

## **King Abdulaziz International Airport (Jeddah, Kingdom of Saudi Arabia)**

After receiving a pipe stress analysis for the KAIA Load Centre C chilled water piping in tunnels and buried corridors, a job was to design all the pipe supports for the above stated project. Pipes ranged from 2,5in to 72in.

### **Action and Implementation by Numikon**

It is common practice that piping designers/layout personnel route pipes with consideration given to space constraints, constructability, operability and reparability and pipe supports. Usually a piping system, when the design is completed, will consist of various types of pipe supports and it is standard practice for the pipe stress engineers to give some design examples of the supports used. This was also the case in the King Abdulaziz International Airport (KAIA) project.

In the first phase of the project, we designed the supports as proposed by ATKINS and ran quick FEM analysis for each design using the loads given in the pipe stress analysis report. We ruled out some designs and upgraded some. At the end of this process, a status report was submitted to the client with all the proposed supports:

- Roller supports with lateral seismic restraints
- Axial hydraulic seismic snubber
- Guide supports
- Sliding supports
- Anchor supports
- Pressure thrust anchor
- Saddle supports w/wo straps
- Clevis hanger support
- Clevis hanger seismic support
- Firefighting supports done acc. to NFPA 13 standard

All the above supports were custom made to fit the specified conditions on site, and to carry the loads obtained by ATKINS, and were designed in accordance with the MSS-SP-58 and NFPA 13 standard.

After the preliminary design was accepted by customer, our team made a detailed calculation for each support. To each type of support was given a separate project number and it was treated like a separate small project within a bigger one. To each number was assigned a detailed FEM analysis report and shop drawings with which, after final submission, the production could start. This way we avoided any installation errors on site. We took special care not to crush the piping insulation, and all supports that had clamps were designed with this in mind. After installation, not a single deformation was noticed. Where supports were welded directly to the pipe special welding calculations were made to insure that the final result will be perfect with no deformation. For this we made precise welding instruction manuals.

We also made installation manuals for each support that showed the customer how the assembly will be installed on site. With this we solved the slope problem (the installation plane was rounded for water drainage) that existed in the installation tunnel. Another problem that we solved was the customer request for pre-installation of HILTI bolts, that is, to install the bolts before the piping or supports arrived on site. We designed special steel templates that showed hole position for bolts and

allowed easy and precise installation on each support location. When the pipes and supports finally arrived on site there was no misalignment.

## **Results**

The project was successfully completed. All the designs reports and drawings were excepted without any comments, and the supports were successfully installed on site.

## **Client**

**INKA**, Turkey

Established in 1986, INKA is a world renowned support manufacturer with a growing customer base world wide. Today, as the quality representative of the industry, INKA exports 75% of its products. 80% of its exports go to European countries whereas the rest of 20% is made to the Middle East, Russia, Turkic Republics, the Balkans and North African countries.

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