the costs of those which are not as far along, and so cash negative. Cash flow is critical, and cash must be available to support not only project costs, but also things like

¹From the research of Prof. Aswath Damodaran, Stern School of Business, New York University, 2019. Accessed 5/30/22 via https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/margin.html

overhead and office salaries. Assessing the WIP (Work in Progress report) and identifying and managing potential cash flow issues is critical to company success.

Compensation methods generally fall into three categories:

- **Lump Sum/Fixed Price:** The awarding entity (so for Mechanical, usually the GC) agrees to pay a flat fee for the work done.
- **Guaranteed Maximum Price (GMP):** Agrees to pay ‘cost of work’ (generally materials and labor) plus a markup (which may be either a percentage of cost of work or a fixed dollar amount), not to exceed the Guaranteed Maximum Price. As you can imagine, this pushes risk onto the party doing the work.
- **Cost Reimbursable:** The contractor gets reimbursement for cost incurred (labor & materials), along with an additional markup (generally a percentage *of cost*).

PROJECTS

Once a project is awarded, things have to happen fast. Projects are deadline-driven: and it is not a deadline the Mechanical Contractor got to set. They are racing the clock, with a million time dependencies (e.g. supply chain; permit offices; heavy equipment rental; labor availability).

It is rare that two construction projects are ever the same – or even very similar. Every job we build is unique: it is a different build with different engineering and specs; different schedule; different requirements; and different client expectations. This is not like the tech industry, or manufacturing. You do not build an iPhone and then next time build an improved iPhone with new features. It is more like building an iPhone, then a home security system, then an automotive computer system. And not only does the scope of work change from job to job – so too do your teams. You start over every time.

In a way, every project is its own standalone business. Once you get the contract, you staff it up – fast – and you pull what you can together. This quick turnaround once the contract has been awarded impacts how you create that team: team creation is limited by field and office staff availability at project start time. In this respect, the military may be a useful model for comparison, in terms of how teams come together for a specific mission, but personnel are not consistent from mission to mission.

You are assembling groups of both field and office staff who may never have worked together before. Many of the field workers may not be known to your company’s people. You select your Project Manager, your Assistant PM or Project Engineer; and hopefully (if you have a good relationship with your Union Hall) you have some say in selecting your field leadership (Foreman, Superintendent). Immediate development of rapport and a sense of shared commitment between office and field is essential: they must rapidly come to feel like a team.²

² This will be discussed in greater detail in the following section, “The Unique Nature of Construction Labor”

You do not have a consistent team for the duration of the project, because a project is not staffed with the same amount of manpower for the duration of the project. In the beginning, crews are smaller and then more tradespeople are gradually brought on until ‘peak labor’ is reached on the ‘manpower curve.’ After that, tradespeople are laid off (and return to the Hall for their next assignment) as manpower requirements reduce.

THE UNIQUE NATURE OF CONSTRUCTION LABOR

Note: The below section describes the relationship between company employees and those who do the actual construction in the field. Those in the ALI classroom rarely interact directly with Field Labor (although some of them will have come from the field, and so are able to offer a unique perspective). Rather, ALI participants are those who lead teams of company project management, estimating, and other staff (Project Executives; Operations Managers; Division Managers), or individuals leading those leaders (Vice Presidents; Presidents; CEOs). However, the relationship between field and office is so critical to project performance and company success that it is described in some detail.

Mechanical Contractors don’t technically build anything. All of the actual construction (other than prefab) is done in the “field” (i.e. onsite) by plumbers, fitters, and sheet metal workers. These people ‘come up through the trades,’ working through apprenticeships to become journeymen – and are broadly referred to as ‘Labor.’ They get their paycheck from the Mechanical Contractor, but they are not employed directly by the contractor. When a contractor needs to staff a job, they reach out to the local Union Hall, and the Hall (aka ‘The Local’ or ‘The Union’) provides that Labor. The Mechanical Contractor generally does not get to hand-select the field personnel and, as with all working groups, these individuals come in varying degrees of quality and experience. Companies may also be pulling from different Unions for a single project – depending upon geographic location of project, and also whether that area has ‘split Locals’ for different trades (e.g. a Union for Plumbers, and one for Fitters).

The Union has its own culture – one of strong loyalty to the Hall and to each other. Labor are the people turning wrenches, and sometimes are skeptical of the ‘suits and ties’ from the office – particularly if it’s a 50-year-old Plumber with 30 years of experience working with a 24-year-old Project Manager with a recent Construction Management degree, who may not even know the difference between PVC and copper pipe. Those in the field do not work for the company Project Manager – they work for the Foreman. The Foreman does not work for the PM – they work for the Union. But the PM is responsible for working with the Foreman to ensure that the project is completed on schedule and within budget: the importance of their relationship cannot be overstated. Events in the field require quick decision-making on the part of the Foreman, and so trust and understanding between field and office leadership is essential. Without this, there is a potential for field leadership to override office authority. The PM must ‘trust but verify.’ The Foreman is essential for developing culture to the field. The PM must engage with and help develop that culture, in line with company values.

This arrangement presents many unique leadership challenges for the Mechanical Contractor. ‘Best in Class’ Field Labor feels they are working for the contractor and has loyalty to the company (particularly if

they have done multiple jobs with them), but even so workforce allegiance is almost always first to their Union. For the most part, these people are there to make a living. Whether the company succeeds or fails has no impact on the labor force, as the Hall will simply send them out on another job with another company. While the company must focus on client satisfaction, the same is not necessary of Labor. At the end of the day, the Labor on a project is a 'temporary workforce.'

It is critical to have Labor feel like part of the team, although they are not technically employees. Being in the field, their exposure to office staff (PM included) may be limited. Building strong teams is important not just in the office but also in the field, with a group of people who may have differing agendas (are they working for the company, the Union, or themselves?).