

Meeting The Need

Innovative Co-generation System Saves University \$1,200 - \$1,500 a Day

Bob Jones University, a fundamental Christian university in Greenville, South Carolina, was recently faced with a problem common to institutions of higher learning everywhere — how to control expenses and keep a lid on rising tuition costs.

Bob Jones found an innovative answer by designing a unique co-generation plant that now provides electric power at about half what the local utility charges.

The university is home to more than 5,000 students, and utility costs were one of its major expenses. Bob Jones heats and lights more than 40 classroom buildings, dorms, a hospital, dining hall, chapels, sports facilities and apartment buildings. In addition, the university paid the local utility, Duke Power Co., a stiff fee during peak demands.

Service from the utility wasn't always reliable. An old back-up generator the university relied upon to produce power at peak demand was threatening to fail.

The critical question became how to meet the university's power requirements economically. "As a Christian university, we're always looking for ways to control costs so more students can afford to attend," says university spokesman Mike Hadley.

Power Plant Cuts Costs in Half

Chief Engineer R.C. Alderson found an answer in a co-generation power plant that would supply the university with electricity at a cost of about three cents per kilowatt hour as compared to the five or six cents charged by Duke Power.

It was felt that the plant could minimize the university's primary reliance on the utility for most of the school's electricity, and even enable Bob Jones to sell power to Duke Power under special circumstances. The system was also designed to supplement the school's main boilers.

Alderson determined the plant construction costs could be minimized using rebuilt diesel engines. He also knew the plant wouldn't be cost effective if the diesels were going to be used only to turn generators.

To make the big diesels pay for themselves, Bob Jones needed to capture the engines' waste heat. That meant the school needed heat exchangers, valves, suction diffusers

and pumps — and the expertise of a top fluid handling equipment manufacturer. Bell & Gossett and the Fluid Handling Division of ITT were enlisted to help.

Detailed computer analyses of the HVAC system and various components were critical to ensure that the system would work effectively. Working closely with the school's engineers, Bell & Gossett's regional representative, James M. Pleasants Company, analyzed and specified all the key HVAC system components using Bell & Gossett's ESP-PLUS™ equipment selection software program.

Bell & Gossett fluid handling equipment was being used in several Bob Jones buildings already. One Bell & Gossett horizontal split case pump has been in service for heating and air conditioning for 40 years.

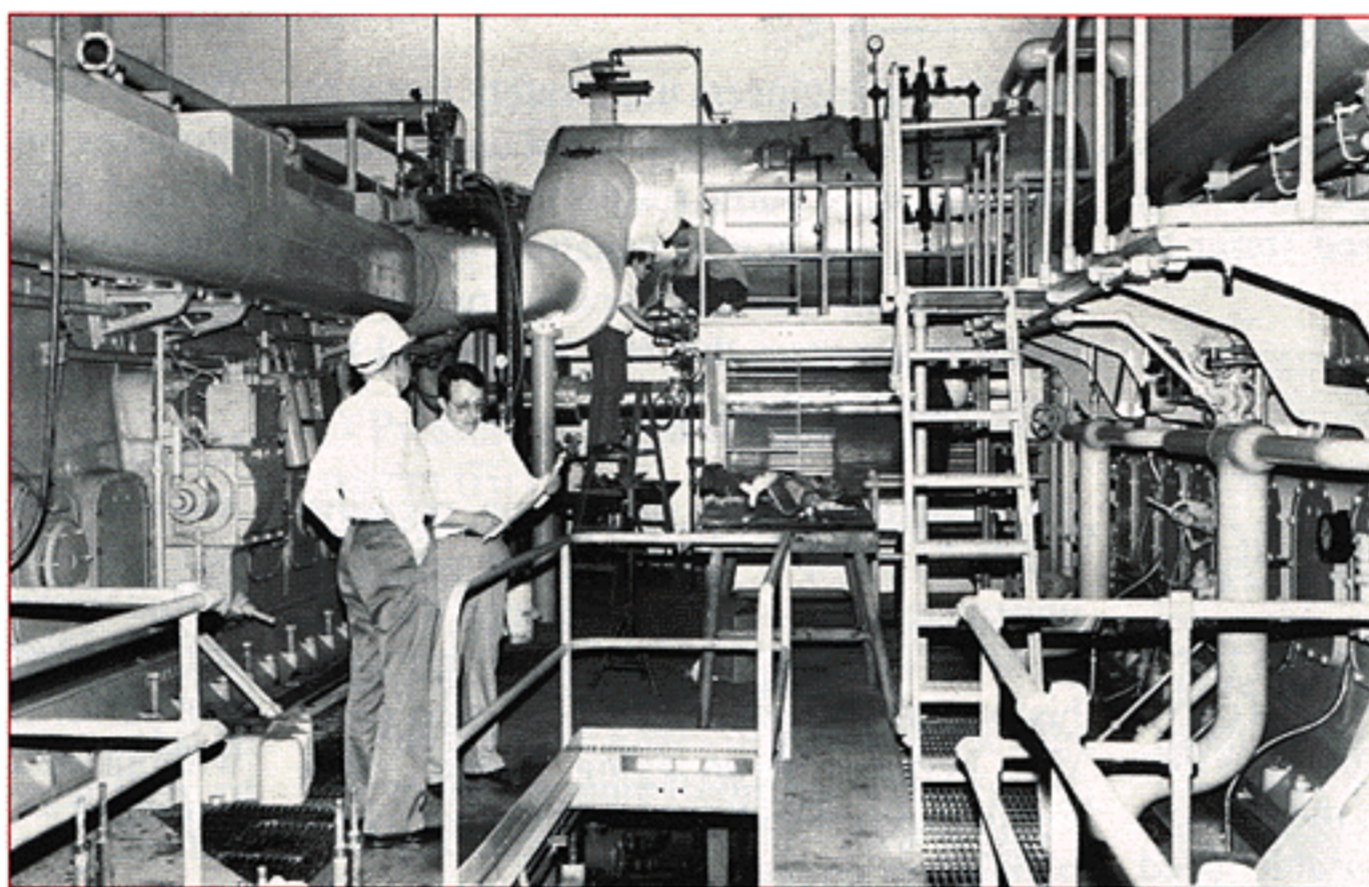
A Bell & Gossett DM-MA715-20-20 pressure booster system with four domestic type DB pumps is installed in line on the university's closed loop heating and hot water systems. Hot water is distributed through more than a mile of insulated pipe to various campus locations. In all, Bell & Gossett's pumps of various sizes, five GF-3 suction diffusers and 11 Triple Duty Valves® are keeping the system running as planned.

Hot exhaust is piped through a heat recovery unit where water is converted to steam at 100 psig for heating dorms and other buildings, and for cooking in the dining room.

Fuel Efficiency Nearly Tripled

Making use of waste heat as well as the generating power of the diesels means the university recovers about 75 cents worth of energy from every dollar it spends on diesel fuel. If the heat weren't recovered, less than 35 cents worth of energy would be recovered from each dollar spent on fuel.

Each diesel engine's exhaust heat produces 2,000 pounds of steam an hour, and the three diesels together can produce 140,000 gallons of hot water per day — more than enough to easily meet the university's needs.



Savings of \$1,200 - \$1,500 a Day

Designed by the school's engineering staff, and built in part with university labor augmented by local contractors, the co-genera-