



# 3D BIM COORDINATION SERVICES

*Revolutionizing the MEP Industry*



- | 3D BIM MODEL
- | COORDINATION & CLASH RESOLUTION
- | SHOP DRAWINGS
- | FABRICATION & SPOOL DRAWINGS
- | QUANTITY TAKE-OFF
- | ONLINE COORDINATION MEETINGS



## Commitment

We are committed to our core values and corporate mission :

- | Maximize client value by adopting the latest technologies and innovations.
- | Improve project efficiency by streamlining workflows to provide high quality services
- | Save time by using a large global team to leverage time zone advantages.
- | Reduce client costs 40-60% by harnessing a highly qualified work pool in India.

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## Revolutionizing MEP

Proper planning and coordination are the keys to the successful execution of projects in the construction industry. Advancements in 3D technology and the advent of Building Information Modeling (BIM) have revolutionized the Architectural, Engineering and Construction (AEC) industry.

BIM allows stakeholders to create and examine virtual representations of the Mechanical, Electrical and Plumbing (MEP) systems, and other utilities of their project. The virtual construct can be used to generate accurate shop drawings and address any and all design issues before construction begins.

Pinnacle Infotech has been acknowledged as a global leader in providing innovative BIM solutions. We have received several awards and recognition from both industry and government. NASSCOM, the leading IT trade

association, has named Pinnacle among the Top 50 innovators 3 years in a row (2006, 2007, 2008) and again in 2011.

The successful completion of more than 3000 projects around the world has provided Pinnacle with a deep understanding of international building codes and procedures. Our global delivery system allows us to seamlessly interface with our clients making geographical separation meaningless.

We recognize the importance of effective work process management and regular communication when outsourcing services. We have developed an ideal mix of infrastructure, experience, global presence and commitment to excellence that has led to long-term relationships with more than 450 clients around the world.



## Benefits of MEP Modeling

- | **COORDINATION** : streamlined communications for quick decision making among Architects, Engineers, Contractors, Sub-Contractors and other services during the design and pre-construction phases.
- | **EFFICIENCY** : check the accuracy and completeness of project plans and drawings before starting construction, eliminating delays due to pending Requests for Information (RFI) and Change Orders.
- | **SAVINGS** : pre-construction reviews mean better use of manpower, better quality construction and less waste of time and materials, all of which translates into lower costs.
- | **PROJECT MANAGEMENT** : the use of detailed materials such as conflict reports, sleeve drawings, hangers and insert drawings allow for a better look at “the big picture” and aid in the review, scheduling and monitoring of each project from beginning to end.

Our clients have reported cost savings of 10 - 25% by successfully implementing BIM.

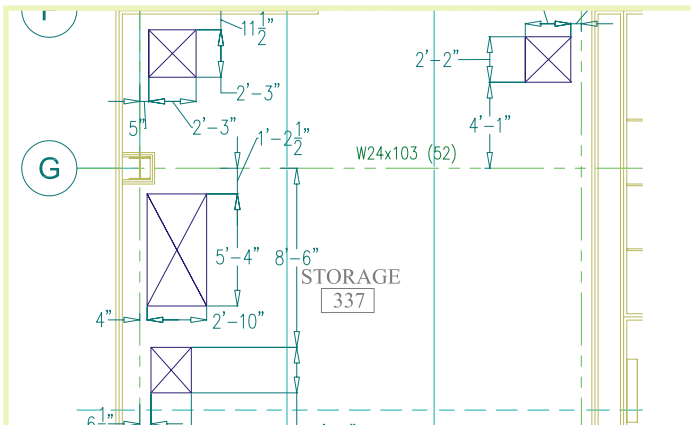
## HVAC

Pinnacle specializes in the virtual construction of 3D BIM models using a range of materials including contract documents, specification sheets, design documents and equipment submittals. A model of the HVAC system, including Hangers, Trapeze and seismic restrainers, is created then augmented using information from architectural, structural and other trade and utility sources. The final model is generated after resolving any potential issues by re-routing ductwork, changing elevations and duct resizing. Value Engineering and Design Validations are also offered.



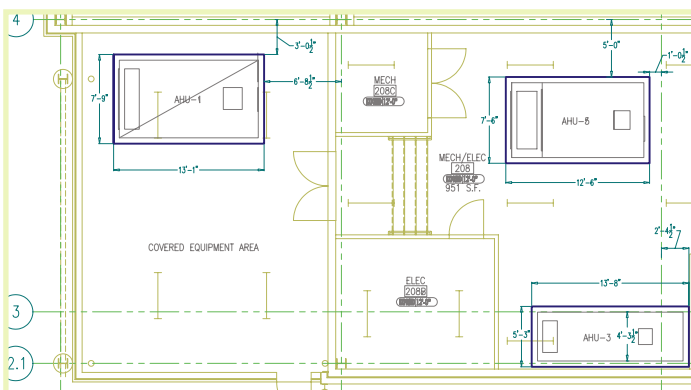
## Block Out Drawing

Block out drawings are required before a contractor can begin pouring concrete on the site. Block out drawings are created from the coordinated BIM model after alignment with the architectural grids. Our experienced team keeps the necessary clearances for the block out as per the contract documents and construction codes.



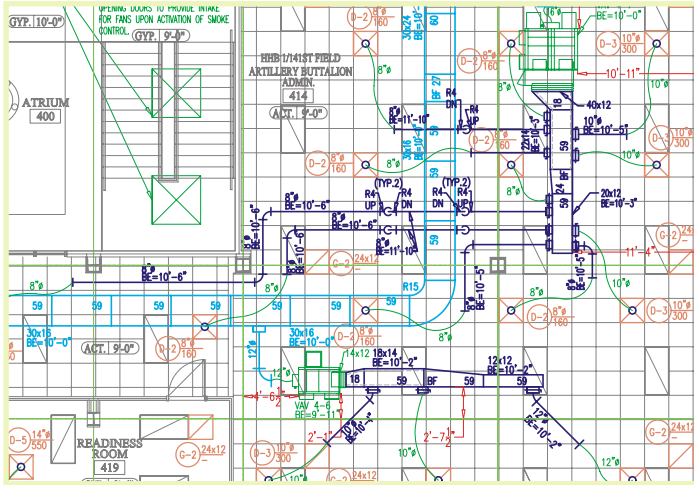
## Equipment Pad Layout

Equipment Pad Layouts need to be accurately determined to ensure the proper installation of HVAC equipment. The innovative use of the BIM model provides accurate pad layout with reference to the architectural grids and structural drawings.



## Shop Drawings

Shop drawings are created based on client standards and are useful for contractors, fabricators, suppliers and manufacturers. These drawings are generated from coordinated HVAC BIM models and are detailed enough to use for workshop fabrication and on-site installations.



## Quantity Take-Off

Quantity take-off is an automated procedure on the HVAC model and is 100% accurate as per the design. Quantity take off covers all ducts, duct-fittings, equipment, hangers, etc.

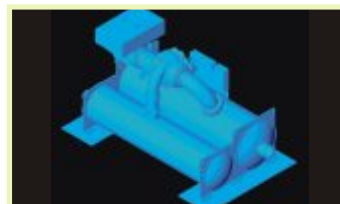
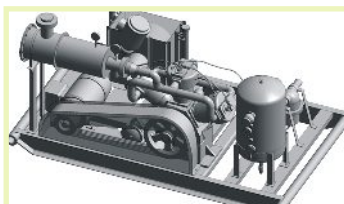
Unit name	System	Locator	Pressure (HP/LP)	Round duct. (			
				Category	Size	Length	Radius
AHU-1							
AHU-1	Supply Air	ce chamber - 1100 / Control Enter-1112	HP	Bell Mouth	6"Ø	8"	
AHU-1	Supply Air		HP	Cut-to-Length	6"Ø	16"	
AHU-1	Supply Air		HP	90-deg Elbow	6"Ø		6"
AHU-1	Supply Air		HP	Cut-to-Length	6"Ø	72"	
AHU-1	Supply Air		HP	Bell Mouth	12"Ø	8"	
AHU-1	Supply Air		HP	STR.	24X18-12"Ø	12"	
AHU-1	Supply Air		HP	Cut-to-Length	12"Ø	30"	
AHU-1	Supply Air		HP	Bell Mouth	14"Ø	8"	
AHU-1	Supply Air		HP	45-deg Elbow	14"Ø		14"
AHU-1	Supply Air		HP	TRL 45°	14"Ø-12"Ø-12"Ø	20"	
AHU-1	Supply Air		HP	Bell Mouth	6"Ø	8"	
AHU-1	Supply Air		HP	Cut-to-Length	6"Ø	36"	
AHU-1	Supply Air		HP	90-deg Elbow	6"Ø		6"
AHU-1	Supply Air		HP	Cut-to-Length	6"Ø	66"	

## Mechanical Room Modeling

Along with HVAC Duct Modeling, we also can provide detailed mechanical piping models to show equipment locations and piping systems. From this model, we can generate detailed spool drawings for accurate manufacturing and procurement with quantity take-off.



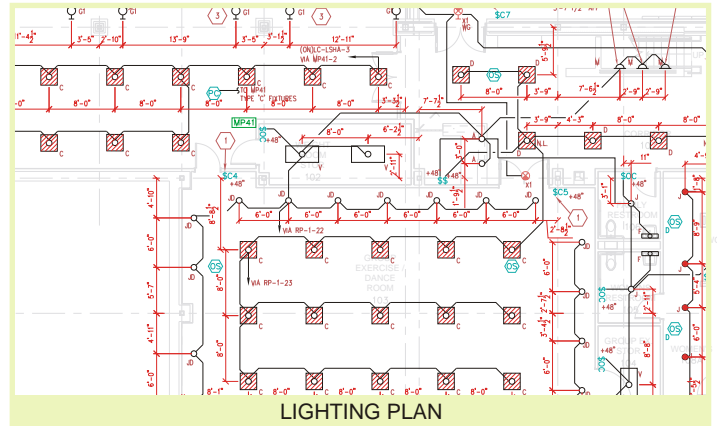
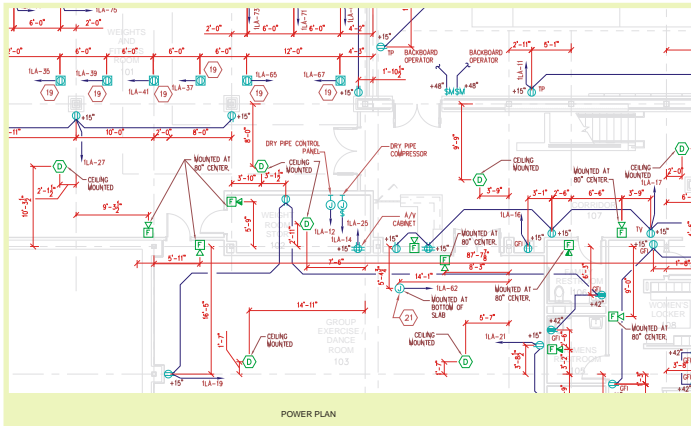
## Equipment Modeling





## Construction Documents

From our model, construction documents are generated automatically. We provide fixture, conduit locations and tray layouts with reference to the architectural walls. This provides the electrical contractor with precise locations for material and equipment installation.

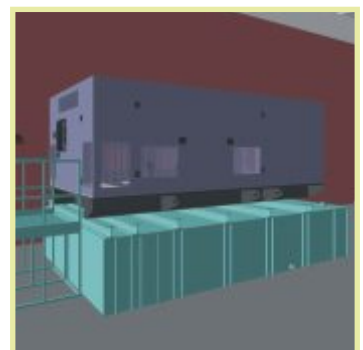
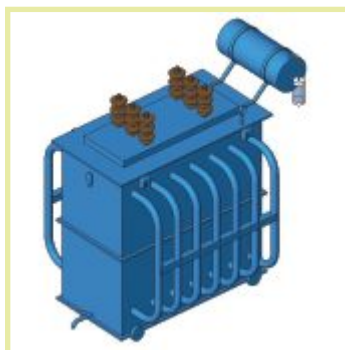
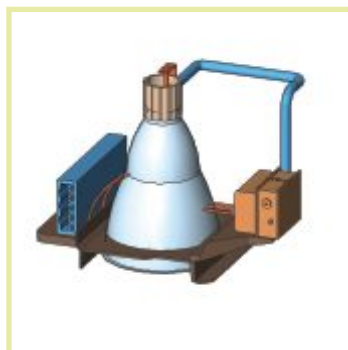
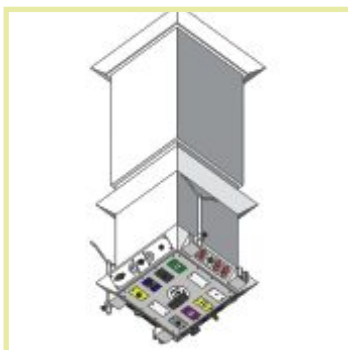


## Electrical Take-Off

The final output from the model is an accurate quantity take off. We provide all the equipment, fixtures and conduit details in a tabulated form with the accurate quantity. It helps the contractors to estimate the project cost and plan material procurement.

ELECTRICAL TAKE-OFF				
Date: 05/09/2008 JOB: Pinnacle Sample Architects & Engineers:				
LIGHTING				
Symbol as per Legend	Description of Item	Location	Quantity	Total
	INCANDESCENT JELLYJAR FIXTURE	ROOF PLAN (EQUIPMENT MOUNTED)	11	11
	DECORATIVE SCONCE	LIGHTING PLAN (WALL MOUNTED)	23	23
	4' FLUORESCENT COVE FIXTURE	LIGHTING PLAN (CEILING MOUNTED)	12	12
	4' UTILITY STRIP	LIGHTING PLAN (CEILING MOUNTED)	6	10
		LIGHTING PLAN (PENDANT)	4	

## Equipment Modeling

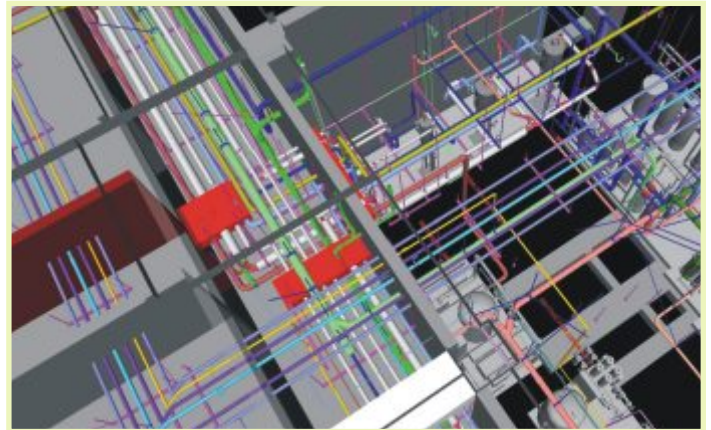


# PLUMBING

## Plumbing Model

The plumbing model is created from the contract/design drawings in strict compliance with contract specifications, technical submittals and the relevant codes (UA/EU or the country/state codes, UPC, NFPA and the local civil defense codes).

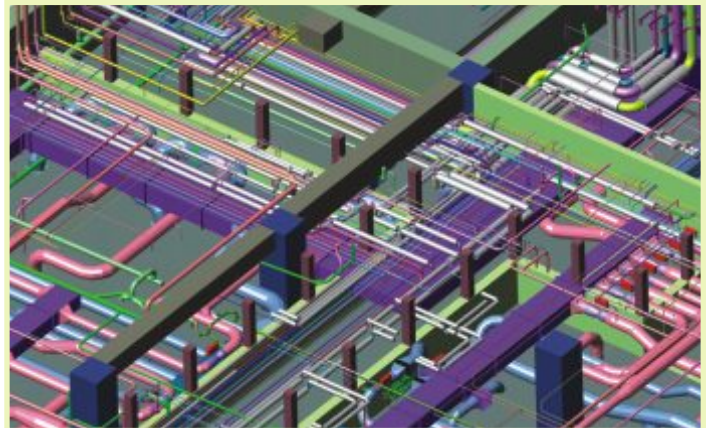
Then the model is coordinated with all other areas for conflict/clash resolution.



## Coordination and Interference Checks

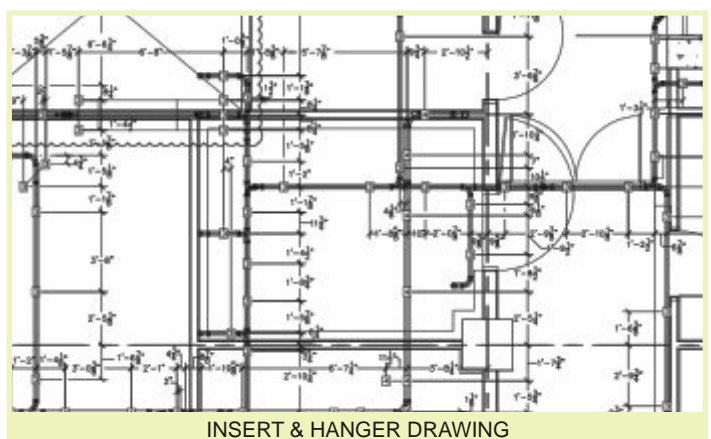
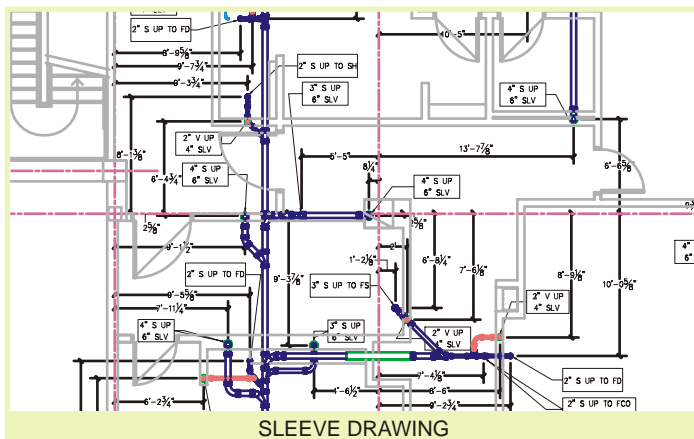
The Coordination Model is created using information from the HVAC, Plumbing, Electrical, Architectural, Structural systems to provide a comprehensive view of all potential conflicts. These are resolved during web-based site coordination meetings, and a final conflict-free plumbing model is created.

Accurate coordinated drawings help the construction team to eliminate RFI's, rework and wastages and enables efficient construction planning.



## Sleeve, Inserts and Hanger Drawings

A critical component of plumbing projects is proper sleeve location, inserts, and hanger positions. We can generate accurate sleeve, penetration, and hanger locations from the plumbing model prior to the start of plumbing installation. These drawings can be directly downloaded on GPS instruments for fast and accurate identifications on site.



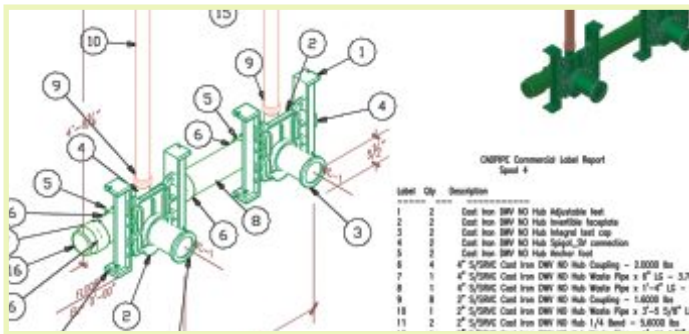
## Installation Drawings

We provide detailed installation drawings to help the contractors in planning and installing plumbing services efficiently, saving both time and costs.



## Spool Drawings

Spool drawings can be generated from the model for accurate pre-fabrication off-site / on-site. Segmented spool drawings and a spool map with segment locations are generated in accordance with the contractor's pre-fabricating standards and preferences. Pre-fabrication significantly improves quality and reduces cost. Clients have reported cost savings of 15-20% using this process.

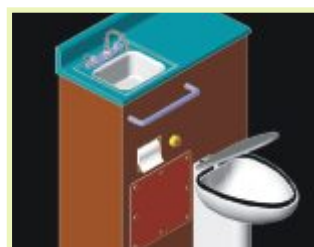
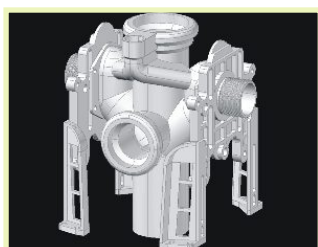


## Quantity Take-Off

The significant benefit of 3D modeling is accurate quantity information. Quantity take-off can be detailed and tabulated as per the client requirement for procurement, fabrication and installation. It is software generated and automatically updates with the changes in the model.

Cold Water Fittings List					
g	Size	Schedule	Material	Connection	Qty
egree Short Radius Elbow	1/2"	Type L Hard	Copper	Soldered	15
pling	1/2"	Type L Hard	Copper	Soldered	21
egree Short Radius Elbow	1/2"	Type L Hard	Copper	Soldered	1
pling	3/4"	Type L Hard	Copper	Soldered	5
egree Short Radius Elbow	3/4"	Type L Hard	Copper	Soldered	2
egree Short Radius Elbow	1-1/2"	Type L Hard	Copper	Soldered	55
pling	1-1/2"	Type L Hard	Copper	Soldered	3
egree Elbow	2"	Type L Hard	Copper	Soldered	1
egree Short Radius Elbow	2"	Type L Hard	Copper	Soldered	16
pling	2"	Type L Hard	Copper	Soldered	8
entric Reducer	2" x 1-1/2"	Type L Hard	Copper	Soldered	2
cing Tee	2" x 2" x 1-1/2"	Type L Hard	Copper	Soldered	5
pling	2"	Type L Hard	Copper	Soldered	12

## Plumbing Fixture Models

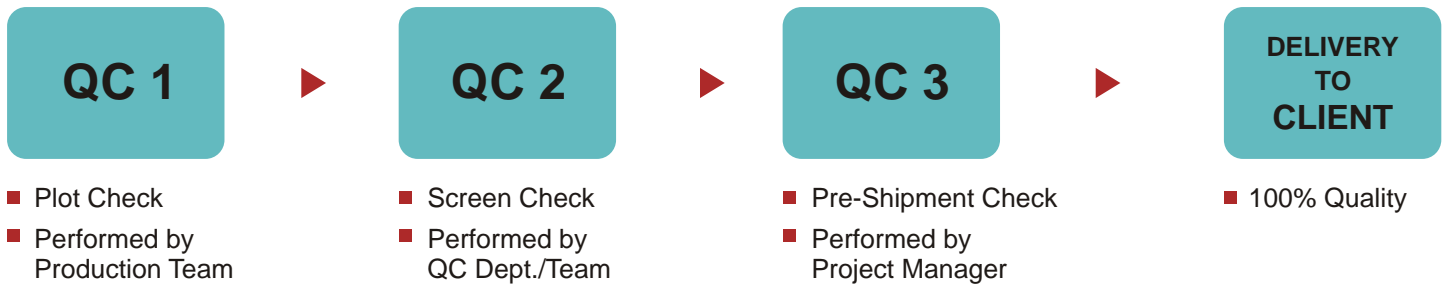


## Quality Control PROCESS

The main objective of the quality control (QC) process is to detect potential problems and correct them as quickly and efficiently as possible.

Ensuring quality is a group effort, and Pinnacle's dedicated QC team is led by a senior engineer with more than 14 years of experience in MEP Coordination and Quality Control.

The entire QC process is handled in three phases:



### QC Check Phase I

- The model is plotted on paper and a preliminary grid by grid check – highlighted in yellow marker – is done comparing it with the original contract documents. Each member of the project team assists with this part of the process.
- The project team leader sends a status report to the QC Department indicating which documents need to be delivered to the client for review.
- The QA/QC Manager reviews and distributes the files to QC Team to begin QC phase II.

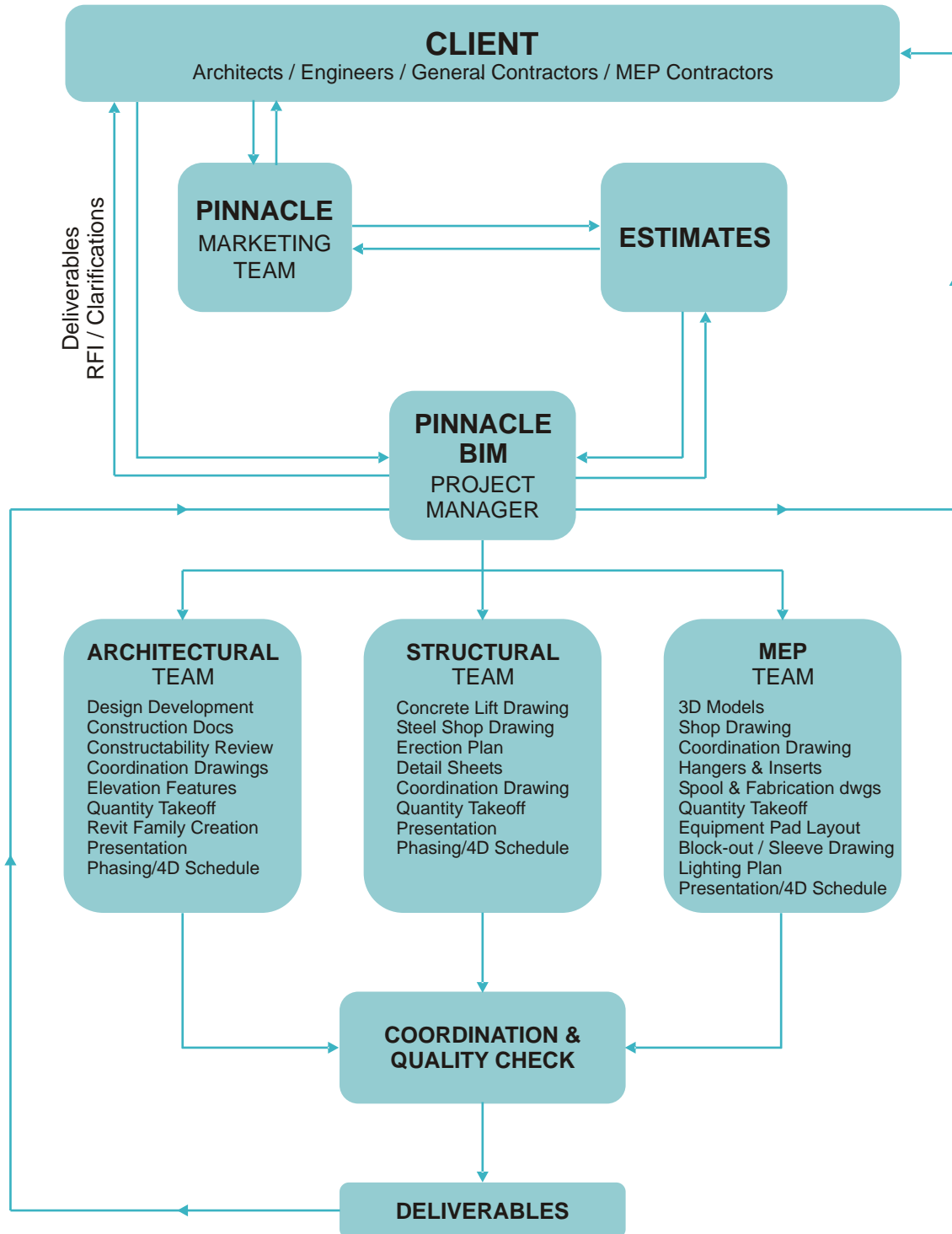
### QC Check Phase II

- The QC Team performs a more detailed comparison of the contract documents against the 3D BIM model. Their main objective is to review, identify and address with any of the following:
  1. Missing data
  2. Mismatches with the contract documents
  3. Clashes (Old/New), Elevation, Routing, Fittings, etc.
  4. Construction point of view.
  5. No-Fly-Zones.
  6. Attribute Checking (Pressure class, Pipe material, etc.)
  7. Location of Equipment such as VAV, Sleeves, Hangers, Valves.
  8. Equipment Connection details as per Schematic Drawings.
  9. Equipment Models as per Technical Submittals.
  10. Annotations & Dimensions, Aesthetic View.
  11. Any miscellaneous issues
- The QA/QC Team maintains continuous contact with the Project Lead and other team members to help resolve any technical issues related to the project.

### QC Check Phase III

- The Project Manager conducts the pre-shipment check -- the final QC review of the model and drawings -- before sending them to the client.

# WORK PROCESS



## WHY PINNACLE?

Multidisciplinary Team

Pinnacle is the world's leader in providing innovative BIM services. Our in-house team of more than 450 experienced architects, engineers and CAD professionals helps us provide end-to-end solutions to discerning clients around the world.

Our 280,000 sq.ft., world-class production facility is equipped with high-end workstations, advanced servers with real time backup and a high speed data and voice network. It is all protected with an uninterrupted power supply with a 24 x 7 security system.



### Fast Turnaround

Our skilled team of professionals can provide quick turnarounds on complex projects. Pinnacle has managed several large-scale projects across multiple verticals including Health Care, Hospitality, Airports, University Centers, Retail Centers, Convention Centers, Commercial, Industrial and Residential Projects.



### Technical Strengths

Pinnacle engineers specialize in the latest BIM software : Revit Software Suite (Revit, Revit MEP, Revit Architecture and Revit Structure), Ecotect Analysis, NavisWorks, Inventor, Civil 3D, Plant Design Suite, Pro/Engineer, Tekla Structure, SolidWorks, Cad Software Suite (CadPipe HVAC, CadDuct(TSI) and CadMEP).

Pinnacle engineers have a deep understanding of global and regional codes and standards. We maintain a consistent level of quality by carefully following the process oriented production and quality control guidelines as per ISO 9001:2000.

### Global Presence

Pinnacle has offices around the world (Texas, Durgapur, Kolkata and Abu Dhabi) so we can help our clients around the clock.

### Experienced in BIM Domain

Pinnacle is one of the leading service providers in the BIM domain. We have successfully collaborated with several leading contractors on BIM projects for specialty hospitals, stadiums, universities, dams, apartment complexes, hotels, casinos, a large retail center, high school, airport, commercial buildings, convention center, high rise tower, and industrial projects.

We are currently working on multiple BIM projects including seven hospitals/medical centers, an airport, two stadiums and several other Institutional facilities.

### Communication

Pinnacle's Project Managers are available to clients through a number of communication channels including:

1. **Global telephone network** for instant communication.
2. **FTP** over a secured network for file transfers.
3. **Email** for reports and interactions.
4. **Video and teleconferencing** for presentations and conversations.
5. **WebEx** conferences with US-based phone systems.

## TESTIMONIALS



"I was given exactly what I asked for. Everyone was very helpful and responsive. Thanks to everyone that worked on this for us. We were in a short turn around schedule and we did not have the manpower to respond. I believe Pinnacle is a great resource for supplementing our force. Construction is unpredictable and keeping ample coordination manpower for all situations is difficult. Thanks again."

*Larry J. Randolph*  
*TD Industries*



"This was our first experience with Pinnacle, and we at Waldrop were satisfied with the level of performance by the Pinnacle team. We were under extreme pressure to deliver under a tight deadline and your team aided us in doing so. We appreciate your work to date and look forward to another successful project together."

*Jamie Porterfield*  
*Waldrop Mechanical Services*



"Pinnacle had revolutionized the BIM elements of our company. They are extremely professional and skilled at what they do and develop a personal relationship with ease. Since our first project, we have used Pinnacle for over a dozen and will continue to do so consistently in the future."

*Nicholas Zent*  
*C.W. Driver*



"We are thrilled to have found a group like yours that service all of our MEP drafting needs, and at record response. We truly feel like you have met and exceeded every thing we could have asked of your group. We look forward to a long and bright future together."

*Bobby Mayfield*  
*MCC Group*



"The MEP modeling, Co-ordination and 2D shop drawings services provided by Pinnacle has always been timely, reliable and most importantly accurate. Team at Pinnacle has good understanding of US construction standards, codes and process. The ability of Pinnacle Cad to quickly react to our company's needs has enabled us to meet critical dates."

*Steve Roman*  
*RMI Drafting*



"The Pinnacle team was very responsive to all of our requests and input. Generated many valuable RFI's during the modeling process."

*Ryan Brown*  
*Turner Construction Company*



"You guys are doing an excellent job and providing my team with excellent tools to excel our performance in the preconstruction process."

*Chris Dolan*  
*The Whiting-Turner Contracting Company*



"In short: Team led by Chandan produced a Model and Concrete Shop Dwgs, to a high level of accuracy."

*Peter Sosnowski*  
*Webcor Concrete*



"I have had a good working relationship with the team from Pinnacle, and look forward to future projects."

*Dave Lopez*  
*DiV 15 Tech*

# Project Snap Shots

## BIM & MEP Services

SECTOR LOCATION	CLIENT	PROJECT NAME DETAILS	TIME LINE	PROJECT AREA MANPOWER
Hospital Virginia USA	General Contractor  Mechanical Contractor	<b>Sentara Princess Anne Hospital</b>  Architectural & Pneumatic Tube, 2D Drawings into 3D BIM/VDC Models. Architectural & Structural items into initial System Model from Revit. Architectural Model including interior, exterior wall assembly, schedules (stud size, plywood, drywall height, etc). Structural support systems including Radiology Equipments. Plumbing & Mechanical Piping, Mech. Penthouse and Coordination with Structural, Sheet Metal, FP & Electrical elements. Pinnacle delivered Shop Drawings, Hanger Supports, Material Take-off on time.	July 2009  October 2009	428,000 Sq.Ft.  22 Architectural Engineers  10 MEP Engineers
Traning Center Virginia USA	MEP Contractor	<b>Fort Lee Central Campus Building C2 Traning Centre</b>  Sheet Metal Shop Drawing. Equipment Detail Drawings. Coordination Drawing for Front 4-stories Classroom. Highbay area Rear 1-stories classroom.	March 2010	1 Lac Sq.Ft.  3 MEP Engineers
Research Center Atlanta USA	General Contractor	<b>Nanotechnology Research Center</b>  BIM Modeling. Providing highend Technology Resource, Building Structure. Simulated Structures of Foundation, Column and Concrete Structure. Simulations for Interior Structural Model, Clash Detection, Structure and Duct. Quantity Estimation and Construction Phasing.	May 2007	295,000 Sq.Ft.  25 MEP Engineers
Stadium Miami USA	Engineering Drafting	<b>New Marlins Ballpark Stadium</b>  3D BIM modeling services for Plumbing. Complete Coordination. Clash Detection and solutions were proposed & discussed for all the trades. Shop Drawings.	January 2010	37,000 Sq. Ft.  10 MEP Engineers
Office Garage Retail  Cincinnati USA	General Contractor	<b>Queen City Square Tower</b>  3D Models of the Architectural and Structural elements as per the Contract Drawings. BIM Coordination with the various subs for clash free construction at site.	August 2010	1,350,000 Sq.Ft.  15 MEP Engineers
IT SEZ Centre Pune INDIA	MEP Contractor  General Contractor	<b>Tata Realty TCS Sahyadri Park</b>  Complete 3D BIM services for the entire Architecture, Structure, Plumbing, Fire Protection, HVAC and Electrical trades. Complete Coordination. Clash Coordination for all the trades with proposed solutions. Wall Penetration & Coordination Drawings and R1, S3, C2 buildings are on progress. HVAC : Water Cooled Central Plant having 3 chillers of 1250 Ton, 2 Chillers of 1000 Ton and 5 Cooling Towers along with several Pumps and accessories.	December 2010	1,667,178 Sq.Ft.  15 MEP Engineers
High School Oregon USA	Mechanical Contractor	<b>New Sandy High School</b>  Underground BIM services with Site Utility Drawings for on site Coordination. Underground Plumbing and Coordination with Structural Elements. Shop Drawings with Sleeve Drawings, Material Take-off produced on time.	September 2010	260,000 Sq.Ft.  5 MEP Engineers
Water Treatment Plant Yorba Linda USA	General Contractor	<b>Robert B. Diemer Water Treatment Plant</b>  Diemer Water Treatment Plant retrofitted. Oxygen/Ozone system. Ozone Generation Building, Ozone Contactors, Influent, Effluent Conduits, Rejection Tunnel, Liquid Oxygen Store, Chemical Feed, Unit Substation, Switchgear Building, Emergency Generator, Yard Conduits & Piping; Grading; Paving; Demolition; modifying Plant Utility; Landscaping; Commissioning; Meter vaults. 3D Modeling, Detailing. Lift Drawing embeds, Penetrations Pre-cast walls, Slabs (primary & secondary), Steel Fabrication.	July 2008	9,234,720 Sq.Ft.  10 MEP Engineers
Hotel Hanoi Vietnam	General Contractor	<b>JW Marriot Hotel</b>  The model used for visualization purposes only. Off site, Structural and Architectural modeling. Fly-thru rendering view. Creating Phasing Sequence for Construction Management.	March 2010	92,600 Sq.Ft.  13 MEP Engineers

# Project Snap Shots

## BIM & MEP Services

SECTOR LOCATION	CLIENT	PROJECT NAME DETAILS	TIME LINE	PROJECT AREA MANPOWER
Convention Center Tennessee USA	General Contractor	<b>Music City Center</b>  The project required 3D Modeling and concrete Quantity Take-off. The model was used for Bid Presentation.	February 2010	370,000 Sq.Ft.  15 MEP Engineers
Aviation New Delhi INDIA	EPC	<b>New Delhi International Airport</b>  BIM services, Passenger Terminal, Runways. Sight Line Report Air Traffic. Raft Foundation, Column (Arrival and Mezzanine Concrete Structure). Sub-basement & Chiller Foundation. Simulations for Interior Structural Model. Structure and HVAC & Structure and SA Duct Clash Phasing.	May 2010	5,920,151 Sq.Ft.  20 MEP Engineers 40 Arch. Engineers
Hospital Baton Rouge USA	Mechanical Contractor	<b>Woman's Hospital</b>  3D Model, Clash Resolve and 2D Shop Drawing of Duct, associated fittings, accessories, equipments, diffusers etc. On Site Coordination with other trades.	March 2010	679,430 Sq. Ft.  6 MEP Engineers
Hospital Houston USA	Mechanical Contractor	<b>West Houston Medical Center</b>  Plumbing, Mechanical Piping & Electrical trades 3D BIM Modeling. MEP Equipment central plant. Clashes solved through WebEx for Sheet Metal, Fire Fighting. Shop Drawings and Material Take-off.	January 2010	151,000 Sq.Ft.  15 MEP Engineers
Infrastructure of Dam Los Angeles USA	General Contractor	<b>The Big Tujunga Dam</b>  Entire BIM services for Coordination and Material Take-off. Lift Drawing from all concrete block in dam. MEP service for Coordination.	April 2009	5,960 Ac.Ft.  20 MEP Engineers
Residential Building Dubai UAE	Engineering Consultant	<b>Saarah Residences</b>  3D Model of the Architectural, Structural and MEP elements according to the Contract Drawings. BIM Coordination with the various subs for Clash free Construction at site.	January 2009	167,529 Sq.Ft.  20 MEP Engineers
Airport Link Bridge Miami USA	General Contractor	<b>Miami Bridge Project</b>  Every span/station was shown through 3D Models. Elevation of top and bottom of pile/pile cap/beam elevation were shown.	May 2011	9,700 CY  8 MEP Engineers
Hospital Dublin IRELAND	Engineering Consultant	<b>Mater NCH</b>  The project required detail modeling work for the main hospital building, modeling work for surrounding 9 building, mass modeling for the remaining site and whole site with all the site element details.	August 2010	662,000 Sq.Ft.  12 MEP Engineers
School Houston USA	General Contractor	<b>Lone Star College, Victory Center</b>  The project required 3D Modeling of Sheet Metal, Plumbing, Mechanical Piping and Electrical. Preliminary coordination was done to identify the difficulties of Design Document.	November 2010	86000 Sq.Ft.  8 MEP Engineers
Apartment Complex San Francisco USA	General Contractor	<b>Harrison Complex</b>  Concrete Model and Shop Drawing created from provided Architectural and Structural Coordination set of drawings.	February 2011	500,000 Sq.Ft.  4 MEP Engineers
Shopping Mall Burlingame USA	General Contractor	<b>Millenium Genetics</b>  An updated new retail area had to be developed from an existing model. Within 7 days a rendered image had to be published, as something closer to a hand sketched image, provided by the client.	April 2011	6 MEP Engineers



### USA Office and Production Center

#### **Pinnacle Infotech Inc.**

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Biswanath Todi  
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### International Production Center

#### **Pinnacle Infotech Solutions**

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