

# Substitution of Electricity by Natural Gas in Textile Stamping Machine: A New Technology

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Venue: Brazil

Patron



Host



Host Sponsor



# Textile Stamping in Santa Catarina

## Santa Catarina State:


- Population: around 6 million inhabitants;
- Natural Gas consumption of 1.9 million m<sup>3</sup>/day;
- Gas infrastructure with 950 Km of pipelines.

## Textile Stamping Industry in Santa Catarina:

- The second largest production of textile stamping in Brazil;
- 500 stamping machines (2000 dryers).



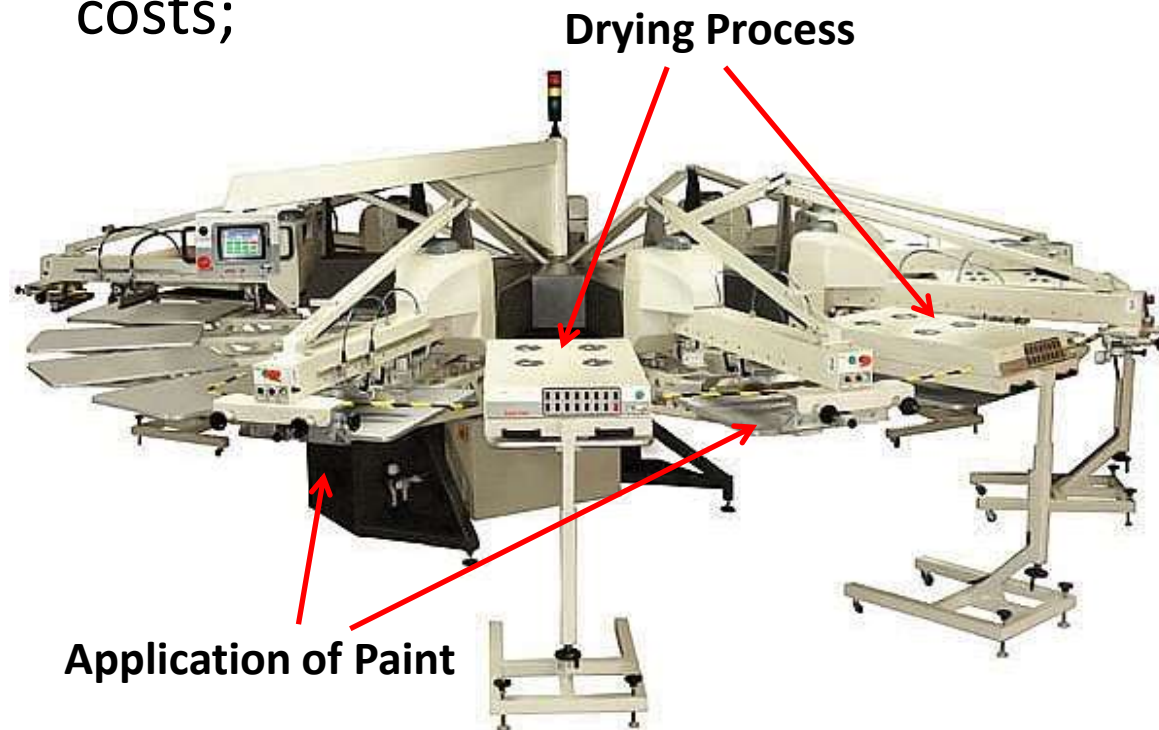
Localization of Textile Stamping Industry:

 North and Vale do Itajaí Region (78% of total textile stamping Dryers)

 South Region (12% of total textile stamping Dryers)

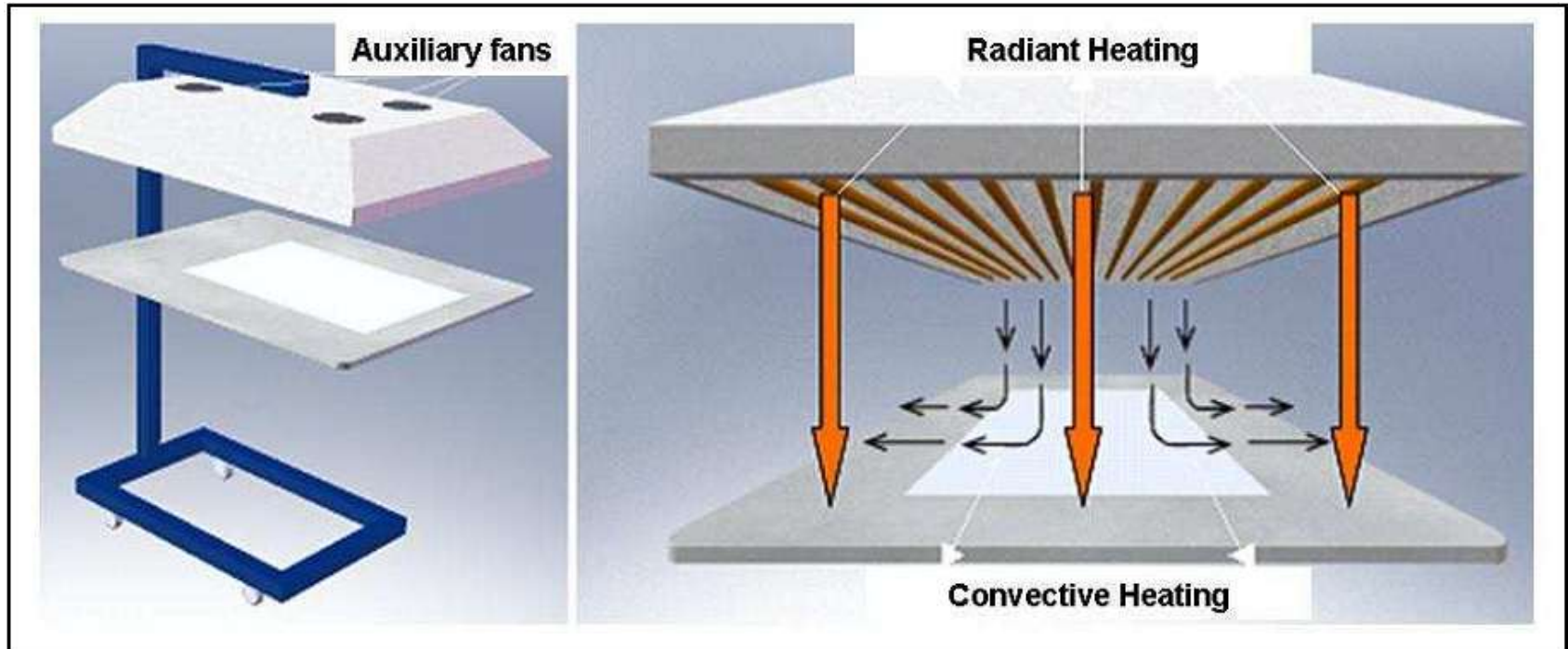
# Research Project Aim

- **Objective:** Develop a technological solution for the replacement of electricity by natural gas in the drying process of textile stamping machines to reduce production costs;

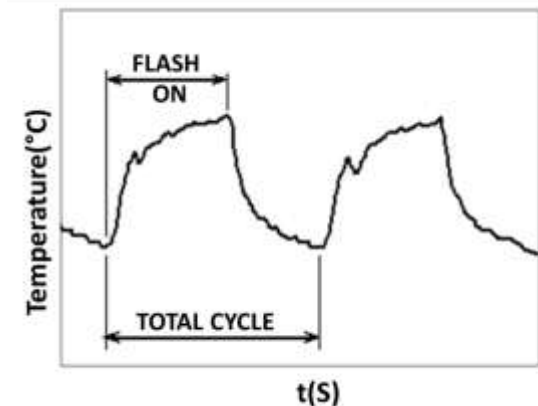


**Final Product**

# Textile Stamping Machine: Drying Component

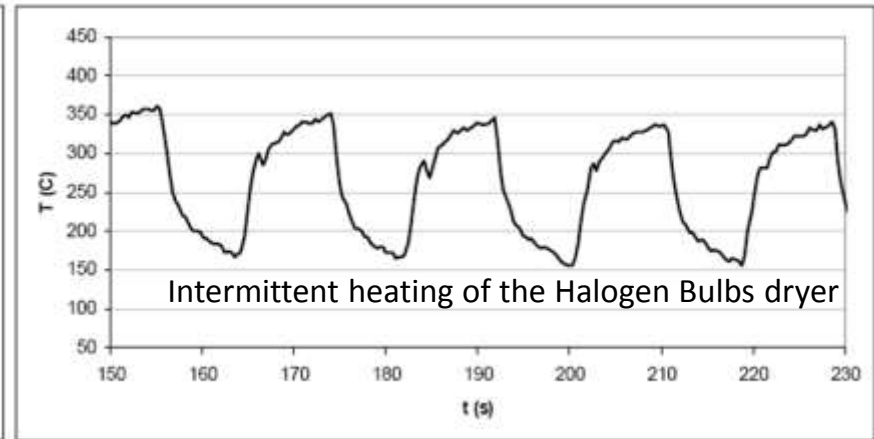
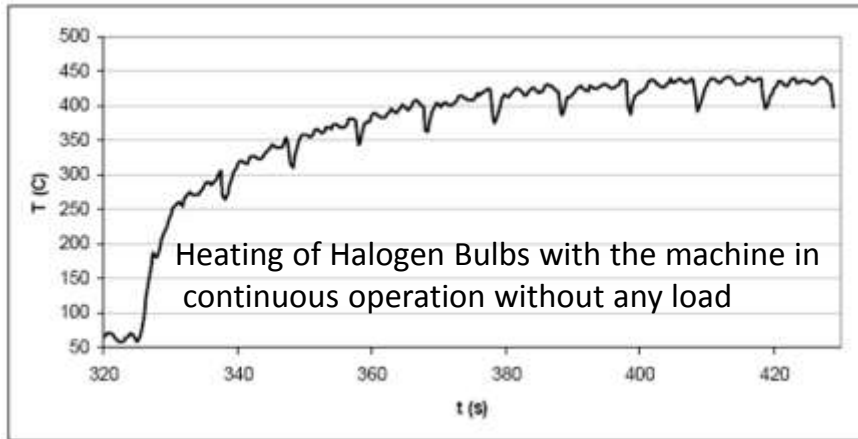


- Intensive use of electrical energy;
- Radiant and Convective Heating;
- Temperature and time control;
- Drying by Flash Cure - Halogen Bulbs;

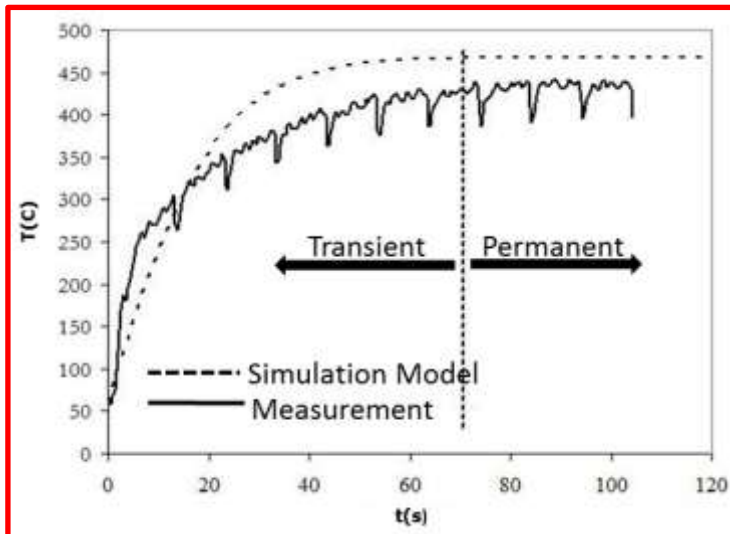


# Experimental Thermal Evaluation

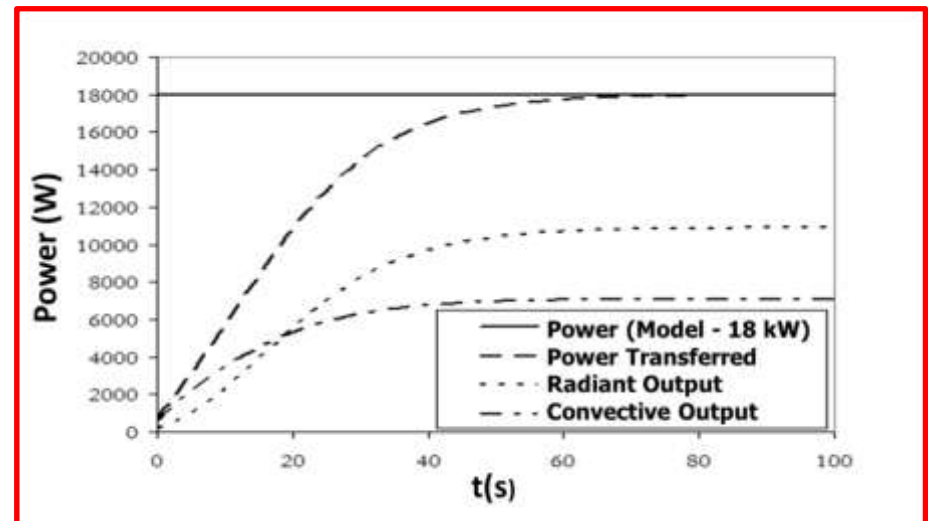
## Heating of Halogen Bulbs



## Simulation model x Measurement



## Power evaluation of Halogen Bulbs heater

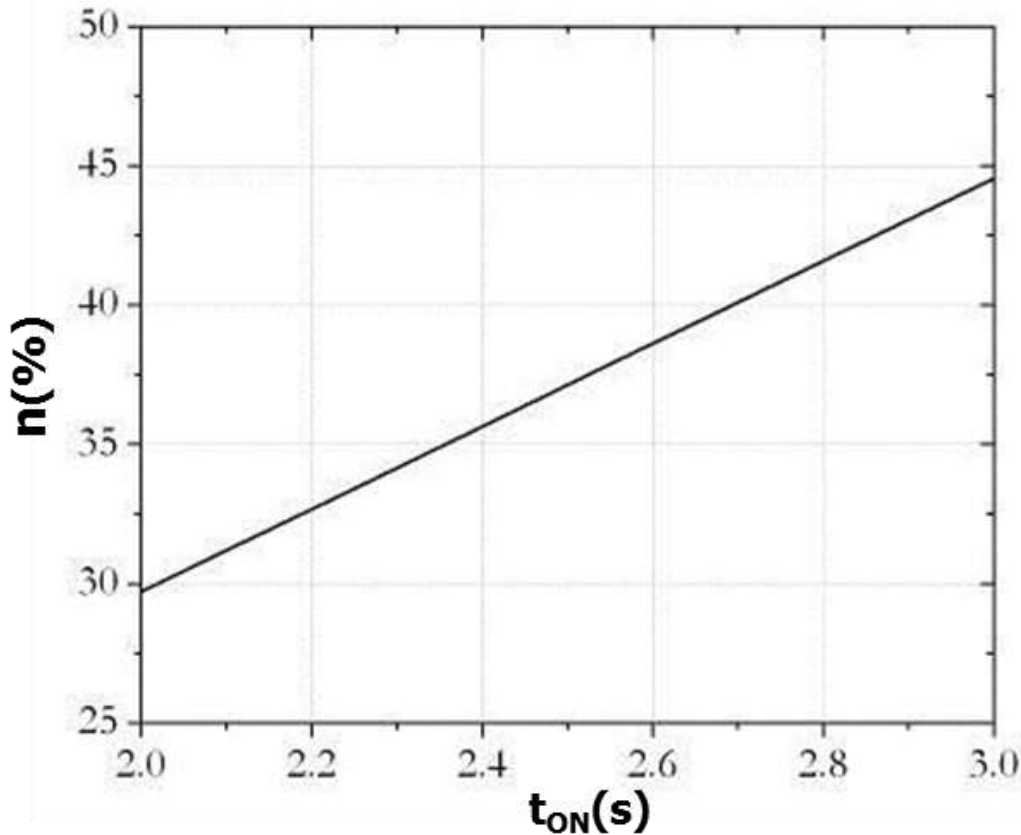


## Porous Radiant Ceramic Burner



Requirement	Halogen lamps Electric	Porous Radiant burner Gas Last Prototype (2012)
Power (kW)	18	9.5
Operation cost per heater (US\$/h)*	1.30(50% Cycle)	0.54
Local emission of pollutants	-	Low
Regime of operation	Transient	Permanent
Allows transient operation	Yes	Yes
Contact of combustion products with the piece	-	Very Low
Modifications on the current form of operation	-	Yes
*Natural Gas price was 0.5553 US\$/m <sup>3</sup> ; Electricity price was 0.1445 US\$/KWh.		

# Simulation Case – Textile Partner Company



Percentage of electrical energy consumption in Stamping Sector

## Characteristics of Stamping Sector:

- 121 dryers, making up 1257 halogen bulbs;
- 11 dryers - electrical resistance model;
- 1,667 KW of total electrical Power;

## Operating conditions:

- Three 8-hour shifts;
- 5 days a week;
- Heater production cycle of 6s (3s of Flash On);

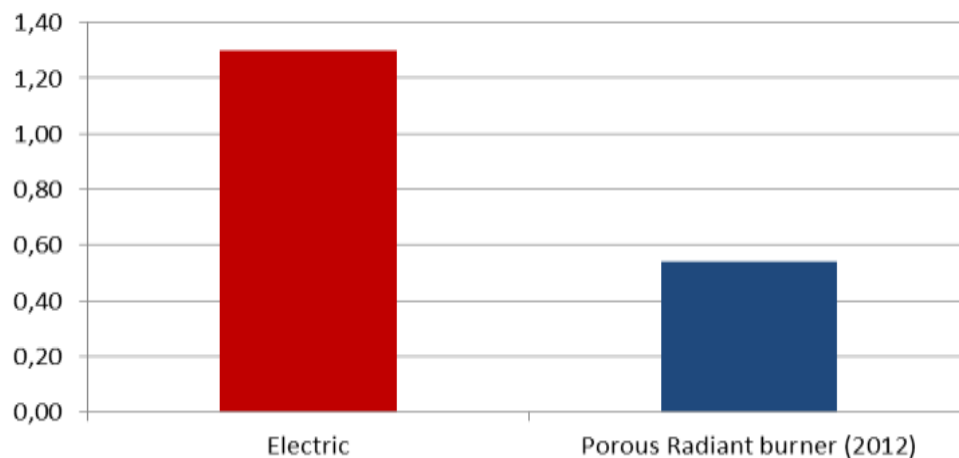
# Results and Economy Forecast

## Expected Consumption of Natural Gas in Textile Partner Company

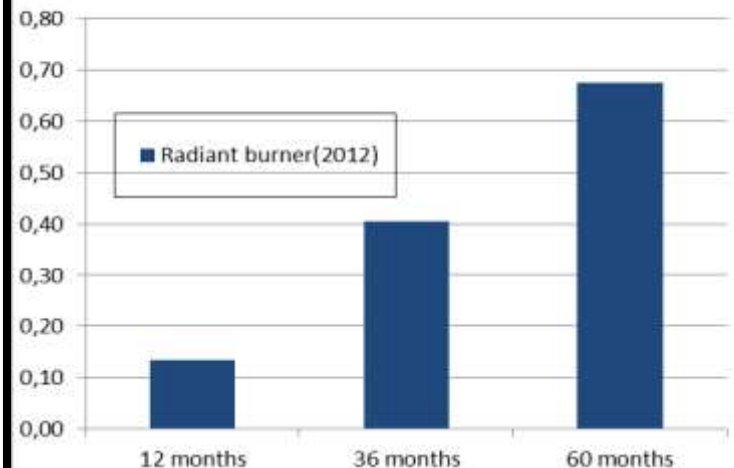
<b>Solution Model</b>	<b>Radiant burner Prototype (2012)</b>
<b>Consumption (m<sup>3</sup>/day)</b>	<b>2,020</b>

Reduction in contracted demand: 700 KW.

### Operation Cost (US\$/hour)



### Economy Forecast (U\$ million)





# Conclusion

## **Textile Stamping Machine operating on Natural Gas provides:**

- **New technological alternative with up to 58% reduction of energy costs;**
- **Good drying quality (same drying quality as the electric dryer);**
- **Rational use of energy with the contribution to diversify the Brazilian energy matrix (electric power: noble input).**

# Thank you

**Project Partnerships:** Santa Catarina Gas Company (SCGÁS), Federal University of Santa Catarina(UFSC) and a Partner Company of Textile Stamping Industry;



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