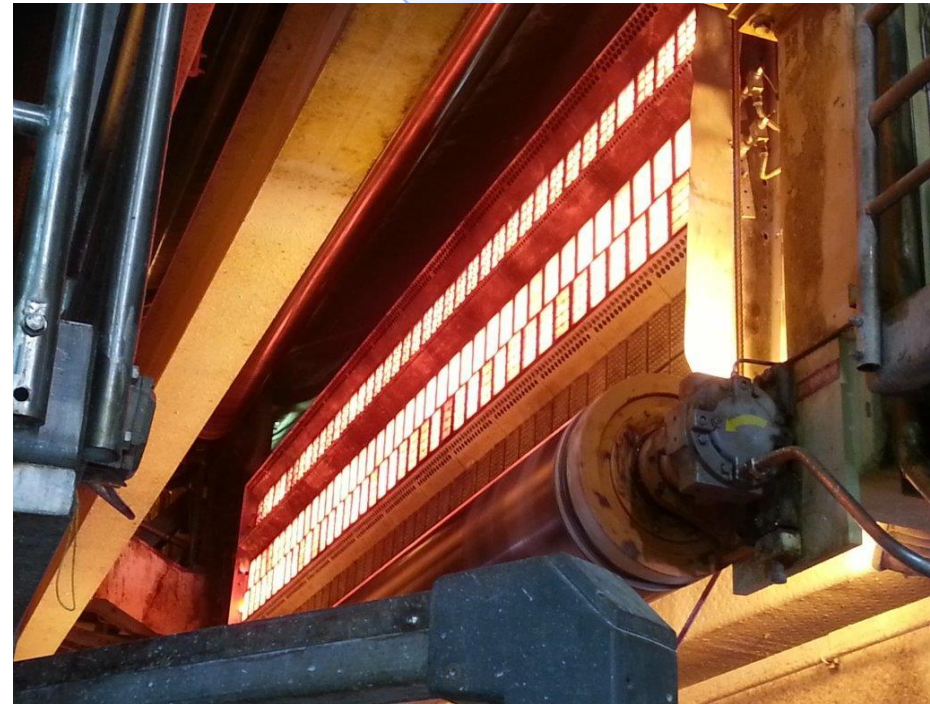
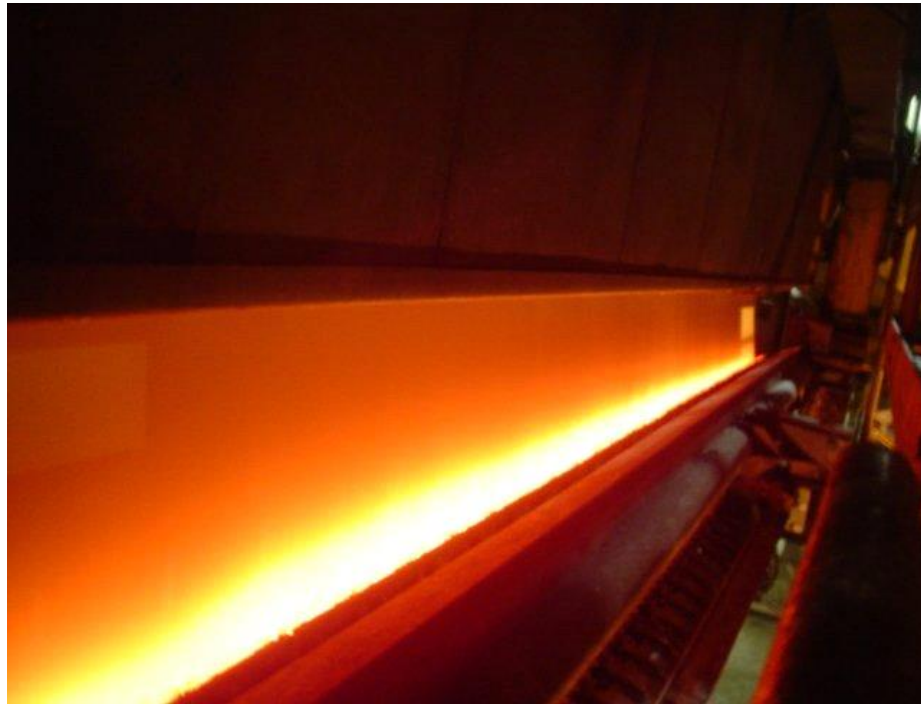


© set point  
IR & COMBUSTION SPECIALISTS





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[www.setpoint.ind.br](http://www.setpoint.ind.br)

# WHAT WE DO

## PAPER INDUSTRY (IR)

OIL PLATFORMS

PETROCHEM

FOOD INDUSTRY

INDUSTRIAL BOILERS

METALLURGY

COMBUSTION SYSTEMS

# PAPER INDUSTRY

## COATING

- Complete IR Systems
- High Efficiency IR Emitters
- Field Service Engineering
- Maintenance & Spare Parts
- Tech Audits: Quality issues, Process Optimization
- Curl Control
- Wet Edges

## PAPER MACHINE PROPER

- Drainage Improvement
- Press Drying (bulk increase)
- Pre-Heating (eliminates Picking, Hard Casing)
- Tech Audits of the Steam & Condensate Systems
- Drying Capacity Increase
- Moisture Profile Control
- Wet Edges elimination

# COATING

- Complete IR Systems
- High Efficiency IR Emitters
- Field Service Engineering
- Maintenance & Spare Parts
- Tech Audits: Quality issues, Process Optimization
- Curl Control
- Wet Edges

# COMPLETE IR SYSTEMS



# COMPLETE IR SYSTEMS

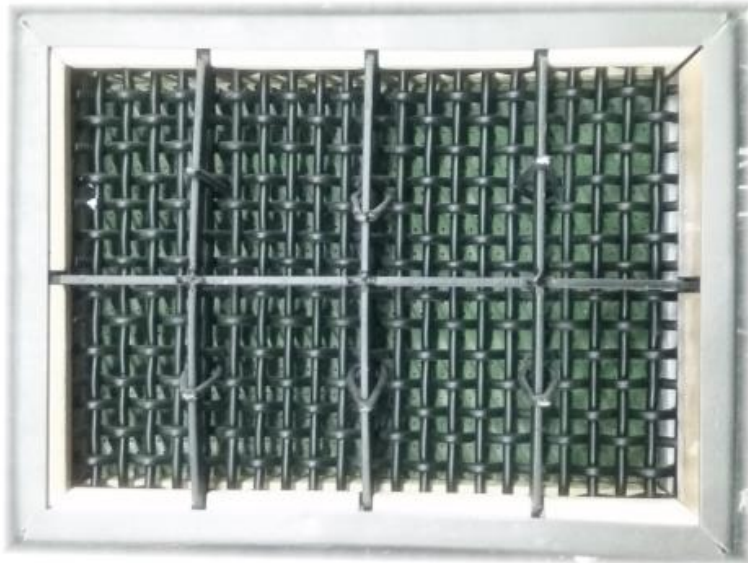
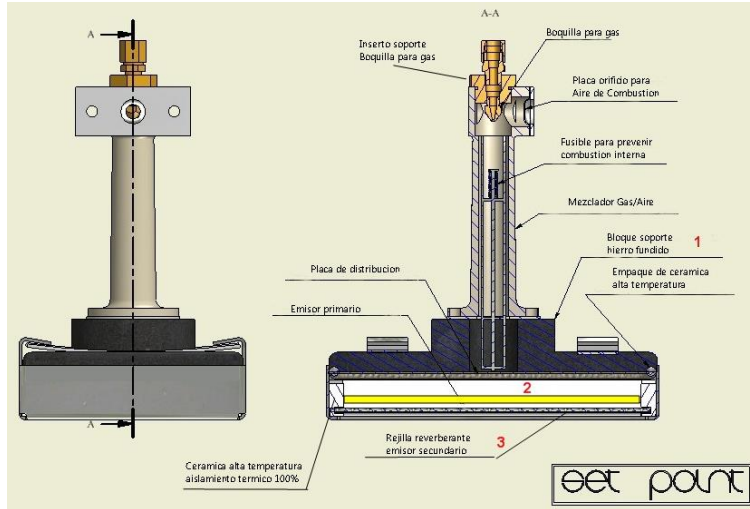


# COMPLETE IR SYSTEMS





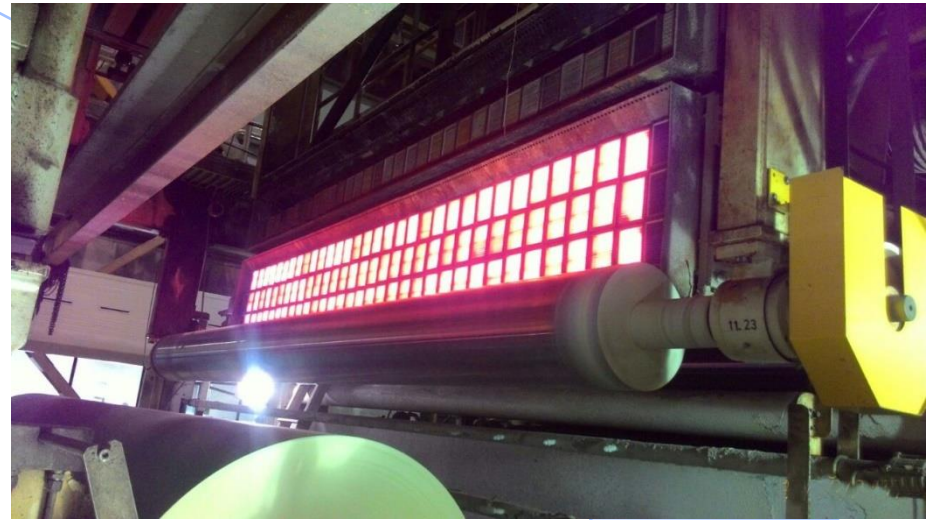
# EMITTERS



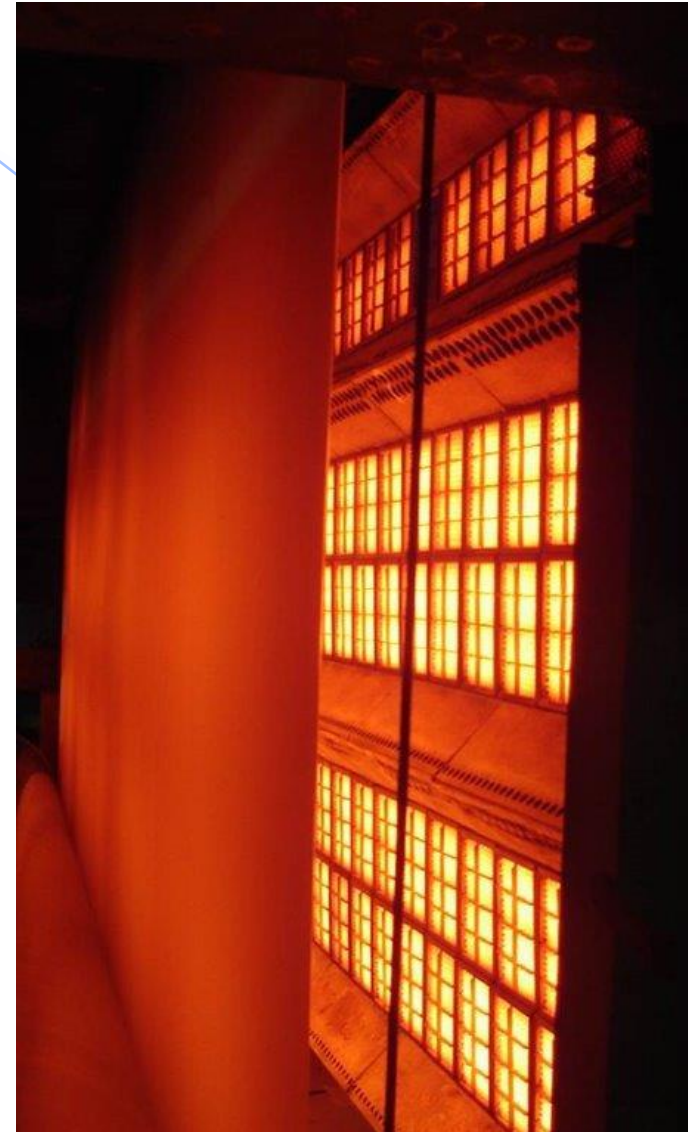
# EMITTERS



# EMITTERS



# EMITTERS



# EMITTERS



31 de mai de 2019

# FIELD SERVICE ENGINEERING & MAINTENANCE

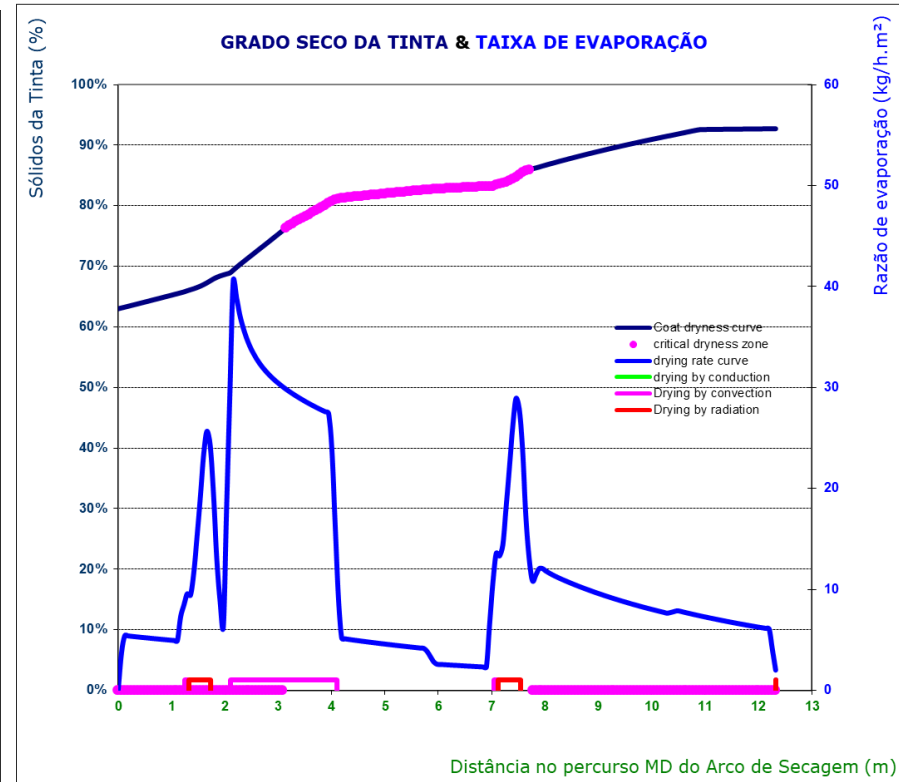
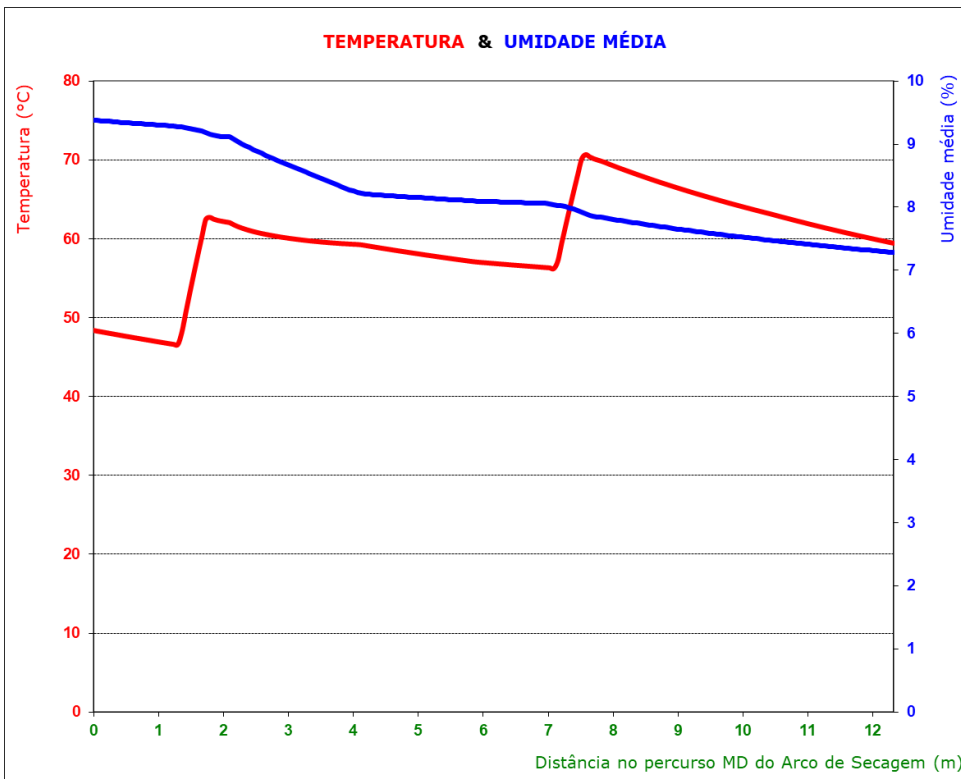


# COAT DRYING AUDITS

Planta	Papirus	Uso	Top Coat
Velocidade (m/min)	500	Ref	210 g/m <sup>2</sup>

	Papel	Aditivos	Papel + Aditivos
Grado Seco (g/m <sup>2</sup> )	183.30	12.00	195.30
Umidade (%)	6.70%	x	9.4%
Sólidos (%)	x	63.0%	90.6%
Massa de água (g/m <sup>2</sup> )	13.16	7.05	20.21
Massa total (g/m <sup>2</sup> )	196.46	19.05	215.51
Temperatura (°C)	49	42	48.38

Arco de Secado (m)	12.32	Umidade Final (%)	7.28%
Temperatura final (°C)	59.4	Evaporação Total (kg/h.m)	146.0



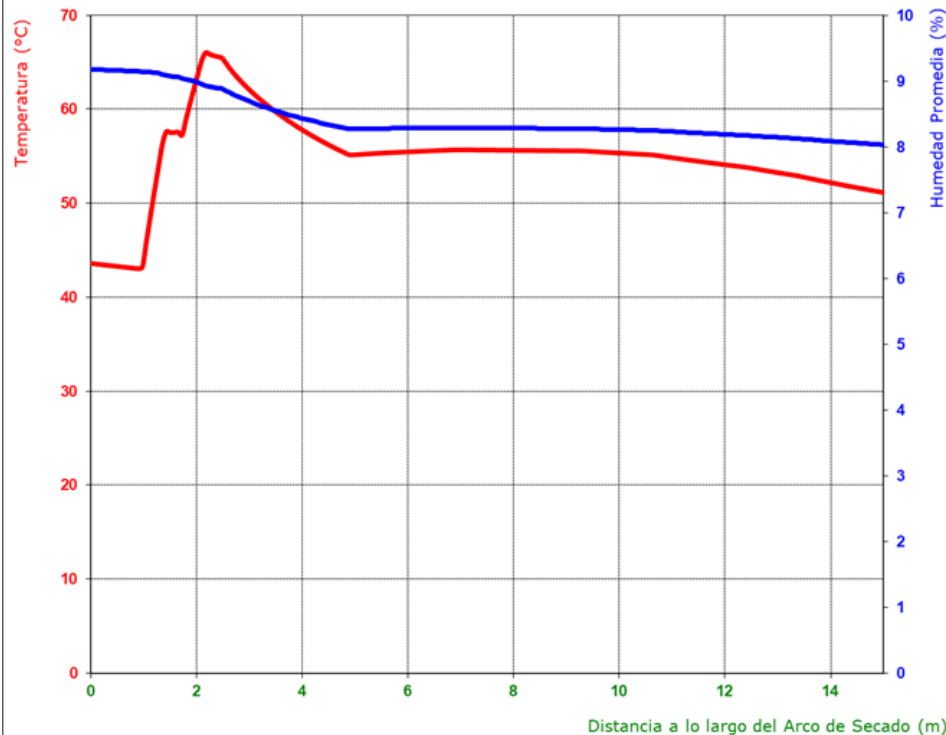
# COAT DRYING AUDITS

Planta	Papelera del Sur	Uso	OMBI-BLADE, Station #4, UPGRADE
Velocidad (m/min)	327	Ref	290 gsm

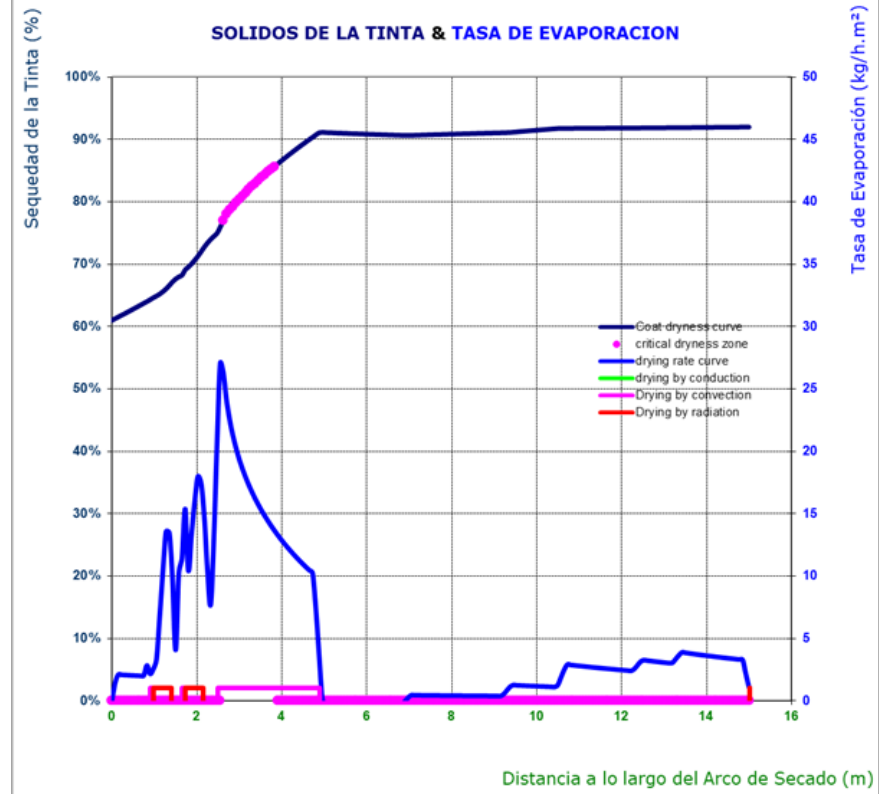
	Papel	Aditivos	Papel + Aditivos
Peso Seco (g/m <sup>2</sup> )	257.80	9.00	266.80
Humedad (%)	7.60%	x	9.2%
Sólidos (%)	x	61.0%	90.8%
Masa de Agua (g/m <sup>2</sup> )	21.20	5.75	26.96
Masa Total (g/m <sup>2</sup> )	279.00	14.75	293.76
Temperatura (°C)	44	36	43.60

Arco de Secado (m)	15.00	Humedad Final (%)	8.03%
Temperatura final (°C)	51.1	Evaporación Total (kg/h.m)	71.8

TEMPERATURA & HUMEDAD PROMEDIA



SOLIDOS DE LA TINTA & TASA DE EVAPORACION





# CURL CONTROL

There are two types of curl: MD direction and CD direction

## **Curl MD:**

- Usually mechanical in nature; must be dealt with as such

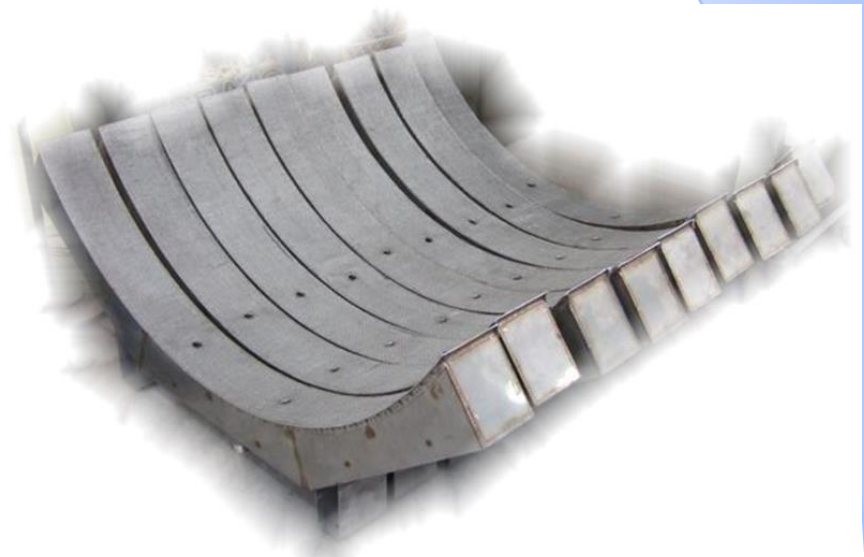
## **Curl CD:**

- Caused by a moisture unbalance between the two sides of the sheet
- Traditionally corrected with dryer cylinders (upper-lower rows at different steam pressures).
- High thermal inertia/slow response system; besides, handicaps the actual installed drying capacity of the PM.

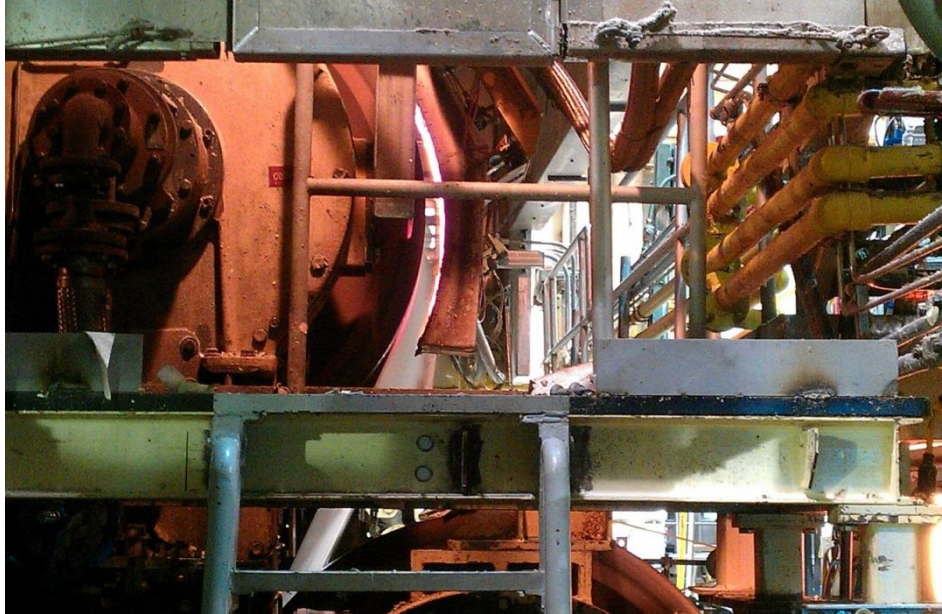
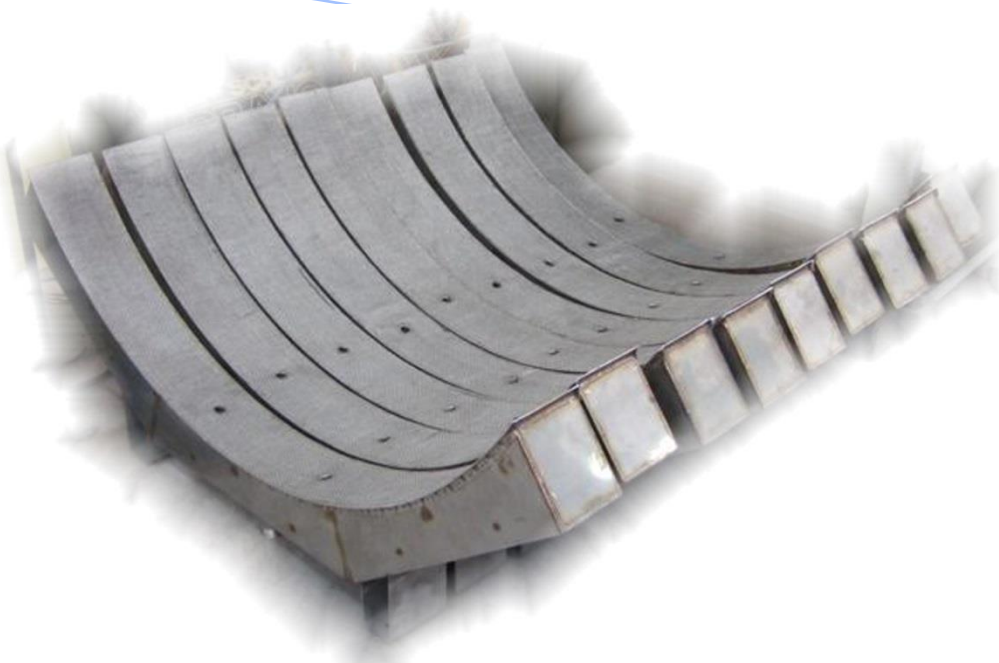




# WET EDGE DRYING



# WET EDGE DRYING

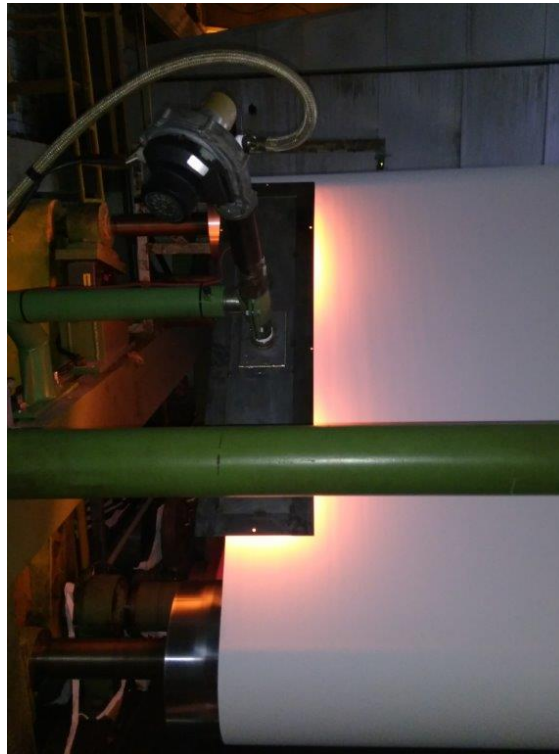


## DRYING OF WET EDGES

Coverage: as needed

Retraction: optional

Capacity: Size & power, as required

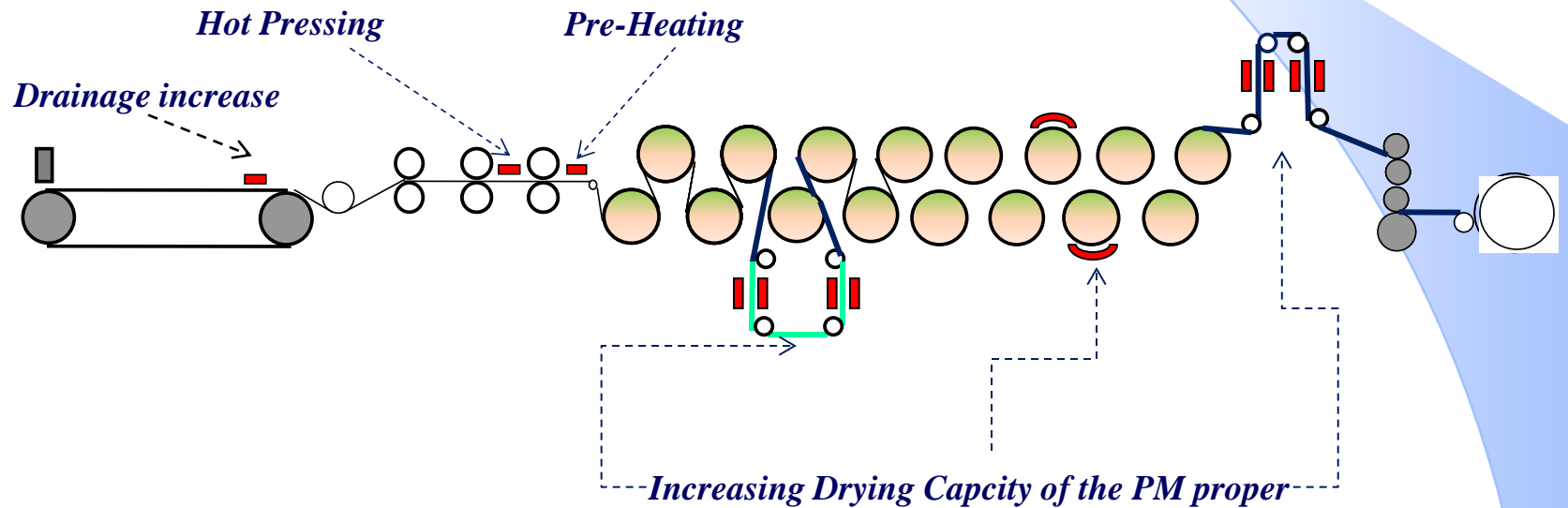


## **PAPER MACHINE PROPER**

- Drainage Improvement
- Press Drying (bulk increase)
- Pre-Heating (eliminates Picking, Hard Casing)
- Drying Capacity Increase
- Moisture Profile Control

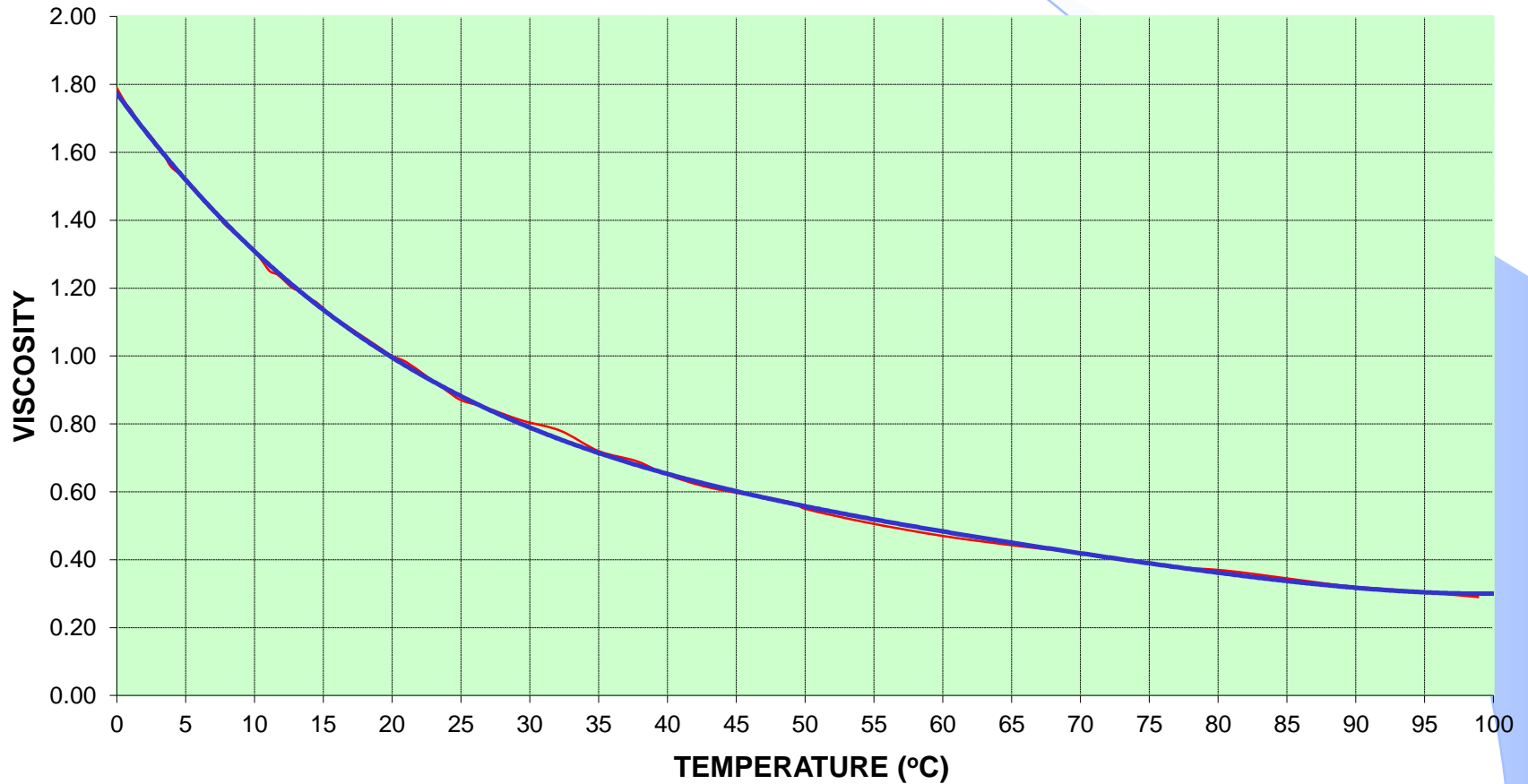
# BESTDRYER

INFRARED ENERGY  
WHERE TO USE IT IN A PAPER MACHINE



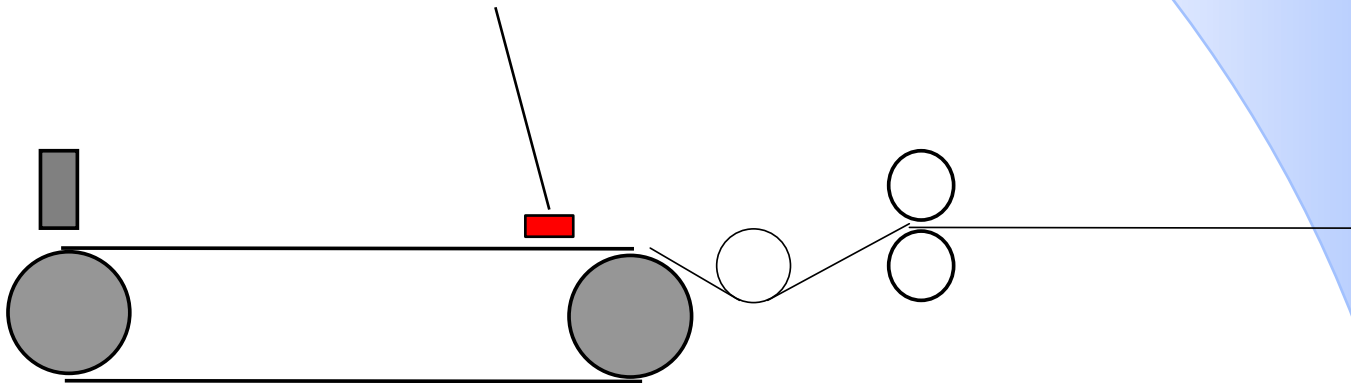


# KINEMATIC VISCOSITY CENTISTOKES



# INFRARED ENERGY ON MACHINE

Drainage increase



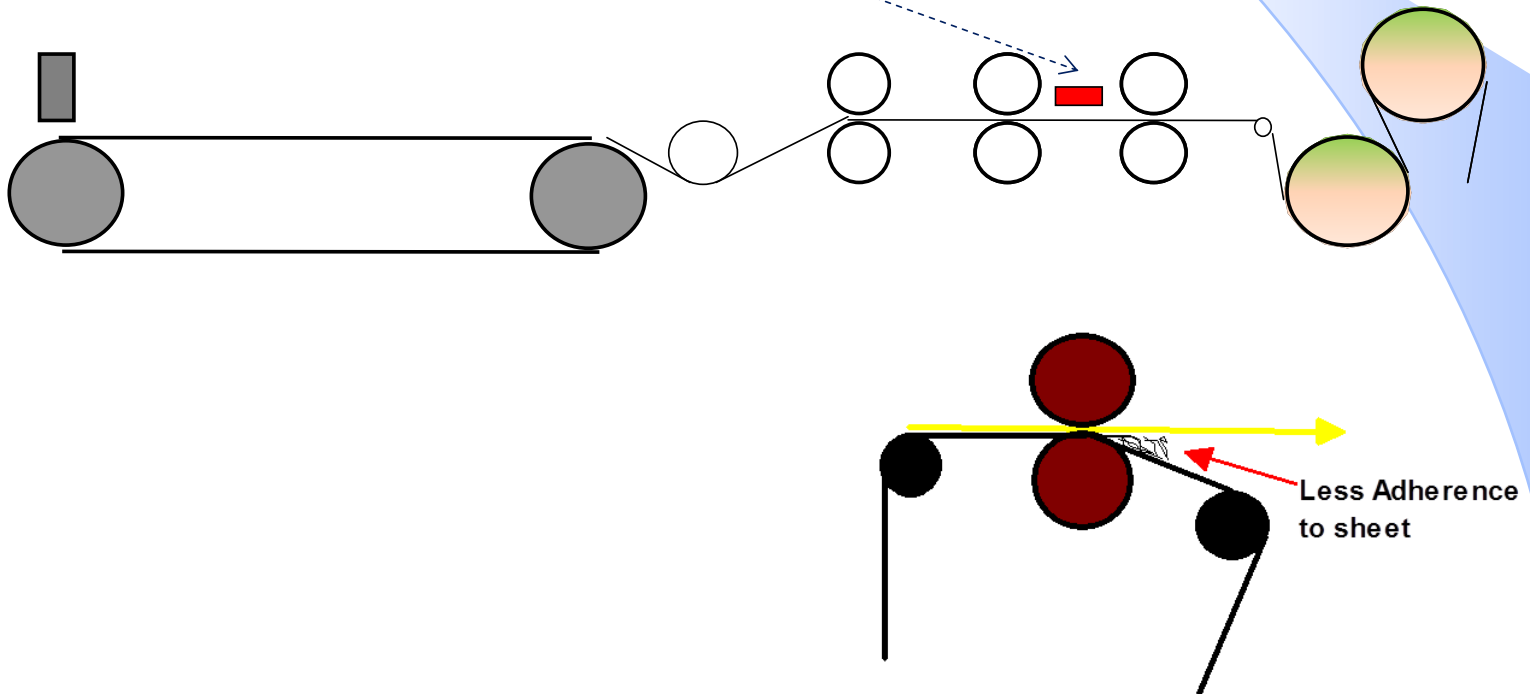
# INFRARED ENERGY ON FOURDRINIER



# IR HEAD OF LAST PRESS

## *BULK INCREASE*

Taber  $\sim$  Bulk<sup>1.6</sup>



## HEAVY BOARD DRYING

### 100% INFRARED

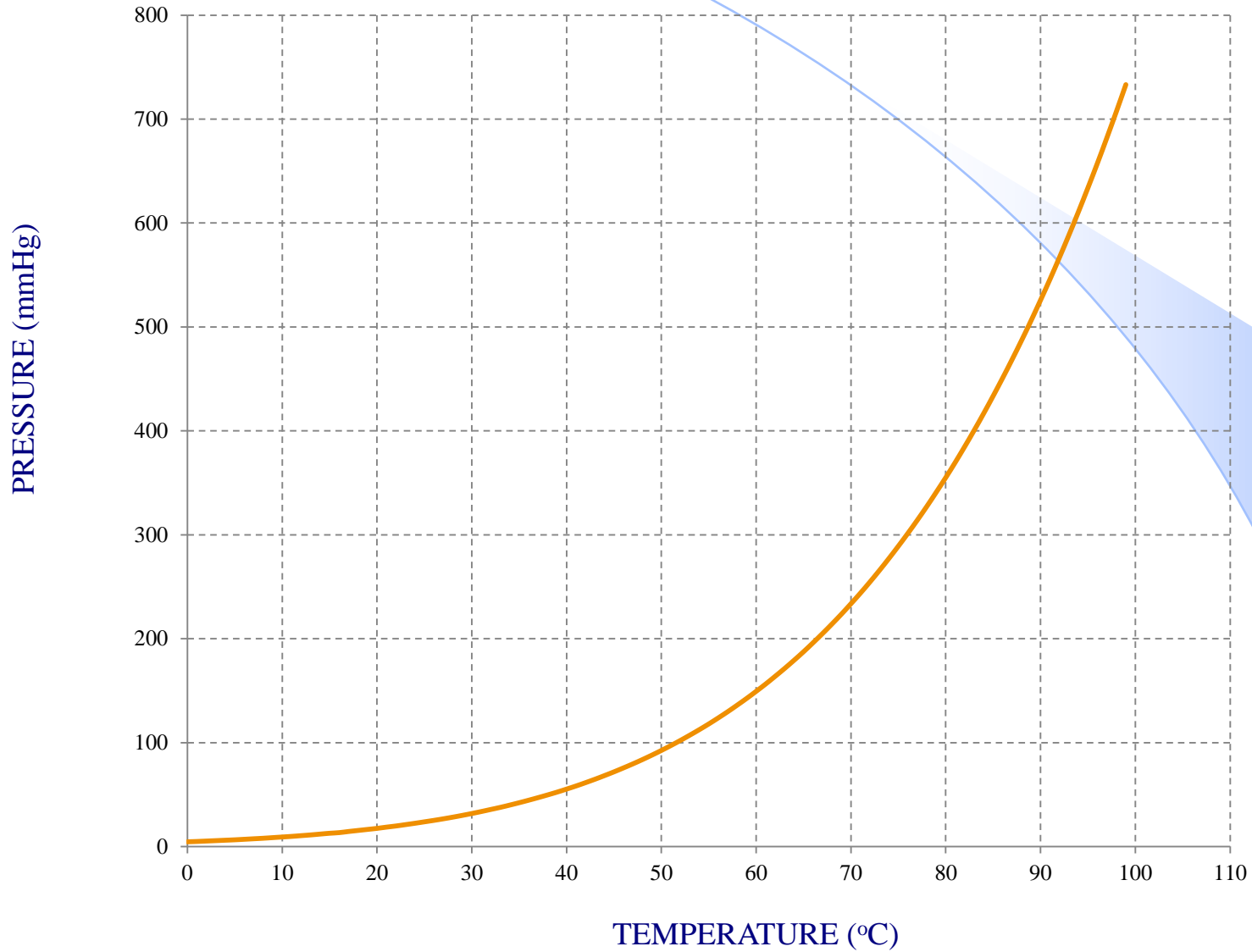
Board sheets of 2.1 x 0.9 m (1.89 m<sup>2</sup>)

6.0/5.0/4.0/3.0/1.5 kg/sheet

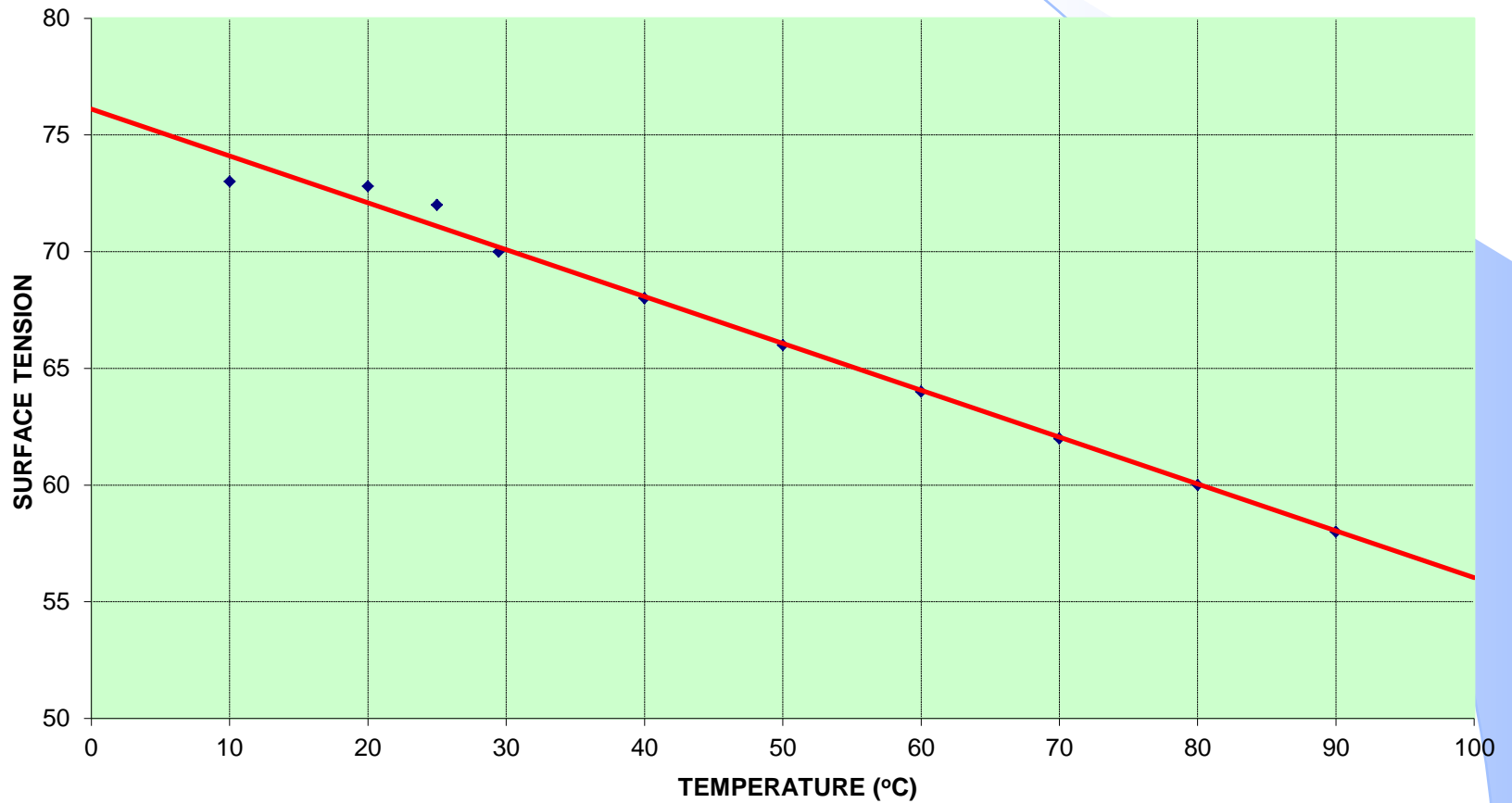
Basis weight: 793 - 3174 g/m<sup>2</sup>



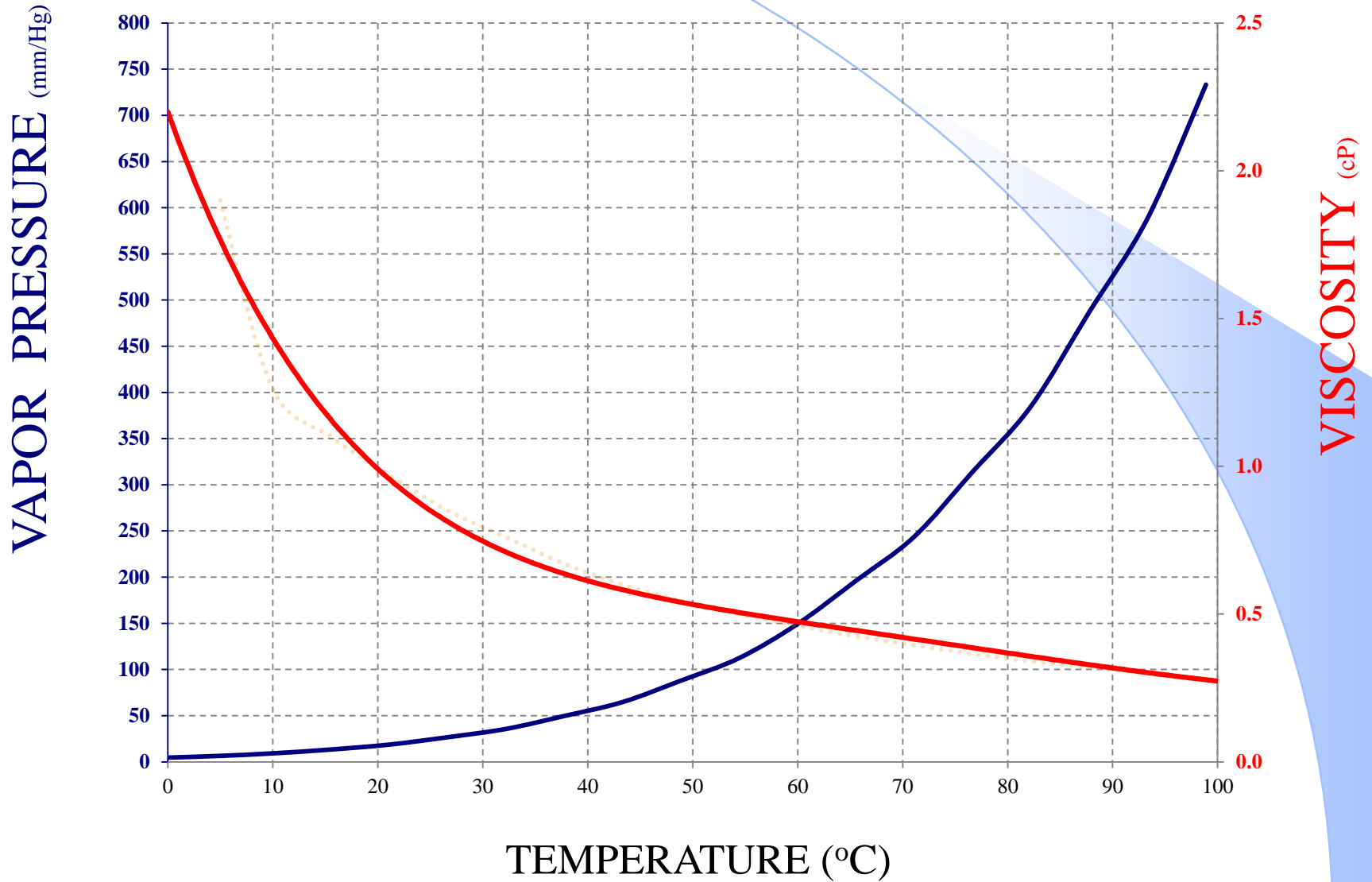
## WATER VAPOR PRESSURE



## SURFACE TENSION dynes/cm



# VAPOR PRESSURE vs VISCOSITY

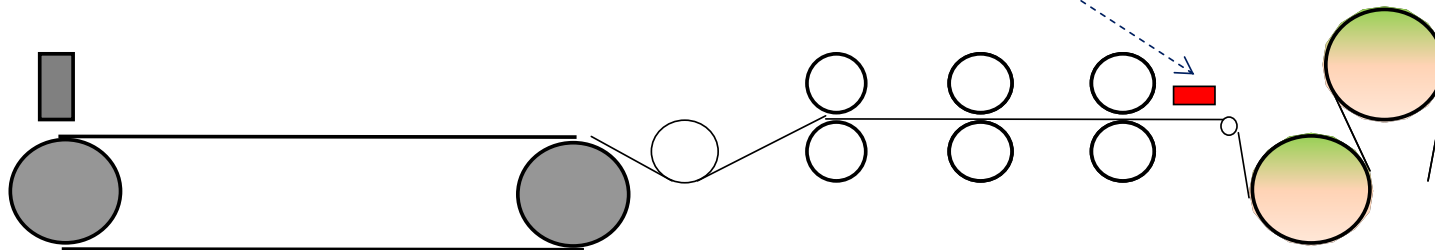




# BESTDRYER TO

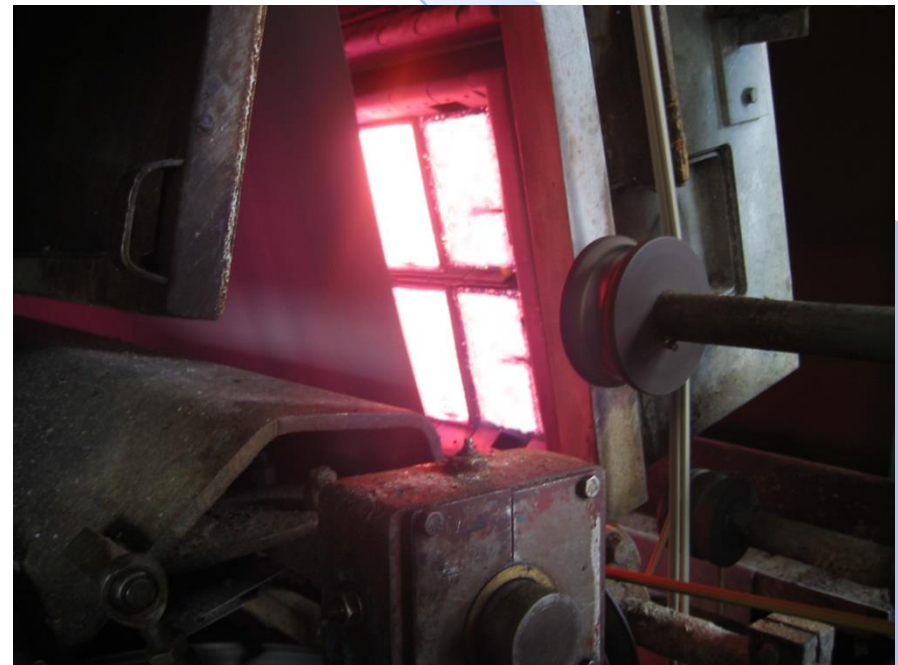
ELIMINATE PICKING AND HARD SURFACING

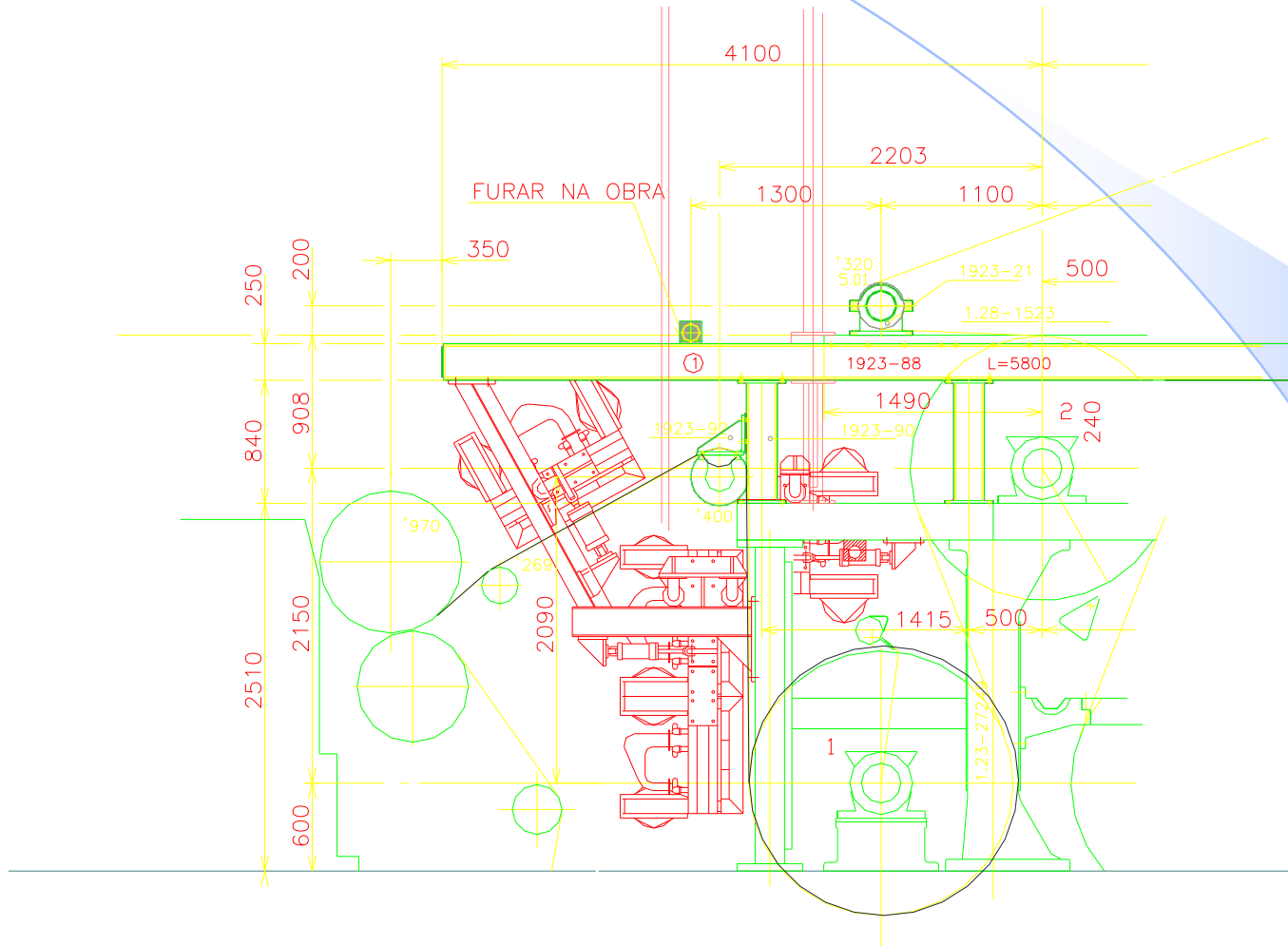
*Pre-Heating*



$$H=1.67D(\mu S/T)^{2/3}$$
$$T=2.2\mu S(D/H)^{1.5}$$

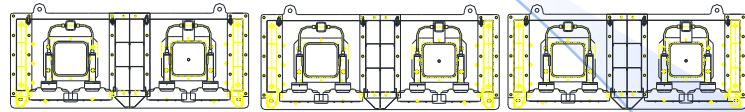




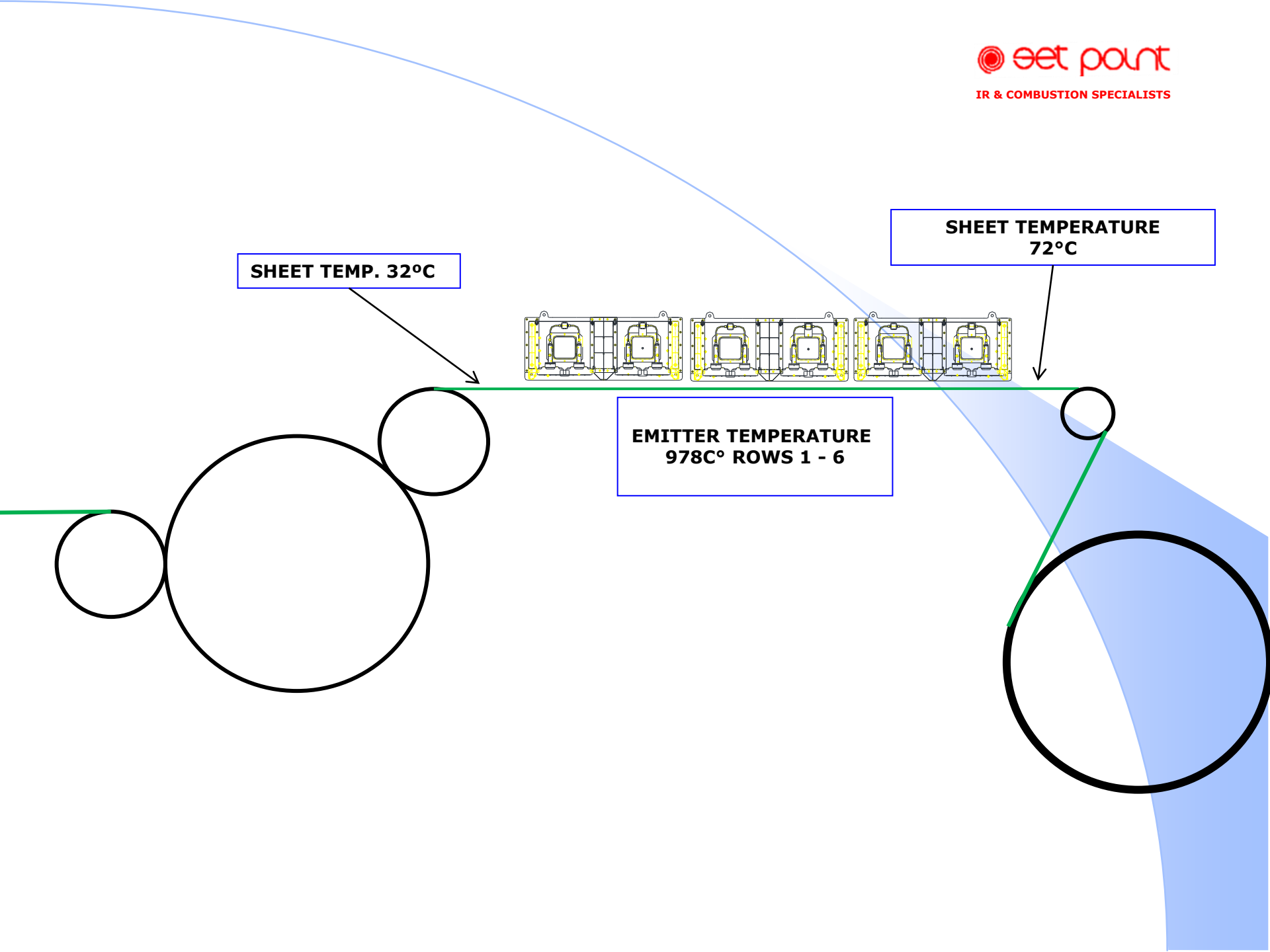


**SHEET TEMP. 32°C**

**SHEET TEMPERATURE  
72°C**



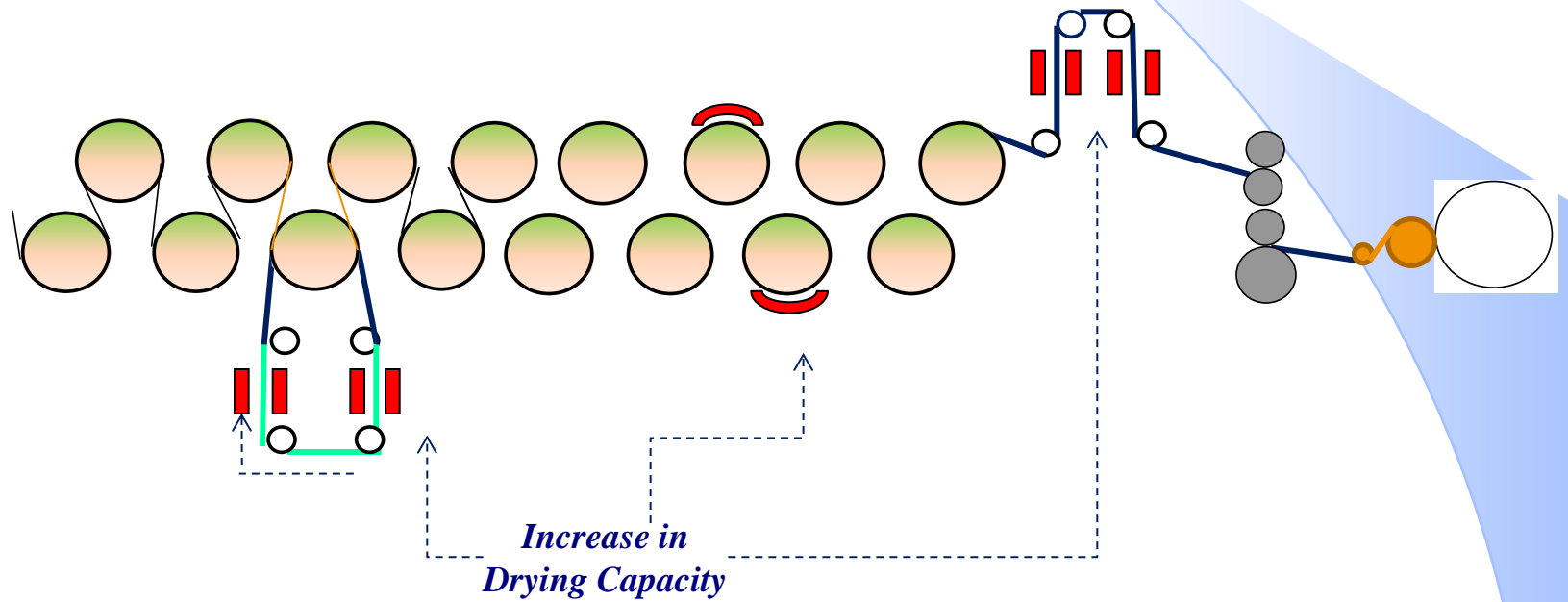
**EMITTER TEMPERATURE  
978C° ROWS 1 - 6**

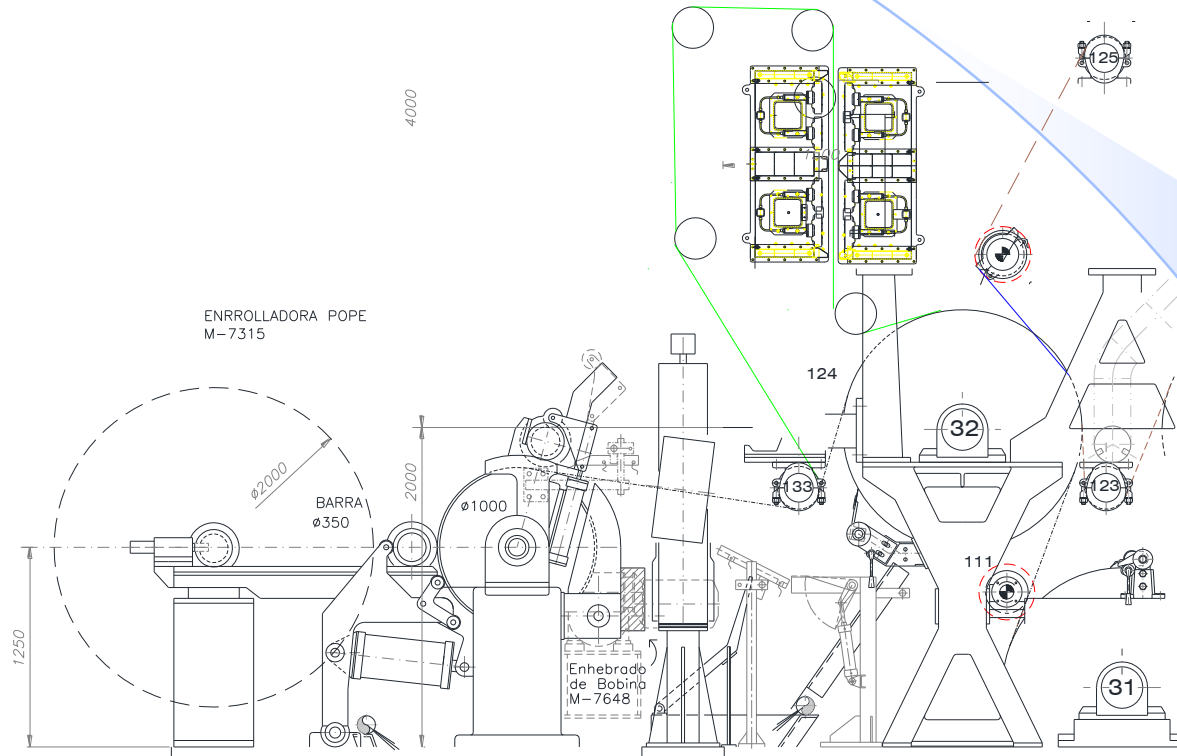


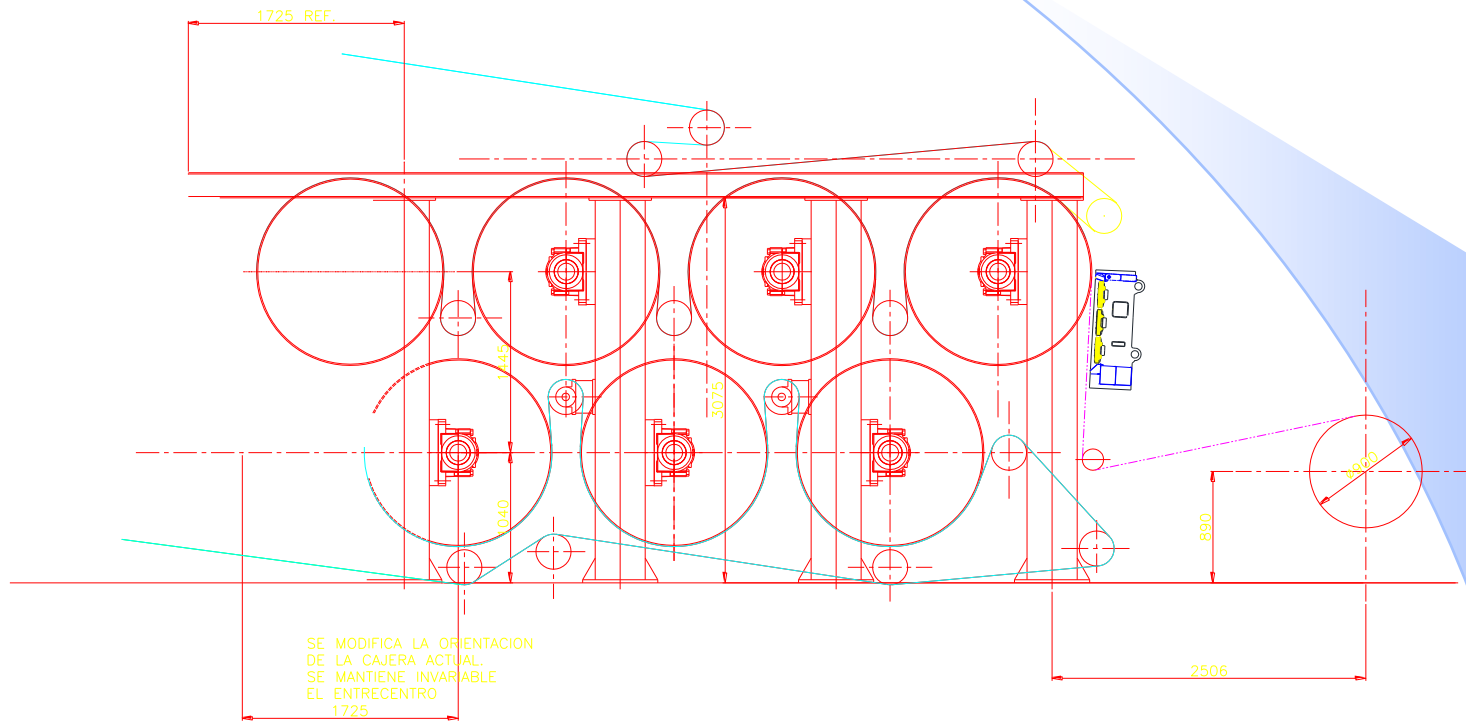
# PM DRY END

## IR ENERGY

TO INCREASE DRYING CAPACITY

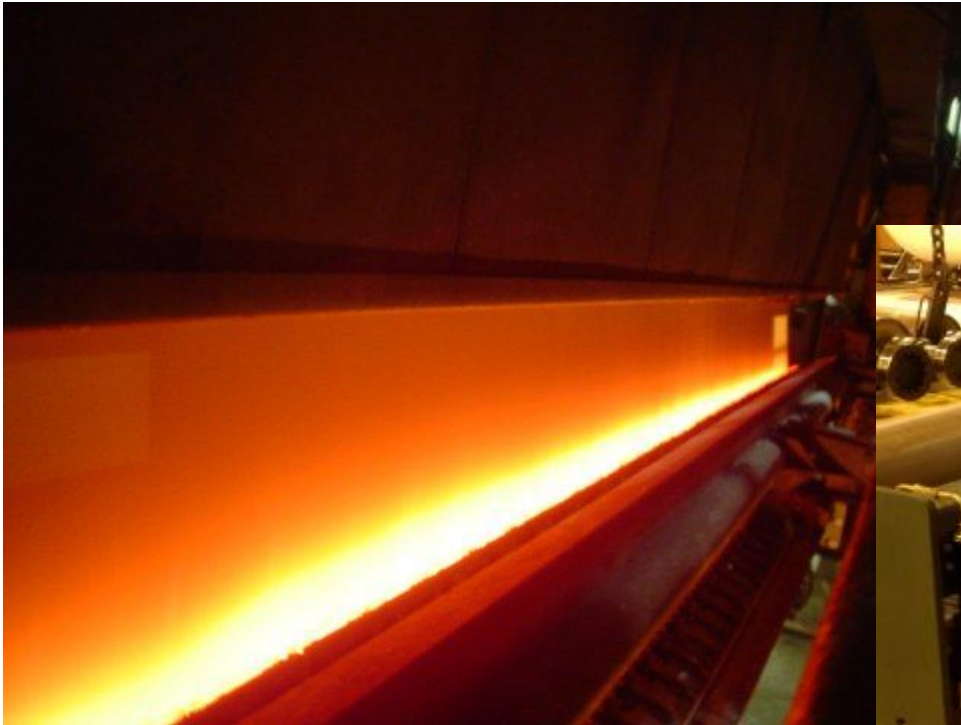








## PRODUCTION INCREASE – COATED BOARD



## PRODUCTION INCREASE – LINER & MEDIUM



# DRYING OF CELLULOSE



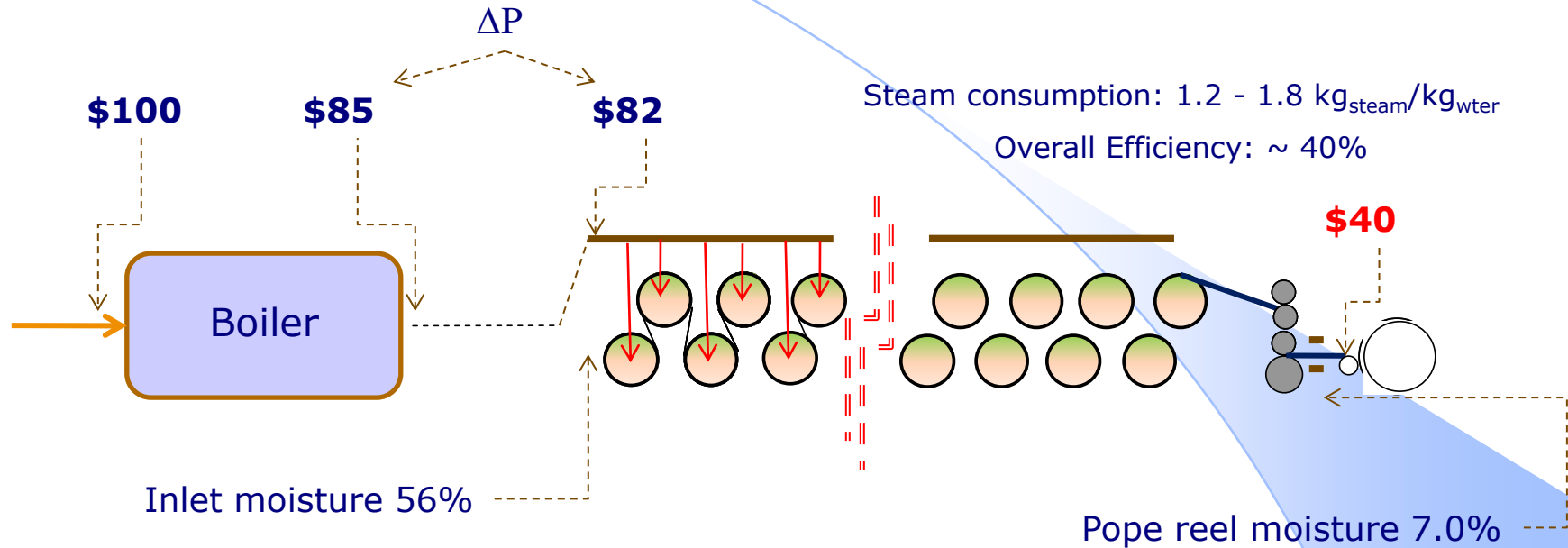
100% INFRARED  
White Cellulose



## PRODUCTION INCREASE –BOARD



## EFFICIENCY OF A STEAM DRYING SYSTEM



Boiler efficiency depends upon numerous factors: excess air, flue gases temperature, working pressure, temperature of fuel, combustion air temperature, etc.

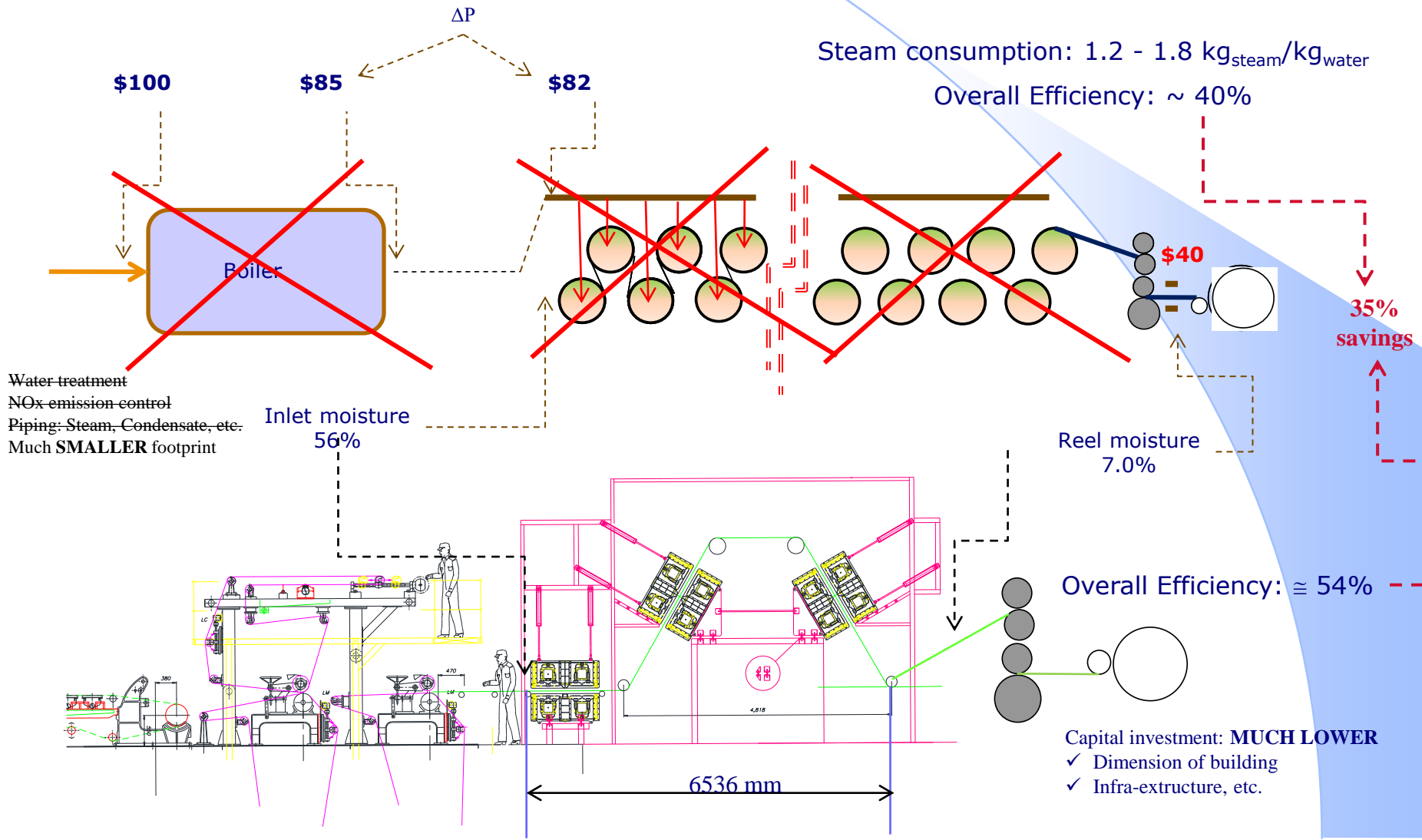
Excess air has a decisive importance:

Excess air (%)	Boiler Efficiency (%)
10	84.8
100	78.5
140	75.0

# EFFICIENCY: IR vs STEAM

DRYING OF LINER/MEDIUM/BOARD

50 tons/day



# DRYING OF LINER/MEDIUM

**100% INFRARED  
NO BOILER!**

