Automated Boiler Combustion Controls for Emission Reduction and Efficiency Improvement

Quarterly Report
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By:
John West

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For
U.S. Department of Energy
Office of Fossil Energy
Federal Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880

By
Control Techtronics, Inc.
99 S. Cameron Street
Harrisburg, Pennsylvania 17101

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FIFTH QUARTER
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1.0 EXECUTIVE SUMMARY - COMBINATION FIFTH QUARTER AND FINAL REPORT OF BUDGET YEAR #1

Control Techtronics International (CTI) is conducting a project to reduce air emissions and increase efficiency in coal fired boilers in Krakow, Poland and to create a commercial venture in Poland which can act as a leader for efficient combustion in boilers throughout the region. In Budget Period One (first year), CTI demonstrated both efficiency improvement and emission reduction at MPEC's Balicka district heating plant in the Widok section of Krakow.

In the first quarter of Budget Period One, there were ongoing contract negotiations with MPEC as the host site for the first CTI installation in Poland. Preliminary engineering was done concurrent to these negotiations. In addition, the transfer and development of training materials began.

In the second quarter, a contract with MPEC was signed which allowed commencement of other project work. This included putting subcontract agreements in place with other Polish partners, completing engineering, revising and coordinating schedules and conducting some of the training.

By the end of the third quarter of Budget Period One, 75% of the material was fabricated and 25% of the total material was shipped to the Balicka site. Baseline performance testing was conducted by the Politechnika on one steam and one hot water boiler. Classroom and in-plant training in the U.S. was provided to four key personnel from MPEC. Training materials and information transmitted from Penn State to the Politechnika were translated and adapted for use in the Polish culture and language. Efforts to secure sites for Budget Period Two began in the third quarter.

In this the fourth quarter, progress was made on several project tasks. Fabrication of all materials was finished in late November, 1994. However, shipments were not completed until the beginning of February. Installation began in October, 1994 and continued until December, 1994. At this point, installation halted for two months. This delay was because of problems with invoicing and payment of VAT. As a result, the contract between CTI and MPEC had to be amended and new subcontract agreements were written with ENAP and Naftokrak. This problem delayed the entire project for over two months.

Graded coal for the Balicka testing as specified in the contract between CTI and MPEC was obtained by MPEC, with the assistance of Mr. Uruski from Katowice.

Progress was made to secure sites for Budget Period Two of the project. John West and Tomasz Szewczyk had follow-up meetings
with three possible host sites. Tomasz Szewczyk presented proposals to these sites in January and February and received two letters of intent.

The following activities took place in this quarter.

1. Complete the installation of controls for all five boilers.

2. Final performance testing by the Politechnika on one hot water boiler after installation of controls.

3. Procurement of graded coal by MPEC.

4. Complete joint operator training of the Balicka operators and MPEC engineers by the Politechnika and establishment of a training center in Krakow.

5. Secured two sites for Budget Period 2. (See attachment for Letters of intent.)

6. Tomasz Szewczyk agreed to be project coordinator in Budget Year 2.

7. Completion of adoption of control components to meet Polish requirements.

In the next quarter, CTI plans to do the following.

1. Close Budget Year 2 control project contracts.

2. Begin engineering and manufacturing of Children’s Hospital project.

3. Establish financing for Polish customers.

4. Establish Polish Limited Liability Company, as wholly owned subsidiary of Control Techtronics International.
2.0 INTRODUCTION

Control Techtronics International (CTI) is conducting a project to reduce air emissions and increase efficiency in coal fired boilers in Krakow, Poland and to create a commercial venture in Poland which can act as a leader for efficient combustion in boilers throughout the region. To achieve the technical goals of the project, CTI will use a three part program as follows:

1. Analyze the fuel specifications of a given plant and recommend modifications as necessary.

2. Apply automatic combustion controls systems to the boilers.

3. Train plant operators in proper plant operation as well as proper use of control systems.

To achieve the commercial goals, CTI will form a commercial venture in Poland to market and service the CTI program after successful demonstration.

In Budget Period One, CTI demonstrated the efficiency improvement and emission reduction at MPEC’s Balicka district heating plant in the Widok section of Krakow. CTI worked with several organizations to accomplish this work. The Pennsylvania State University (PSU) provided technical assistance in analysis of the fuel quality, technical assistance in the application of the controls, training material and techniques, and project management assistance. The Politechnika Krakowska (PK) conducted performance tests on the boilers at Balicka and conducted training in the Polish language. Naftokrak-Naftobudowa (NK) was the installing contractor. MPEC is the owner of the host site for the first CTI installation. Energoparatura (ENAP) built the control panels that were engineered by CTI and contain both Polish and American components. CTI is also interfacing with the Honeywell system heating controls in the Widok district.
3.0 DESCRIPTION OF ACTIVITIES DURING THE FIFTH QUARTER

Progress was made on several project tasks during the fifth quarter. Fabrication of all materials was finished in late November, 1994. Shipments were not completed until the beginning of February. Installation began in October, 1994 and were completed in May, 1995. These delays were because of problems with invoicing and payment of VAT. As a result, the contract between CTI and MPEC had to be amended and new subcontract agreements were written with ENAP and Naftokrak. This problem delayed the entire project for over two months.

At the same time, problems arose regarding the availability of graded coal for the Balicka testing as specified in the contract between CTI and MPEC. With the help of Mr. Uruski in Katowice, graded coal was obtained.

Progress was made to secure sites for Budget Period Two of the project. Tomasz Szewczyk presented proposals to these sites in January and February and received two letters of intent.

Analysis was made on the technical details as were accomplished in Baliska/MPEC. Technical areas which could best be modified for Polish work were defined, so that the adoption process to meet the Polish market has been completed.
STATUS OF TASKS

Following is an estimated percentage completion for each task in Budget Period One.

FIFTH QUARTER/BUDGET YEAR ONE

<table>
<thead>
<tr>
<th>Task</th>
<th>Completion</th>
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<tbody>
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<tr>
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<tr>
<td>Task 14</td>
<td>100%</td>
</tr>
<tr>
<td>Task 15</td>
<td>30%</td>
</tr>
</tbody>
</table>

Task 1: Formation and Operation of a Commercial Joint Venture.

CTI's cooperation with several Polish organizations has been essential to the work in Krakow. A continuing relationship with Naftokrak as the installing contractor, MPEC as the owner of the first demonstration site and ENAP as a panel fabricator will be necessary for continuing success. A limited liability company, wholly owned by CTI, is being established.

Task 2: Engineering, Fabrication and Shipment of Controls to Balicka.

Control components were completed in the fourth quarter.

Task 3: Installation and Start-up of Control Components

Installation which began at the end of the third quarter was halted early in the fourth quarter. Installation work did not begin again until early February and was completed in May 1995.

Task 4: Procurement of Graded Coal

Completed in April, 1995.


This task was completed in previous reporting periods. During the third quarter, the training materials were
revised and translated into Polish by the Politechnika.

Task 6: Select and Train Polish Field and Marketing Engineer

Tomasz Szewczyk continues to act as the main point of contact in Poland for CTI. Mr. Tomasz Szewczyk attended the CTI international sales meetings and the annual ASHRAE conference in Chicago in January, 1995 in an effort to extend his training. In this quarter Mr. Szewczyk became actively involved in selection of sites for Budget Period Two. Mr. Kalinowski of NK-NB became the start-up engineer.

Task 7: Operator Training for Balicka Personnel

Training took place in Krakow for the operators during the fourth quarter at the same time as start-up of the first boiler.

Task 8: Testing and Documentation of Performance at Balicka

Final testing was conducted after start-up of the boiler used in the baseline tests. Results were astonishing:

- 25% Energy Reduction
- 85% Particulate Reduction

Task 9: Develop Evaluative Protocol for Other Plants

A survey to evaluate other plants was developed in earlier quarters was be used to gather information and assist in selecting plants for Budget Period 2.

Task 10: Identify Other Plant Sites for Control Systems

Two letters of intent were received, with two more expected to be received this summer.

Task 11: Adoption of Control Components

This was accomplished.
Task 12: Engineering, Fabrication of Shipment of Controls

A small portion of this was accomplished at Baliska Boiler house.

Task 14: Establish Training Center in Krakow

With the providing by CTI of a simulator and training by PK, this was accomplished.

Task 15: Joint Operator Training

The initial operator training was very successfully accomplished.
5.0 NEXT QUARTER ACTIVITIES (May 15, 1995 to August 15, 1995)

The following are major activities that are anticipated to take place in the next quarter.

1. Close Budget Year 2 contracts.
2. Begin work on Budget Year 2 projects.
3. Sign papers for limited liability company.
4. Establish financing for Polish customers.