

## **RK Mechanical: DIA HSTE (Westin Hotel) Project Narrative for AGC ACE Awards**

### **Overview Statement: Unique Hotel Design Takes Flight**

The Denver International Airport Westin Hotel and Transit Center will open soon—and will give travelers an experience unlike any other at DIA, inspired by the existing terminal and surrounding landscape.

The design emulates a pair of wings and was determined to be the best option for both functionality and aesthetics. Gigantic windows throughout provide sweeping views of the city, mountains and surrounding airport. The mindful design also allows for the airport's future growth and expansion.

The 433,000 square foot, 14-story hotel features 519 guest rooms, a convention center, transit center and plaza. DIA owns the hotel but Westin will operate it. The suites occupy the far ends of each wing and inside, guests peering out the massive windows appear to be hanging in the air over airport transit routes. A truly unique experience!

RK introduced several innovations on this massively complex project that saved time, resources and money. We utilized integrated CAD applications, iAuditor quality control, custom budget codes, a clever connex system, money-saving value engineering and excellent communications skills to not only complete the job, but go beyond all expectations.

### **BIM Capabilities so Innovative that Autodesk®**

#### **Published a Success Story about RK's Work at DIA**

Autodesk® wrote a case history featuring RK's progressive use of integrated BIM, CAD and related field applications on the DIA project.

Jeremy Owen, RK Mechanical's Project Manager said, "DIA HSTE combines several independent, but physically integrated projects—from the new rail station and hotel with retail stores, restaurants, conference and office spaces, to the extension of the existing concourse and baggage-handling systems. Fitting our mechanical systems into this integration of dissimilar structures, functions and spaces was a real challenge."

In addition to these spatial constraints, the building's unique winged shape created challenges. "A conventional hotel or office building has stacked floors, where the layout of each floor and its building systems match the floor below it," explained Owen, "but in this hotel, every level is different and there are many spaces and rooms without floors below them—complicating the location and fit of the building's mechanical systems."

RK utilized advanced BIM by integrating Autodesk® Fabrication® software and our own 3D modeling platform to digitally layout our building systems and coordinate the design with architectural and structural models.

Scott Pittman, RK Mechanical's CAD Manager, said, "This job included approximately 31 miles of piping and plumbing, 9 miles of PEX piping, almost 430,000 pounds of sheet metal ductwork, and over 70,000 joints or welds. We had to be certain that what we were modeling is what we needed—and that what we fabricated wouldn't interfere with other trades."

"Using Fabrication CADmep improved our ability to make informed decisions about our layout and avoid interferences—helping minimize field rework and delays," said Pittman. "The software's 3D modeling environment helped us test whether the actual size of the as-designed systems would fit while allowing adequate access and clearance."

For example, the hotel contains several large ballrooms with operable folding partitions, as well as very large chandeliers and other special lighting fixtures. "When we started to virtually layout our mechanical systems in the ceiling above one of the ballrooms, we found complications due to the additional structural supports needed for the lighting and fixtures," said Pittman. "We were able to redesign some elements and change some of the routing so that everything would fit above the ceiling."

RK streamlined field operations by using Fabrication RemoteEntry to digitally order components right at the job site instead of taking notes at the site and submitting an order form later, saving time. RK also used cloud-based BIM 360 Glue which allowed our team to carry BIM models in the field on iPads so they didn't have to go back to the trailer to see how other trades were progressing. This also saved time and increased productivity.

Our integrated BIM, CAD and field applications paid off when we needed to run 10 and 12-inch carbon-steel piping from the airport’s central utility plant to the hotel and transit center, which is about a mile away. We were able to prefabricate almost all of the piping—eliminating the cost of on-site logistics and labor for field welding—a big savings of time and money.

Pittman said, “The ability to combine all that information, and see it in a virtual 3D world, both in the office and in the field, gave everyone a better understanding of the project and improved decision-making. At the end of the day, this is a win-win for everyone involved in this project.”

### **Safety and Quality Go Mobile with iAuditor Implementation**

RK implemented iAuditor for first use on the DIA HSTE (Westin Hotel) project. This application automates our QC rough-in and final QC processes and also makes them paperless. Every RK foreman and quality control manager was equipped with an iPad with the iAuditor app. Now, instead of traveling back and forth to the jobsite trailer, QC information was accessible and seamlessly managed through the app. Foremen could create PDF reports and send them out with ease.

### **Productivity Takes Off with Project-Specific Budgeting for Better Tracking**

Project Manager Jeremy Owen assessed the project’s complexity and decided to devise and use budget codes that were a lot more in-depth and granular than RK’s standard codes.

With our standard code system, many project functions (punch list, testing, hangers, etc.) are lumped into one budget. Jeremy methodically created separate categories so that RK could track costs on a granular level. This added a level of precision and enhanced RK’s ability to track smaller amounts of money under separate codes to help us gain better insights into the project.

The new budget tracking system paid off by uncovering a major issue and allowing RK to remedy it quickly. The rough-in shower columns were the wrong height. Jeremy and his team caught the issue after completing only 2.5 out of 20 the floors—potentially saving a lot of lost time in rework.

## **A Better Way for Materials to Land**

Project Superintendent Grant Wands designed an innovative new connex system specifically for this project. The connex full of materials was connected to a crane and then hoisted up to the appropriate floor. Once on the floor, the connex would then be attached to the building floor. The material was placed in rolling bins that employees would pull out of the connex using a pole with a hook on it. This simple yet highly utilitarian system made materials delivery much easier and faster, saving time and increasing on-site productivity.

## **Value Engineering at High Altitude**

The value engineering and analysis process on this project was challenging. With multiple general contractors, mechanical contractors and design contractors, open communications were the key to success. The RK team facilitated multiple meetings each week and explored many value engineering options that could save money without sacrificing quality. By utilizing integrated preconstruction engineering, 3D modeling and teamwork, we successfully saved the project money and delivered a quality product that met all of the goals.

*Our team downsized the 900 feet of chilled water piping running from the Central Utility Plant to the new building from 18” to 14” which saved the owner about \$2,000,000!*

## **Flying Above All Obstacles**

**Two sets of project specs:** The Westin and DIA each had their own set of project standards. RK had to be mindful of both sets of specs, and they had to remember who owned which part of the building to ensure they were meeting the correct set of standards and guidelines.

**Maintaining effective communications amongst multiple owners, GCs and contractors:** The complicated matrix of stakeholders sometimes led to miscommunications and delays. There were other mechanical contractors aside from RK on the job. The RK team took special care to have proactive conversations in order to distinguish where our scope of work ended and another’s began.

**Managing man hour limitations:** Due to no on-site parking, all workers were bussed to the job site daily. Once on-site, workers had to get to their specific worker area via alternate transportation or walking. The commuting time ate up about two hours of each worker's day so RK had to manage labor hours to accomplish the work on fewer actual labor hours.

### **Overcoming Turbulence in Extenuating Circumstances**

Our team started rough-in during severe negative degree weather. We put in extra time and research to find, and test, a duct sealant that would work in 50 degree below temperatures because the building wasn't enclosed yet. Fortunately, our testing paid off and we successfully completed the work—without losing any fingers to frostbite!

Once again, Mother Nature intervened. In September 2013, flooding caused some damage that resulted in an insurance claim and setback to the project schedule. The RK team worked hard to maintain open communications with all parties to recalibrate and continue the project.

### **Community Contribution to Denver's International Presence**

Our crew took off with velocity and continued to soar! Our team's tenacity, ingenuity and dedication resulted in not only successfully completing the project, but innovating better ways of doing it at every stage. We are proud to have contributed to the DIA Westin Hotel, an urban landmark that also pays tribute to Colorado's natural beauty and reinforces Denver's reputation as an international destination.



Project progress



Weather disrupts worksite conditions



RK Mechanical team receives equipment on top floor



Cold Colorado weather slows project



Project progress



Light rail platform progress



Project scaffolding



Central utility plant piping



Finished mechanical room



Denver International Airport HST project completion