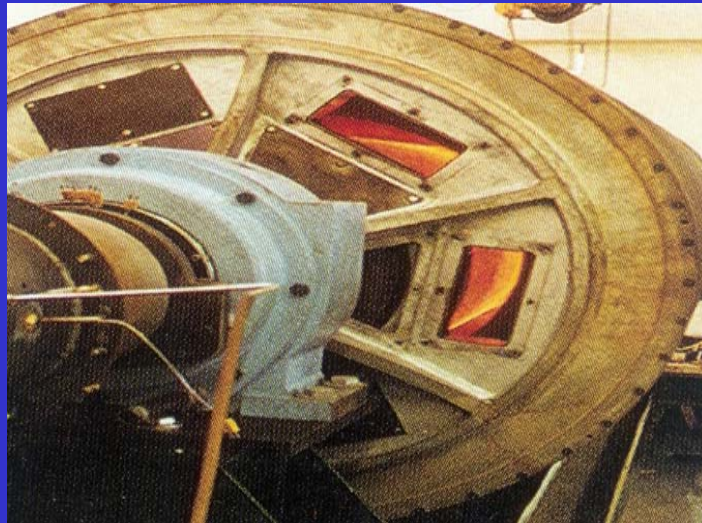

ANDRITZ

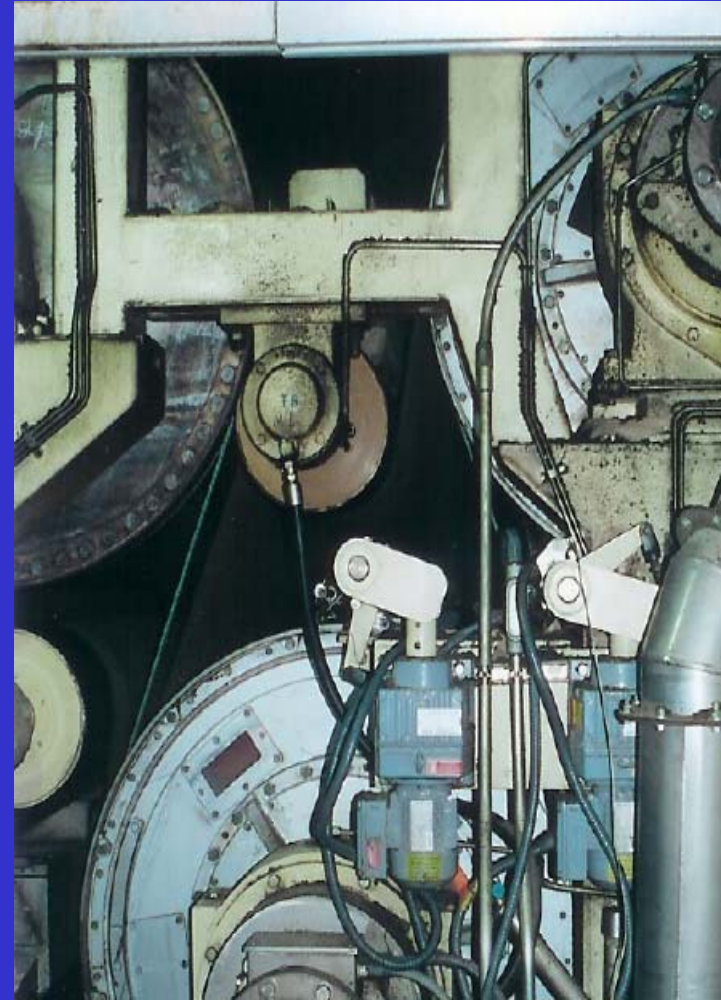


Gas Heated Paper Dryer

SYSTEM OVERVIEW (GHPD 101)

WHAT IS A GAS HEATED PAPER DRYER?

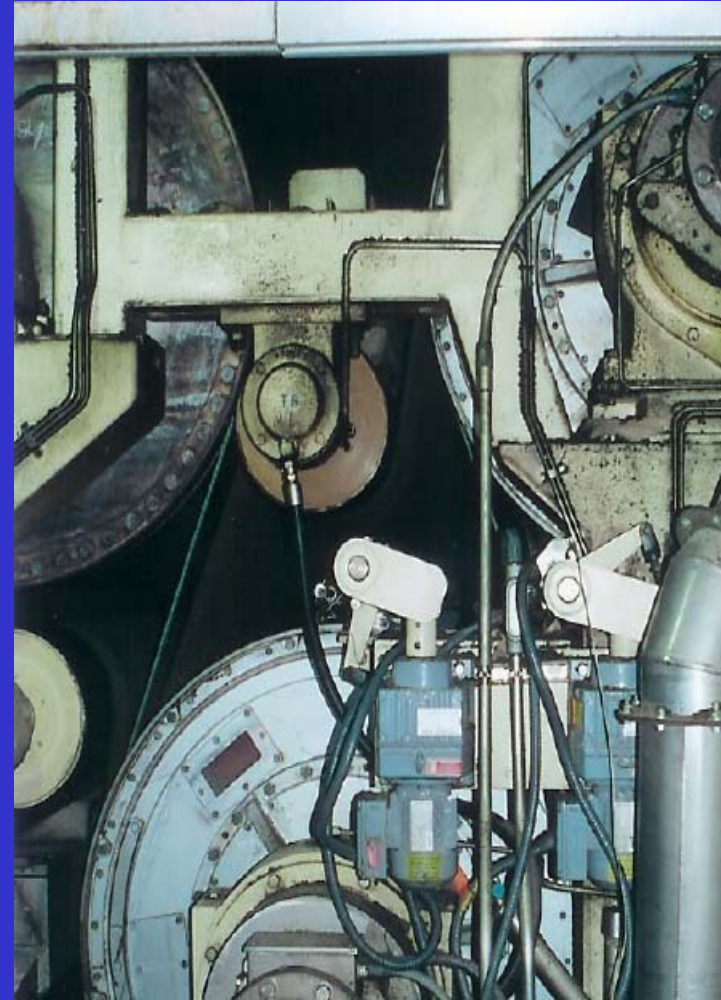
- The GHPD is a drying system engineered to increase the production capacity of a paper machine.



SYSTEM OVERVIEW (GHPD 101)

WHAT IS A GAS HEATED PAPER DRYER?

- The GHPD can be added to the dryer section.
- Existing steam cylinders can be replaced with GHPD's.



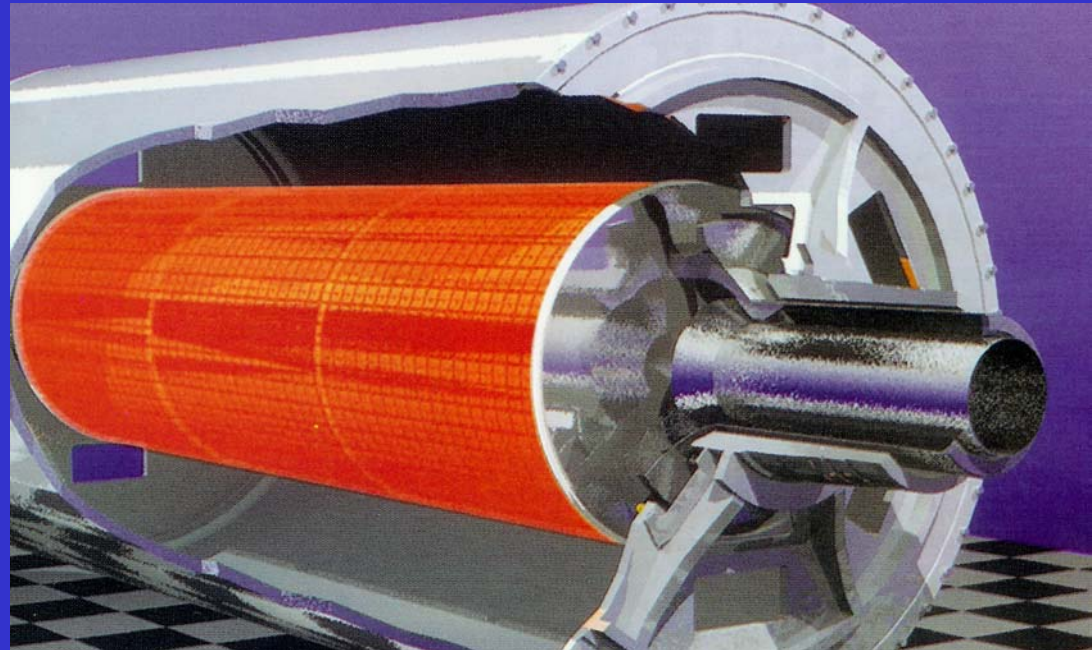
SYSTEM OVERVIEW (GHPD 101)

HOW DOES A GHPD WORK?

- A stationary radiant burner provides both radiant and convective heating to a rotating cylinder.

- The GHPD is not a pressure vessel.

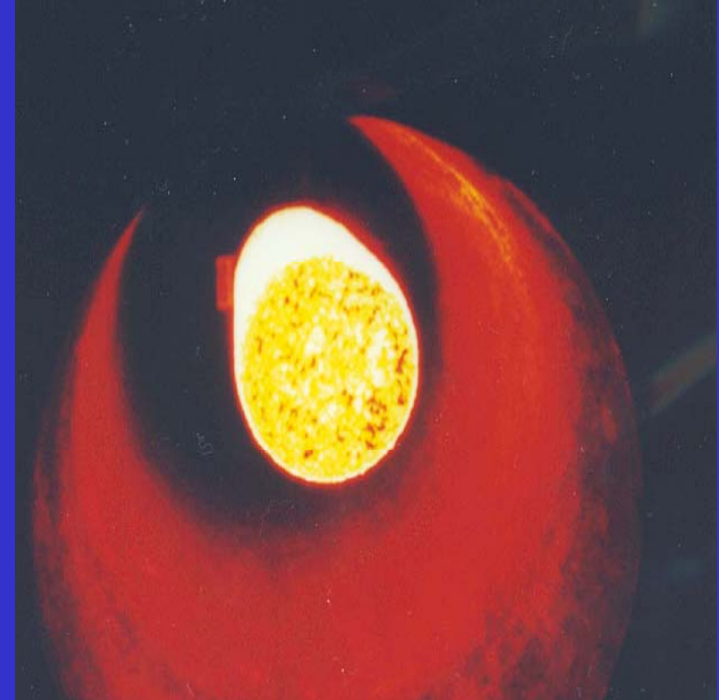
The GHPD operates at much higher temperatures than steam cylinders.



SYSTEM OVERVIEW (GHPD 101)

HOW DOES A GHPD WORK?

- STEAM CYLINDER @ 75 PSIG....250° F
- STEAM CYLINDER @ 150 PSIG....300° F
- GHPD.....550- 600° F

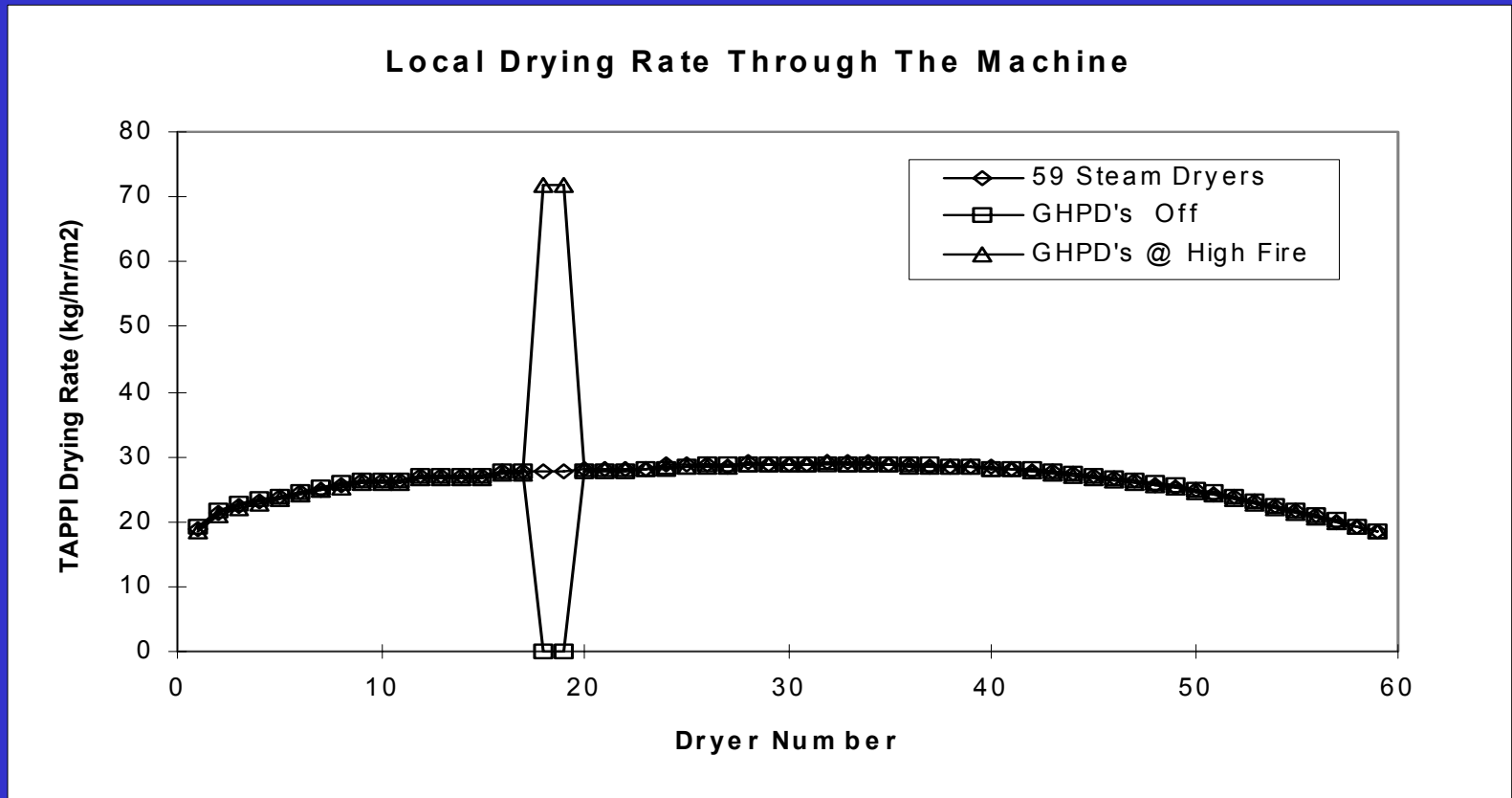


Higher Surface Temperature = Higher Drying Rate

SYSTEM OVERVIEW (GHPD 101)

HOW DOES A GHPD WORK?

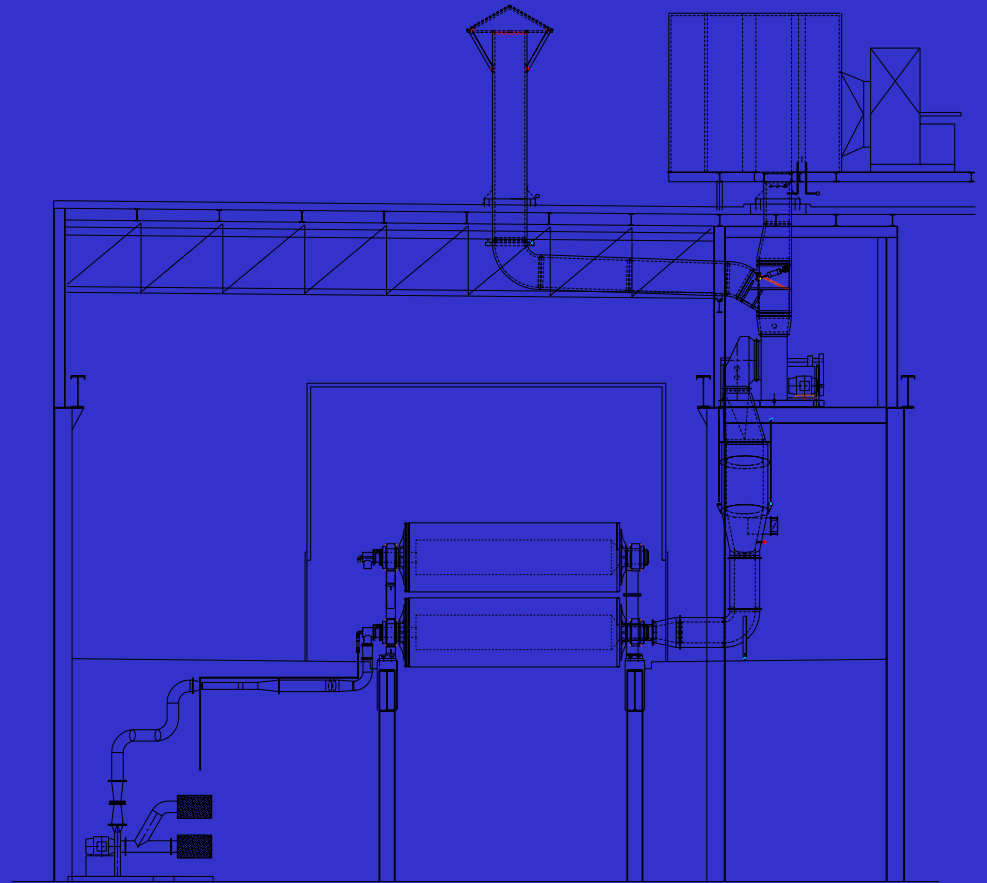
Higher Surface Temperature = Higher Drying Rate



SYSTEM OVERVIEW (GHPD 101)

WHAT IS THE TYPICAL SCOPE OF SUPPLY?

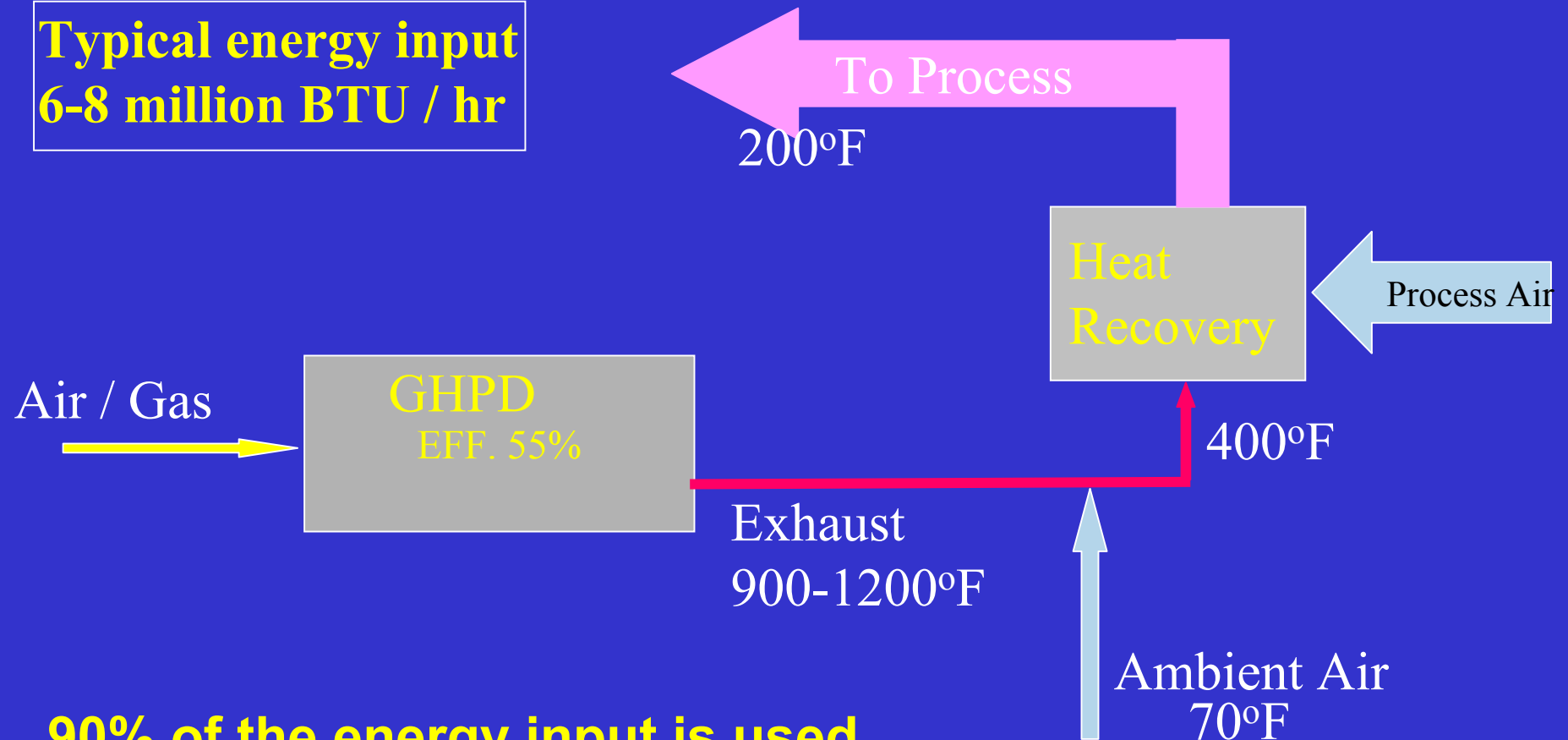
- 2 Dryer cylinders complete with burner assembly
- Air / Gas supply and ratio equipment
- Exhaust system
- Heat recovery
- Controls



SYSTEM OVERVIEW (GHPD 101)

ENERGY USAGE and EFFICIENCY

Typical energy input
6-8 million BTU / hr



90% of the energy input is used in the drying process.

SYSTEM OVERVIEW (GHPD 101)

ENVIRONMENTAL and QUALITY ISSUES

■ Emissions

- NOx = 10 - 40 ppm @ 10% excess air
- CO = 0 - 100 ppm
- UHC = 0 - 10 ppm

■ Paper Properties

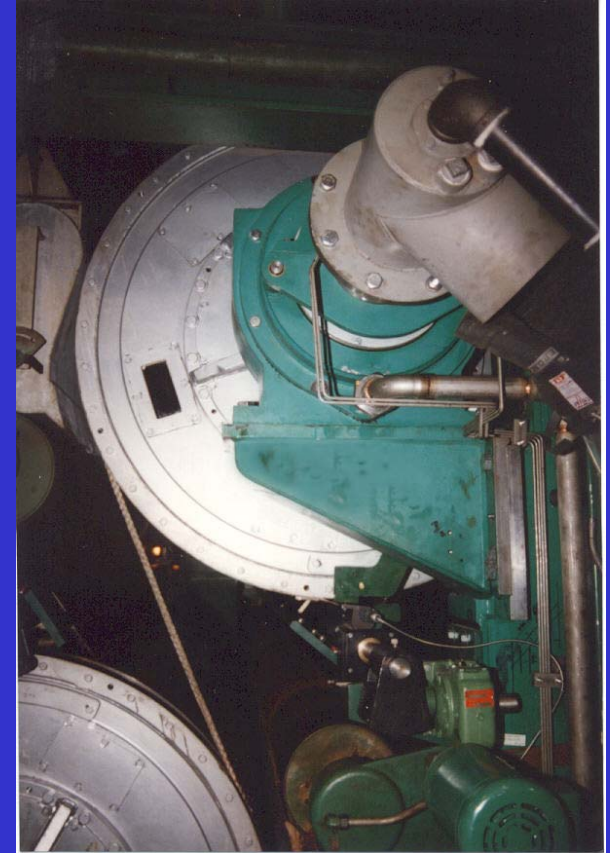
- Results from commercial installations
- Independent testing by PAPRICAN
- No detrimental effect on paper properties
- Evidence of some property improvements

SUCCESS STORIES

Weyerhaeuser (Willamette), Albany, Oregon

World record producing machine 7.0 % production increase

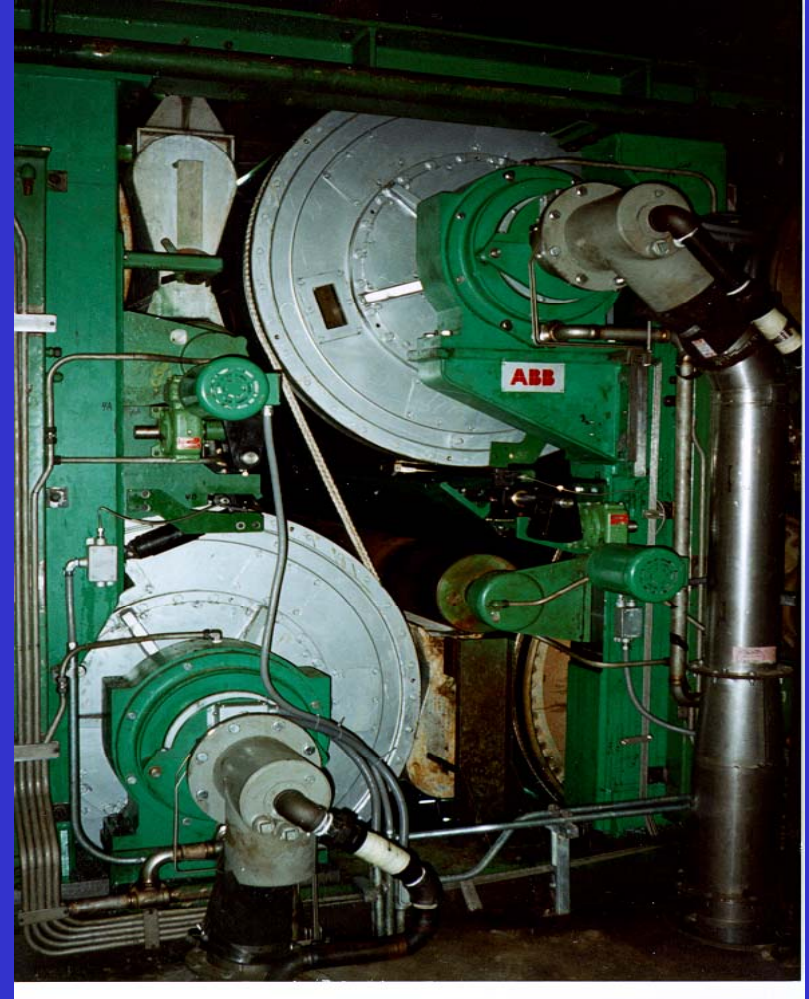
- START UP & SUPPLY: 1995, 2 GHPD's replaced dryers No.17 & 18
- GRADE : LINERBOARD, 205 g/m² (42 lbs /1000 ft²)
- DRYER SIZE : 1,500 x 4,650 mm (59 in. x 183 in)
- DRYING RATE : 70 kg/h/m² (14.3 lbs/hr/ft²) TAPPI



SUCCESS STORIES

Weyerhaeuser (Willamette), Albany, Oregon

- BURNER CAPACITY : 2.1 MW EACH (7 MBTU/hr)
- DRYING EFFICIENCY : 46 to 55 %
- HEAT RECOVERED : 1MW EACH (3.4 MBTU/hr)
- OVERALL ENERGY EFFICIENCY : 90%
- DRYER AVAILABILITY : 100%

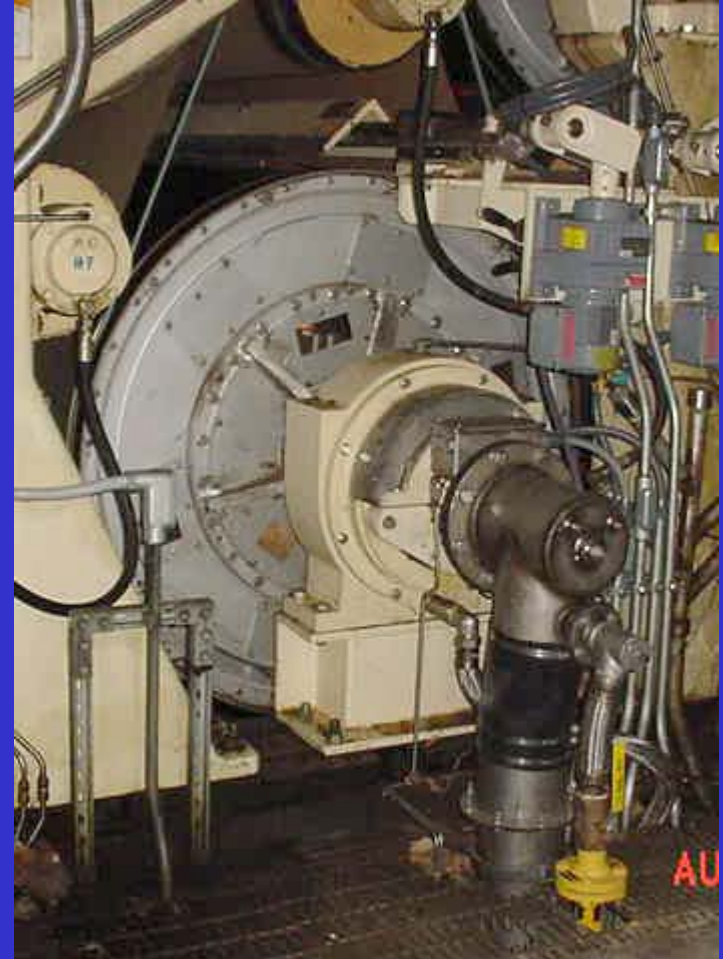


SUCCESS STORIES

Corrugated Services Inc., Forney, Texas

15.5% Increase in Capacity

- START UP & SUPPLY: 2001, 4 GHPD's in 5th dryer section (positions 37,38,43,44)
- GRADE : LINERBOARD, 205 g/m² (42 lbs /1000 ft²)
- DRYER SIZE : 1,500 x 4,420 mm (59 in. x 174 in)
- DRYING RATE : 53.2 kg/h/m² (10.9 lbs/hr/ft²) TAPPI



SUCCESS STORIES

Corrugated Services Inc., Forney, Texas

- BURNER CAPACITY : 2.1 MW EACH (7 MBTU/hr)
- DRYING EFFICIENCY : 46 to 55 %
- HEAT RECOVERED : 1MW EACH (3.4 MBTU/hr)
- OVERALL ENERGY EFFICIENCY :90%
- DRYER AVAILABILITY : 100%



COMPETITIVE ADVANTAGE

COMPETING TECHNOLOGIES

There are no other high temperature drying cylinders currently available.

Dryer Section Extension

Press Upgrade

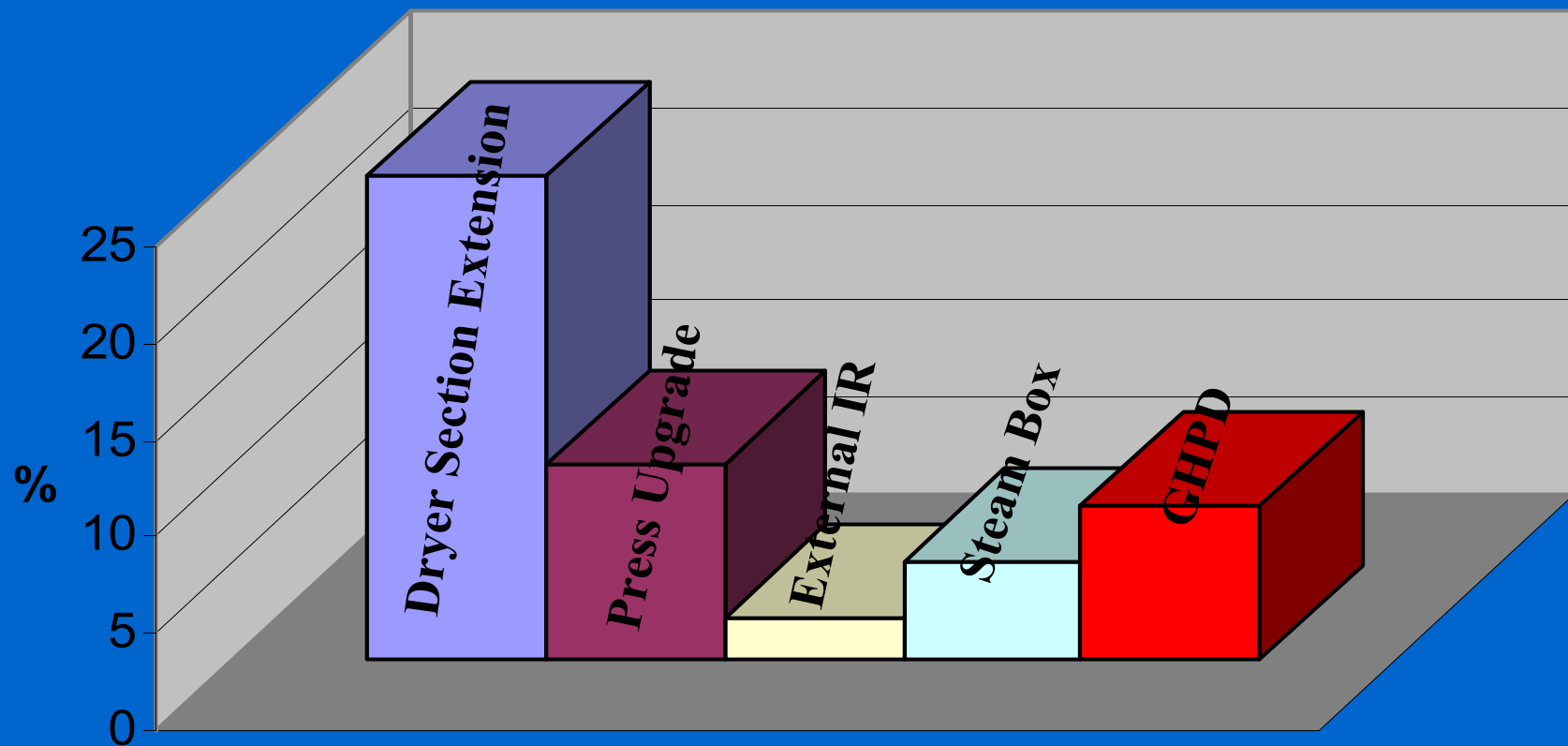
External IR

Steam Box

COMPETITIVE ADVANTAGE

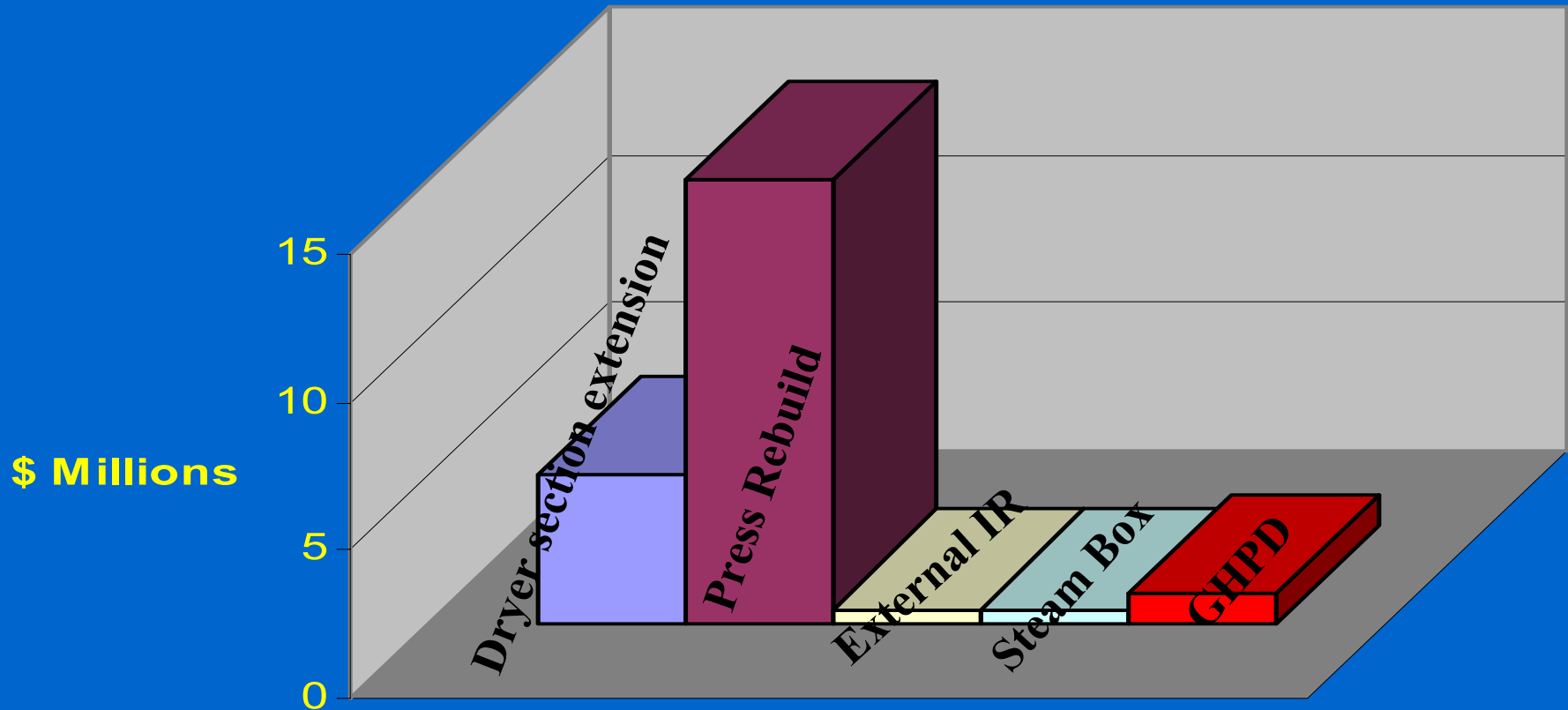
COMPETING TECHNOLOGIES

RELATIVE CAPACITY INCREASE



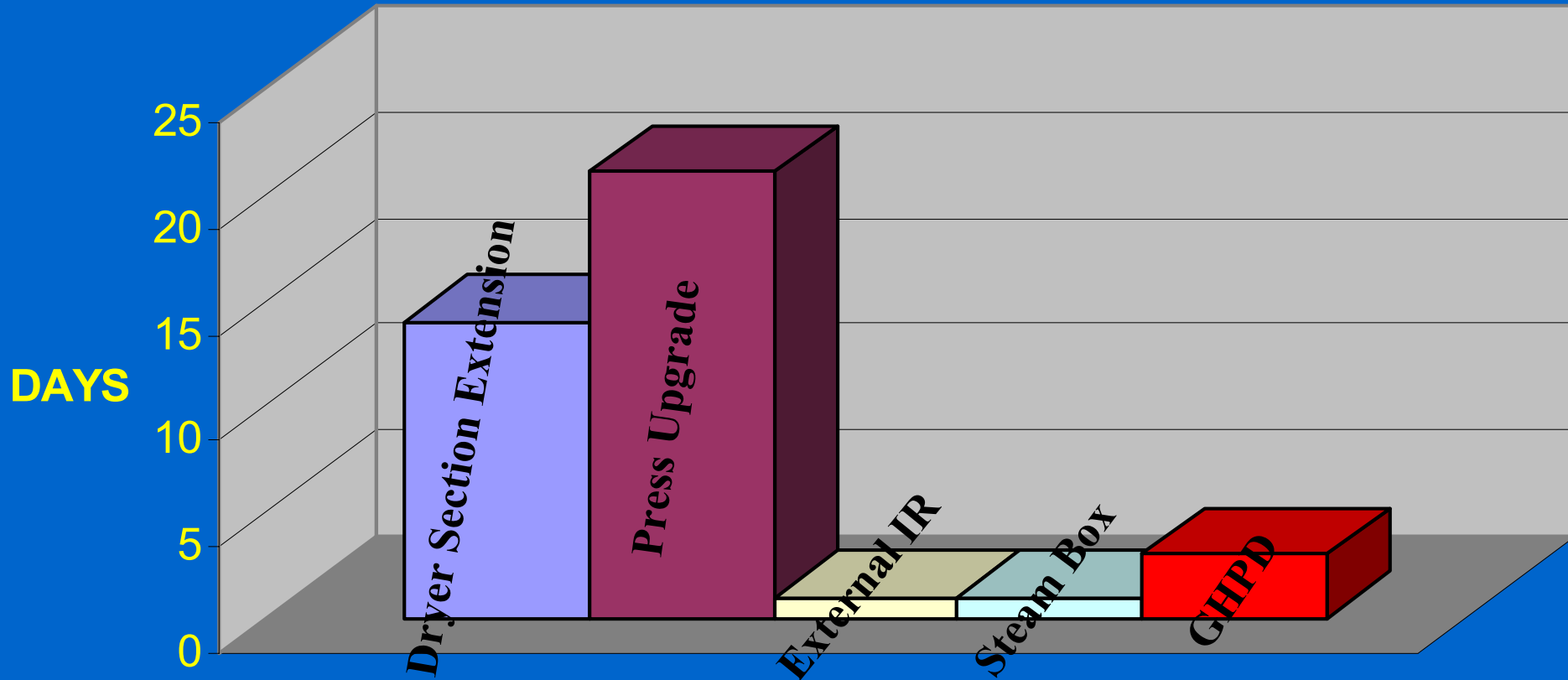
Competitive Advantage

RELATIVE CAPITAL COST



Competitive Advantage

DOWNTIME



Competitive Advantage

- **The GHPD provides a high capacity increase at low cost with minimal downtime.**

MARKETING STRATEGY

Sell Sell Sell



HELP!



MARKETING STRATEGY

Barriers to Success

- Current market climate sucks.
 - Machines are being shutdown
 - Downtime extended
 - Paper prices are low

- Paper Industry is Extremely Coservative
 - Reluctant to try new technologies

MARKETING STRATEGY

Breaking down barriers

Best Candidates

Specialty grade producers

Machines that have already installed the competing technologies.

Low cost producers

Take advantage of excellent references

MARKETING STRATEGY

Cooperation with the Energy Solutions Center

Marketing Materials

The Corrugated Services brochure produced by the Pulp and Paper Consortium is an excellent endorsement of the GHPD.

This type of support is greatly appreciated.

MARKETING STRATEGY

HOW CAN YOU HELP?

Spread the word

Distribute the Corrugated Services brochure

Use the GHPD questionnaire to provide feedback

BY GENERATING SALES, WE WILL ALL BENEFIT

GHPD

- Thank you to the **ENERGY SOLUTIONS CENTER** for providing this opportunity to present the Gas Heated Paper Dryer technology.

- Thank You!

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