

New Approaches In Recovery Boiler Deliveries

Case Study of South American Boiler

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ABSTRACT

Recovery boiler is known to be the most expensive individual department of the pulp mill. This is not only because of the price of the equipment but also due to longish delivery time. Recovery boiler project can easily take 20 to 24 months, from the contract signing to start-up of the boiler, which is far most the longest delivery time, together with turbines, of the pulp mill. Noticeable sums of money can be saved with accurate project planning, e.g. two months' earlier start-up of the boiler can save tens of millions US dollars to the owner of the mill. In this paper a showcases from Brazil and India are represented and the phases of the projects are discussed.

The Aracruz project represents the first Ahlstrom recovery boiler delivery to Brazil. It is also the first EPC project of Ahlstrom Machinery Group for South America. All previous work out of Ahlstrom Recovery Inc. has been equipment supply. The capacity of the new boiler today is 2200 tDS/day but in future the capacity of the boiler will be 2800 tDS/day. The supply of the boiler was a complete Engineer Procure-Construct (EPC) turn-key project. The boiler was designed, erected and started in 18 months time. In the Aracruz case new methods in project work were successfully used; for example the Align™ structured program helps the owner, suppliers, engineering companies, and construction companies have a project that is completed on time, is constructed at or below budget, promotes teamwork, quality, and safety and demonstrates a reduced start-up curve. Schedules and milestones of the project are presented and the savings in the project phase as well as in earlier increase of production are presented.

INTRODUCTION

Ahlstrom Machinery

A. Ahlstrom Corporation operates as four independent business groups: Ahlstrom Paper, Akerlund & Rausing, Ahlstrom Machinery and Ahlstrom Pumps. These business groups supply systems and process equipment for pulp and paper industry world wide and manufacture specialty papers and converted products.

Ahlstrom Machinery Group produces process equipment for pulp and paper industry. Ahlstrom Machinery products are used in chemical fiberlines, chemical recovery and energy and steam production (such as recovery boilers, evaporation plants, recausticizing plants and lime kilns), recycled fiber

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handling and preparation of paper machine stock. The group operates along global product lines, with major manufacturing and sales bases in Finland and North America, Scandinavia and Europe.

Aracruz mill, Aracruz Celulose, Brazil

The production capacity of the mill has been 1060000 t fully bleached Eucalyptus pulp per annum. The mill intends to increase its production before the end of this year up to 1 300 000 t/year. This increase in production will be mainly achieved when the new recovery boiler has come to its full speed of operation. Mill has also scheduled an increase of production capacity to 1 700 000 t/ year with the existing recovery boiler in year 2000. This will be accomplished by making some minor changes in the recovery boiler, for which the boiler has designed-in provisions for a future superheater and screen section for increase capacity.

Recovery boiler

The capacity of the new boiler today is 2200 t DS/day which equals 336 tons/hour steam production. Steam temperature and pressure are 455°C and 64 bar, respectively. Dry solids concentration of the liquor is 75%. In future the capacity of the boiler will be 2800 t DS/day. The supply of the boiler was a complete Engineer Procure-Construct (EPC) turn-key project. The full scope of supply for Ahlstrom includes the boiler, electrostatic precipitator, stack and all auxiliary equipment. In addition Ahlstrom provided the boiler building, foundations, service building, electrical, instrumentation and piping. The boiler was designed, erected and started in 18 months time.

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RECOVERY BOILER DELIVERY

How to deliver a recovery boiler in record time?

There are some basic elements, which make it possible to supply a recovery boiler in short time span:

- Supplier must have modern, efficient design tools.
- The manufacturing must be automated to be as proficient as possible.
- The detailed design of the boiler should be standardized as completely as possible.
- The size of the prefabricated parts for installation must be maximized.
- Well planned project management and scheduling.
- Sufficient resources for the project from the very first beginning to the end.

The advantage of making the Aracruz boiler a mirror image of Bowater boiler in the USA is distinct. It made possible to reduce the front-end engineering to a minimum and gave the confidence to commit such a tight construction schedule. Bowaters's management even hosted a tour of their new boiler and briefed Aracruz's project team on the boiler's performance since it started up in 1994.

Only minor differences are evident between Bowater and Aracruz boilers; the economizer and boiler bank of Aracruz boiler are longer, and the Aracruz boiler has designed-in provisions for future superheater and screen section for increased capacity.

Phases of the project

Before the contract phase

It is very essential to define the scope of the supply so that all parties have the same understanding over the project.

Acceptance of the sub-suppliers must be carried out before any major movements into delivery. During the bidding process, Ahlstrom Machinery teamed with two Brazilian companies, CNO and Confab, CNO is a Brazilian construction company, responsible for construction of the recovery boiler. Confab is also a Brazilian company which fabricated the feedwater storage tank, the

steam drum and economizer for the boiler. They also coordinated the fabrication of the boiler casing, ash hoppers, stack, sootblowers piping and ductwork with their sub-suppliers in Brazil.

Quite often there is clear tend to slide in schedules in accepting the documents and blue-prints. These schedule targets must be agreed mutually between the supplier and the client to prevent the delays at this stage.

The supplier must prepare the basic process design and basic lay-out before the contract signing. This must be done in sales negotiations together with the client. At the same time all the standards to be applied in the project must be agreed.

After contract signing

The most important phase after contract signing is to get all parties committed to the project-to make all participants to work for mutual goal and benefit. Constant project meetings monthly with mutually agreed targets are essential part of this process. And this means real decision making not just gathering-up for habit.

When the pre-conceptual work has been done properly no major changes will be done in the design or in the scope of the supply. It is obvious that the best technical experts should be working together from the client's side and the supplier side.

Typically a recovery boiler delivery scope contains more sub-suppliers equipment than boiler manufacturers own products. To make the whole chain of deliveries work fluently co-operative suppliers should be chosen together by the client and the main supplier.

A good tool to make the project go smoothly is to use so called 90 days "look ahead" schedule for activities. This means that every task will have "early start, early finish".

Modern on-line communication systems, such as Internet and electronic mail should be used to make the interaction as fast and efficient as pos-

sible. This is not only viable for messages but for drawings and detailed engineering.

NEW TYPE OF APPROACH IN PROJECT WORK

Align™ process

The Align™ structured program helps the owner, suppliers, engineering companies, and construction companies have a project that:

- is completed on time
- is constructed at or below budget
- meets performance standards
- demonstrates a reduced start-up curve
- promotes teamwork, quality, and safety

The key to the success of this program is that it provides a forum for all the major players in the project to openly discuss common issues and concerns. The issues and concerns are discussed and action items to resolve them are developed by the Align™ meeting team.

The Align™ program uses a structured approach to promote an open atmosphere for discussion. Everyone in the meeting agrees on the major issues, which traditionally include :

- schedule
- scope
- quality
- safety

The smaller breakout groups are used to develop action items to resolve the major issues by :

1. identify the key issues
2. define the actions to resolve the issues
3. identify the time period to complete the actions
4. assign the leader for each action item

Table-I			
Schedule of a recovery boiler project			
The schedule of the recovery boiler project	24 months schedule	Aracruz	Saving in the time
1. Procurement of pressure parts	2 months	0 months	2 months
2. Manufacturing of the pressure parts	7 months	4 months	3 months
3. Steel construction erection	8 months	5 months	3 months
4. Erection of pressure parts	12 months	9 months	3 months
5. Hydro test	19 months	14 months	5 months
6. Start-up	24 months	18 months	6 months

The program supplements the regular monthly projects reviews most projects regularly schedule. It does not conflict with the project managers role of responsibility, but helps the project manager to bring attention and action to critical areas.

PROJECT SCHEDULES

In **Table-I** a typical recovery boiler project is

Table-II	
Milestones of The Aracruz project	
Milestones of the Aracruz Project	
Received Order	November 1, 1995
Mobilized to Site	December 1, 1995
Started Foundations	January 2, 1996
Started Steel Erection	March 22, 1996
Started Pressure Part Erection	July 30, 1996
Hydro Test	December 28, 1996
First Liquor Fire	April 30, 1997

compared with the case Aracruz.

THE BENEFITS OF THE ARACRUZ PROJECT

The benefits of the short delivery time for the client are obvious. For example in Aracruz case :

- The savings in the interest of the investment were 2.4 million US\$
- The savings in the sorter time for committing the resources was 0.5 million US\$
- Savings in earlier increase of production 36 million US\$.