Divide and Conquer MEP Coordination

The use of the term "MEP Coordination" in conjunction with Building Information Modeling (BIM) is common terminology in the AEC industry today. A lot has already been written on the subject and this article does not intend to reiterate what is now a well-established concept. BIM based MEP coordination reduces field conflicts and saves cost on the project. It benefits not only contractors but also owners, designers, engineers and consultants on a project. It facilitates a more aggressive construction schedule, lends higher productivity to project teams and much more. The purpose of this article is rather to describe the strategy formulated to conduct BIM-based MEP coordination on a large hospital project in Northern California.

The project description: The Lucile Packard Children's Hospital (LPCH) Phase II expansion project is located at the Stanford University campus in California. This 100 initial bed (200 final) quaternary care facility is a 530,000-sq.-ft. (416,000-sq.-ft. tenant improvement) expansion to the existing hospital and will consist of diagnostic and treatment facilities, imaging, nuclear medicine, intensive care patient rooms, medical surgery patient rooms along with all other components of a hospital building. The Office of Statewide Health Planning and Development (OSHPD) California will be the governing body for building permits and approval. The OSHPD submissions are divided into increments which follow the general construction sequence of
Structure > Envelope and Core > MEPF Systems > Interior finishes. Given the project scale and size, the BIM implementation plan was used as a contractual document during the bidding stage to outline preconstruction roles and responsibilities of each stakeholder (identified in figure 1) in the project team including the design assist and build contractors. The goal was to identify the deliverables of BIM on the project, establish measurable metrics, formulate the preconstruction coordination plan, develop a BIM implementation schedule and identify smaller teams functioning individually and collaboratively in achieving the OSHPD submittal schedule.

OSHPD creates a unique environment within which project teams need to function and thrive to plan, build and deliver a healthcare building in California. An OSHPD project requires an immeasurable coordination effort between various trade systems in order to achieve code compliance and approval. The task therefore on LPCH was to align the coordination efforts of the design assist and design build contractors with drawing submittal packages of the architect and engineer of record.

The BIM implementation plan is our quintessential tool to orchestrate this process. The plan divides this effort into three main arterial paths of structure, envelope and core and interiors (MEP systems and finishes). Each path has a coordination schedule which culminates in an OSHPD increment drawing package submission. Additionally the building is divided into coordination zones referred to as “chunks” which represent an average area of 40,000 sq. ft. at a given floor level. The process map below (Figure 2) depicts the steps involved for a typical chunk to be fully coordinated and approved.

The process initiates when a chunk is frozen in terms of architectural, structural and MEP design followed in sequence. It is worth mentioning here that there needs to be a common consensus on the definition of design freeze with the project stakeholders. One of the excerpts from our document states "A ‘chunk’ is considered frozen when the design conforms to all Code requirements and the intent has been validated by the Owner, Architects, Engineers, Contractors, Consultants, and Reviewers." Following this, the contractors produce 3D virtual models and perform clash detection between trades. This cyclical process involves coordination meetings with input from owners, designers, field personnel, and the inspector of record. Coordination signoff is done when the 3D virtual models are 95% clash-free and memorialized as time-stamped documents. The steps are repeated for every chunk and eventually will lead to a full drawing package for OSHPD submission.

Having said that, we understand that design is a non-iterative progression. And given the aforementioned process, it is critical to receive design decisions and owner approval for finalizing each chunk before subcontractors initiate coordination. We employed additional
schedule tracking tools of pull planning to identify the last responsible moment for making decisions and accomplishing tasks (Figure 3) pertaining to each chunk.

There is a famous quote which says, "If you are not keeping score, it’s just practice." In light of that, we have established metrics for tracking MEP coordination and regularly produce charts depicting clash statistics. The coordination signoff milestone in Figure 2 is achieved only when the 3D virtual model of the chunk is 95% clash-free. The remaining 5% termed as "parking lot" items remain unresolved as they fall outside the bounds of the immediate project team. An example of this would be medical equipment which gets selected late in the game. Eventually we would like to track towards the metric of zero change orders due to field conflicts during construction.

An OSHPD project requires an incredible planning effort but, more importantly, it requires robust team collaboration and dialogue which develops trust. I have realized trust as the single most important factor to make this process a success.

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Figure 3: Pull Planning using post-it notes which are then converted to an electronic format to track deliverables on a weekly basis

Technical Sessions at the NEBB National Convention

We have two and a half days packed with technical sessions at the annual meeting in Georgia. Here is a listing:

- Job Site Electrical Safety—A Matter of Life and Death
- Testing Building Envelopes—What is the Process and Why is it Important to NEBB Professionals?
- Securing GSA Work
- HVAC Duct and Air Leakage Testing for Commercial and Industrial Applications
- Looking for an EXIT? Getting Out of Business the Right Way
- Starting a Lab Project? Understanding Hazards
- Achieving Total Flow Control in Hydronic Systems
- The Economics of Balance
- Pressurization Testing of Commercial Buildings

- Cleanroom Testing—Changes to ISO Parts 1 and 2
- Simple BIM—TAB Using BIM in the Real World
- Differential Pressure Control and Balancing of Hydronic Systems
- Events that May Change HEPA Filter Test Methodology
- The Basics of Selling
- Airborne Particle Counters/APC/OPC
- Change Orders
- HVAC/Heat Exchanging Coil Performance Optimization
Professional Fume Hood Diagnostic Tools

Dif-Kits Tracer Gas Hardware


Features:
- Specifications of Standard drawing #110-83M
- Flow rate of 4 liters per minute
- The diffuser is placed in the fume hood and sulfur hexafluoride gas is injected at a supply pressure of 30 psi

Optional Tools:
- Test-mannequin
- Vapor analyzer
- Thermal anemometer for face velocity measurement
- Data stored in the Anemometer can be downloaded to a datalogger from its analog output

Ensure Lab Worker Safety
FEATURED ASSOCIATE

Pacific Test & Balance, Inc. (PacTab) was started in April 2009 by Jason Huffman. Pacific Test & Balance, Inc. has offices in Hawaii, California and Guam. The firm offers many services which include but are not limited to: Testing, Adjusting and Balancing and Building Systems Commissioning for military, public and private works. Their client base is eighty percent (80%) preferred contractors. Pacific Test & Balance, Inc.’s main focus is customer service.

Their philosophy is, “Integrity, Service and Relationships to achieve a Quality Product.”

Jason has 13 years of TAB (Testing, Adjusting and Balancing) experience with 4 years in the apprenticeship program at the North Bay JATC. He started working for a TAB company, while attending the apprenticeship program and has worked in this industry ever since. Five years ago he transferred to Hawaii with the balancing firm he was employed with and attained his NEBB certification, while working in Hawaii. In 2009 he decided to open his own firm and a year later his firm achieved their NEBB certification. Jason is NEBB certified in TAB and Building Systems Commissioning (BSC).

Currently Pacific Test and Balance, Inc. has nineteen (19) employees. Thirteen (13) employees are TAB and BSC field employees. They have 3 Certified Professionals. Jason Huffman is located at the Hawaii office and the other two Certified Professionals, Steve Smith and Mike Dabney, are located at the California office. The remaining ten are technicians with 5 being NEBB Technician certified; Davis Nguyen and Brad Bannister who are located in Hawaii, Ernie Rodriguez and Jonathan Belisle, Lead Technicians in California, and Jeff Kitt who is the Field Supervisor for Guam. The remaining six (6) employees are office staff. Kianna Chung started with Pacific Test and Balance, Inc. in June 2009 and works on Project Development. Nathaniel Irvin handles accounting and payroll, Jessica Guerra provides project specific administration and Jenelle, Jason’s wife, is the HR Manager. Randy Hogg is the Operations Manager for the California office and Brandon Consalvi provides Client Services and Relations for all regions.

Jason made the decision to become NEBB certified to validate his years of experience and ability through succeeding in the certification process. “Having a NEBB certification tells the client from day one that we are willing to put in the extra time and effort to, not only meet a set of standards, but also to be governed and held to those standards by a group of our peers including our competitors. By being NEBB certified, we set the bar high.” Pacific Test & Balance, Inc. believes in local involvement thru the NEBB Chapter.

Steve Smith, Northern California Construction Manager, is the Technical Committee Chair and Jason serves as a member of the Technical Committee in the NorCal-Hawaii NEBB Chapter.

Few of their customers understand completely the importance and value of the NEBB certification. Because of this, Jason feels that there needs to be an onslaught of continual education in our field of work to help contractors and engineers know that NEBB is not just a line item in a specification. Being a part of the NEBB organization brings a system of “checks & balances” to ensure quality control and procedural standards “second to none” in the industry. Jason believes and has seen in the Hawaii and California market that this education is opening the door for PacTab to grow its market-share in the commissioning realm as well. The NEBB professional brings quality control into the mix, regarding the mechanical scope on projects. Being a NEBB professional should tell

2011 NEBB NATIONAL ANNUAL MEETING IN SAVANNAH, GEORGIA

This year’s NEBB Annual Meeting will be in beautiful, historic Savannah, Georgia from October 20-22, 2011 at the Hyatt Regency Savannah.

Join NEBB for two days of technical sessions on October 21st and 22nd. See the listing of seminars in this issue. The 2nd Annual Fishing Tournament will be held Thursday, October 20th. The 14th Annual NEBB Golf Tournament will also be held on Thursday, October 20th and the ever popular Get Acquainted Party will be Thursday, October 20th. As usual, there will be great tours to explore all that Savannah has to offer!

On-line Registration is available now at www.nebb.org.
the Mechanical Team that the integrity and quality of the client’s final product is the number one priority.

Jason feels that marketing plays a very important role in his company. He has developed a website which many TAB firms do not have, and he has received many jobs through his website. The firm has been contacted by clients located in San Antonio, Texas, Japan, the Philippines and the Marshall Islands through his website as well as consulting with the McDonalds Corporation mechanical group on a worldwide energy savings research study involving energy usage trending at all Hawaii McDonalds restaurants and future coordination being planned throughout the nation. Jason has been a member of ASHRAE and feels that this has been very beneficial in developing contacts and leads, and providing support from a TAB point of view and therefore developing trust to quality standards between PACTAB and the Engineering Community. Jason is also a member of USGBC which has also aided in education and support for the commissioning work performed by PacTab. The Company believes that future growth and expansion into the commissioning market has great potential for the company and has seen already a huge need for its services in that market throughout the Pacific and Asia.

Pacific Test and Balance, Inc. have many projects of which they are proud to have worked on such as the Allure Waikiki. Allure Waikiki is a 35-story tower that contains 291 one, two and three bedroom units ranging in size from 833 square feet to 1,633 sq. ft., each with a private lanai, a 19,500 sq. ft. recreational terrace, 9,000 sq. ft. of signature dining and/or upscale retail space. It was a LEED Silver project.

Another project is the West Hawaii Civic Center on the Big Island of Hawaii. This is a $50 million dollar project and is on its way to becoming a LEED-Certified building. The West Hawai‘i Civic Center consists of a community center, amphitheater, services from 15 County agencies, a Hawai‘i County Council Chamber and Office of the County Clerk. Built on a seven-acre parcel, county offices are housed within the center.

A highlight of the LEED certification is a 320 kW photovoltaic system atop the center’s parking structure with the capacity to expand another 100 kW. The buildings are designed to control thermal comfort and lighting, with systems to reduce heat gain and energy consumption throughout the complex.
Succession Planning: *Continuing Success* Part 2

**Step Four: Valuation Methods**

The following are some of the valuation methods you can use when selling your business:

1. **“Fix the price.”** Many owners simply fix the price of their business, although it is more common to obtain a formal business appraisal. Both buyer and seller can arrange for independent appraisals, with the individual appraisers choosing a third appraiser.

2. **Establish the value of the company based on book value,** which is simply an evaluation of the company’s balance sheet at a specific point in time. This is usually done by the company’s accounting firm, using generally accepted accounting standards. Book value may not, however, reflect the current fair market value of the company, and therefore, an appraiser’s valuation, using book value as a starting point, may be necessary.

3. **Fix the price by capitalizing the earnings of the business.** Under this method, the business’s net income is capitalized at a specific rate (called the “multiplier”) with the result reflecting the total value of the business. For example, a business with net income of $1,000,000 and an 8% capitalization rate would be valued at $12,500,000 ($1,000,000 ÷ .08). A reasonable approach would be to average net income over a certain number of prior years, perhaps giving greater weight to recent years, and use a capitalization rate consistent with industry standards.

It is both acceptable and often advisable to use a combination of methods. For example, using asset valuation alone can underestimate the value of the business, since, by ignoring earnings, the future capabilities of the company are excluded. The goal is to reach a valuation that fairly compensates the owner for his interest in the business and that makes the business attractive to the potential buyer. If done properly, both parties will come to view the price as a “win-win” situation.

Caution—Since valuing a business can be more of an art than a science, potential tax problems can be avoided by consulting the most recent IRS Valuation Guide as a starting point. The IRS is interested in having the business fairly priced for income, estate, and gift tax purposes. This is especially important if a related party is at the other end of the transaction. Some of the factors the IRS will look at are the following:

- The nature and history of the business.
- The economic outlook for the business’s industry.
- How assets and earnings are being valued, and the existence of intangible assets, including goodwill.
- The selling price of comparable businesses using, if possible, acceptable industry formulas.
Step Five: Buy-Sell Agreements

While each specific business continuity strategy depends on the purposes and objectives the owners are trying to accomplish, almost all succession plans begin with some sort of buy-sell agreement.

In its simplest form, a buy-sell agreement is an agreement between two or more parties, whereupon a triggering event, one party has an obligation to buy and the other has an obligation to sell his or her interest in the company. Do not consider drafting a buy-sell agreement without consulting your attorney.

In addition to fixing the price, one of the more important purposes of a buy-sell agreement is to restrict ownership. While business owners usually don’t intend for their ownership interests to fall into the hands of someone who is not part of the succession plan, this may indeed happen despite good intentions.

For example, the divorce of an owner could result in the ex-spouse gaining control of the stock of the company which could then be transferred to another party. Also, an owner’s creditors could force the passing of ownership interests to outsiders. With closely held corporate stock, it is generally advisable to try to prevent passing of such stock to a third party by placing a restrictive legend on the face of the stock.

Buy-sell agreements also help to define a market for the eventual sale of an ownership interest. Potential buyers include the other owners, interested family members, and unrelated parties including the employees of the business or owners of similar businesses. The business needs to know in advance what the potential price and market is in order to limit the disruption caused by a withdrawing owner.

Three general methods for structuring buy-sell agreements within a company:

1. The first technique is called a redemption or entity purchase agreement because the entity (the company) is the purchaser. The company is assumed to be a C-corporation for the following discussion. Upon some precipitating event (for example, retirement or death), the company agrees to buy back the shares of the withdrawing shareholder. Redemption agreements are commonly used when the owners have relatively equal ownership interests and want to maintain that equal ownership among the remaining owners, the ages of the owners are different, and family attribution problems (discussed below) do not exist. Among the disadvantages of a redemption plan are the lack of “step up” in basis for the surviving shareholders and a potential squeeze on the company’s capital in order to accomplish the purchase. Family attribution issues can subject the transaction to double tax. As a general rule, any payment, including a payment to redeem stock, by a corporation to a shareholder will be treated as a dividend unless it qualifies as a sale or exchange. However, an exception to the dividend treatment provides for treatment as a capital transaction if all of a shareholder’s stock is redeemed, thus terminating the shareholder’s interest in the corporation. The problem arises in dealing with the definition of “all” under the “attribution of ownership” rules contained in Section 318 of the IRS Tax Code. Simply put, a shareholder would be considered to own, by application of the family attribution rules, shares owned by his spouse, children, parents, and grandchildren. Consequently, as a general planning principle, most family-owned businesses face the possibility of dividend tax treatment upon the sale of ownership interests because shares are usually owned by multiple family members. These rules are quite complicated, but techniques do exist for avoiding the onerous consequences of the attribution rules. The application of these techniques requires expert legal advice.

2. The second technique is a cross-purchase agreement, which is a buy-sell agreement solely among
shareholders. Again, upon the occurrence of some previously defined event, one shareholder (or his estate in the case of death) must sell, and the remaining shareholders must buy, his stock. Cross-purchase agreements have been used successfully in situations where attribution problems exist, or where shares are owned unequally and an owner of a smaller number of shares has the financial ability to purchase more shares. The attribution rules do not apply to cross-purchase agreements because the remaining owners, rather than the corporation, are buying the withdrawing shareholder’s interest, and the tax consequences of dividend treatment only apply to corporate redemptions. While a cross-purchase plan does provide for a “step up” in basis for the surviving shareholders, its main disadvantage is that the purchase is accomplished using personal dollars.

3. The third technique is a hybrid or combination agreement in which both the business entity and the remaining shareholders agree to buy the withdrawing shareholder’s stock. Consider a company with two shareholders, each owning 100 shares of stock. With a combination strategy, there is a stock redemption (entity purchase) agreement for 50 shares, and a cross-purchase agreement for the other 50 shares of stock.

**Wait-and-See Buy-Sell Agreement**

A variation on the traditional buy-sell theme is what has been called a “wait-and-see” buy-sell agreement. In this arrangement, the business owners mutually agree to buy and sell their respective business interests under specified conditions. Typically, this would involve the business having the first option to purchase a decedent’s interest. However, if it is not exercised, the option passes to the surviving owners. Then, if neither option is exercised, the business has a mandatory obligation to purchase the decedent’s interest.

The main advantage of this technique is that it allows the owners to delay some decisions until the time of purchase. However, while it may be attractive on the surface because of its flexibility, this strategy has the undesirable quality of not knowing who the purchaser will be, complicating the funding of the agreement. Obviously, buy-sell agreements can be intricate and detailed documents.

Steps Six, Seven and the Summary will be found in next quarter’s newsletter.

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Upcoming Events

NEBB Certified Professional Written/Practical Exam
September 17, 2011, 8:00 a.m.—1:00 p.m., San Leandro, CA
Contact the Chapter to sign up, akearns@nocalhawaiinebb.org

Fume Hood Performance Testing Seminar
September 19-23, 2011, Labconco, Kansas City, Kansas
Contact NEBB National to sign up, elana@nebb.org

Basic BSC Seminar and Exam
November 7-9, 2011, MAEBA Chapter Office, Pennsylvania
Contact NEBB National to sign up, elana@nebb.org

NEBB Technician Exam
On Demand Basis
Contact the Chapter to sign up, akearns@nocalhawaiinebb.org

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