

Heat steel plates of various thicknesses on the same line

Objective To heat steel plates of various thicknesses to temperature on the same line

Material

- Steel plates that are 8 feet (2.4m) wide by 20 feet (6m) long with thicknesses ranging from 0.25"-1.65" (6.4-41.9mm)

Temperature 1650 °F (899 °C)

Frequency 1-100 kHz

Equipment

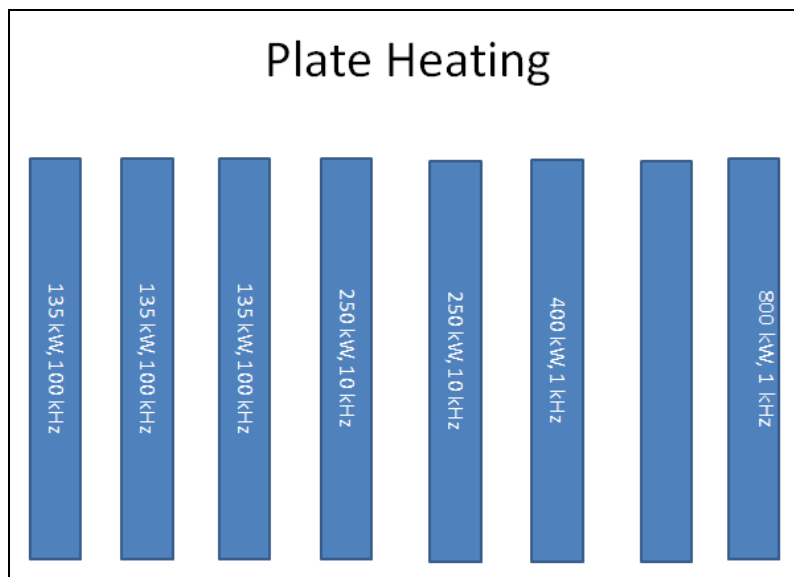
- Ambrell (1) EKOHEAT 800kW/1 kHz, (1) 400kW/1 kHz, (2) 250kW/10 kHz and (3) 135kW/100 kHz power supplies
- A series of coils in-line for each induction heating system

Process A line consisting of 7 Ambrell induction heating systems will be set up, with the part entering the coil of the EKOHEAT 800kW/1 kHz and moving along in-line to progressively less powerful/higher frequency systems. This arrangement is due to the variation in thickness among the plates which must run in the same line. Thin plates will run at a more rapid speed, while thick plates will run at a slower speed.

With heating occurring above curie, the result is a considerable change in load at that point. Additionally, the depth of heating grows significantly above curie. This results in lower frequency systems not being able to heat thinner plates effectively. For that reason, higher frequency power supplies were needed in this line too.

Results/Benefits

- Versatility: This in-line system enables the client to heat plates with significantly different thicknesses
- Speed: While the feet per minute varies considerably based on the thickness of the part, induction is a fast method of heating steel plates to temperature
- Precision: Induction offers the precision and control necessary to heat plates of varying thicknesses in the same line to the same temperature



A sketch of the in-line plate system, with the plate entering from the right

Plate Calculations

Thick ne(in)	Min Frequ ency < 1350F kHz	Freque ncy >1350F kHz	Speed Feet per minute	Energy used for 1350F, kW	Energy required to heat from 1300F to 1650F, kW	Total Energy Requir ed, kW	
0.25	0.42	42	2.25	900	200	1100	
0.5	0.1	10.4	1.5	900	400	1300	
0.75	0.05	4.6	0.75	1100	500	1700	
1.0	0.03	2.6	0.75	1200	700	1900	
1.625	0.01	1	.5	1200	700	1900	

The required energy and feet per minute run rates vary considerably based on the thickness of the plate