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Datapaq Furnace Tracker System for Continuous Heat Treatment Furnaces

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The Importance of Temperature Profiling in Aluminium Heat Treatment Processes (Solution Treatment, Quenching and Age Hardening).

Furnace Tracker System for aluminium wheel heat treatment monitoring

Today, many high-volume production foundries use continuous furnaces for the heat treatment of castings. Cylinder heads, wheels, suspension components and many other aluminium alloy products are placed in wire product baskets and treated in pusher or roller hearth furnaces.

Temperature has to be carefully controlled in the various heat treatment cycle stages in order to make sure the end product complies with design requirements.

The typical heat treatment process parameters are temperature, the time the castings remain in the furnace and the time from when they leave the solution treatment stage until they enter the quench tank.

Typical heat treatment processes, known as T6 and T7, involve a solution treatment, followed by air or water quench and, lastly an accelerated age hardening phase.

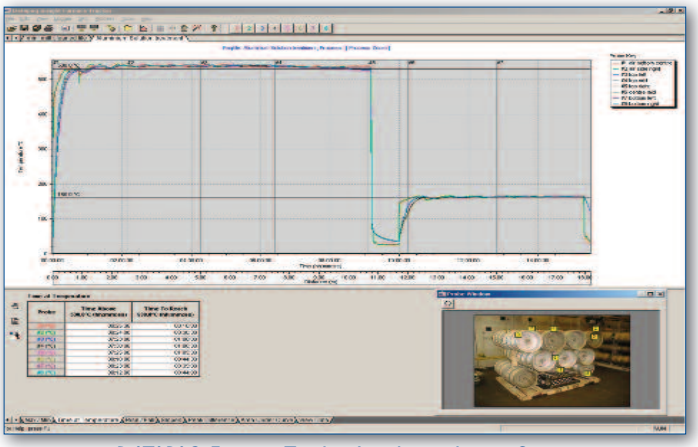
Age hardening is a very important and delicate stage as it defines the mechanical properties of the processed material (such as the breaking load, limit of proportionality, extension and strength).

Accurate temperature monitoring is therefore vital in order to make sure the client's product specifications are met.

Automatic management of continuous furnaces is normally based on the forced circulating air temperature, which is only indirectly related to the actual temperature of the processed product.

Alternatively, the temperature may be measured by trailing thermocouples, appropriately placed in the castings. However this is only feasible for monitoring semi-continuous furnaces, not for continuous furnaces, particularly if they are divided into several stages.

In such cases, which are very frequent in actual foundries, 'in-process' control is the only feasible method for monitoring product temperature.



DATAPAQ Furnace Tracker Insight analysis software

These are measurement systems, like the Datapaq system, that are placed in the product baskets which carry the castings in the furnace. They can read and store analogue signals from up to 10 temperature sensors (thermocouples), placed at strategic points in the basket/castings.

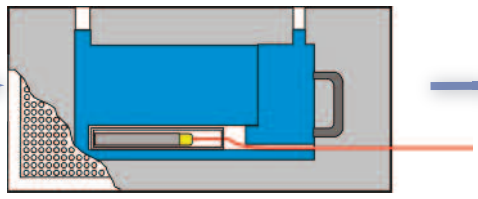
The Datapaq system has a battery which provides enough energy to profile a complete process cycle with a minimum 3 second sampling rate.

SOLUTION TREATMENT ➔ QUENCHING ➔ AGEING

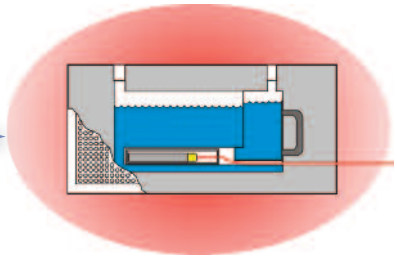
The logger, that stores the data in the memory after analogue to digital conversion, is protected by a protective thermal barrier. This barrier is made of a highly efficient insulating material that can withstand high temperatures for long periods of time and submersion in the water quench.

When the heat treatment cycle is over, the stored temperature data may be retrieved and displayed by simply transferring them from the logger memory to any personal computer.

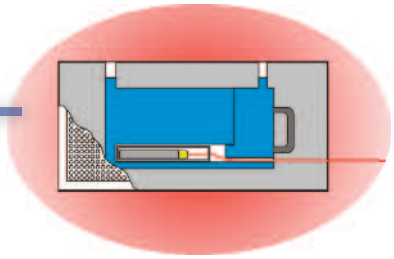
***1** - Program the data logger*



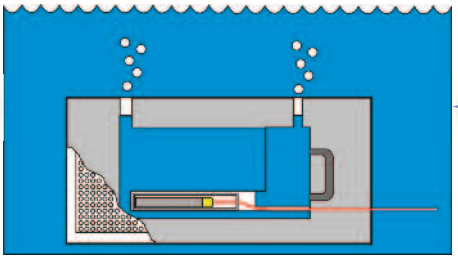
***2** - Place the logger in the thermal barrier, fill the barrier with water and attach the thermocouples to the product*



***3** - The water boils and evaporates during the solution treatment process*



***4** - The barrier is filled with water again during the quenching stage*



***5** - In the ageing furnace*

***6** - The data logger is removed and the thermal profile analysed*

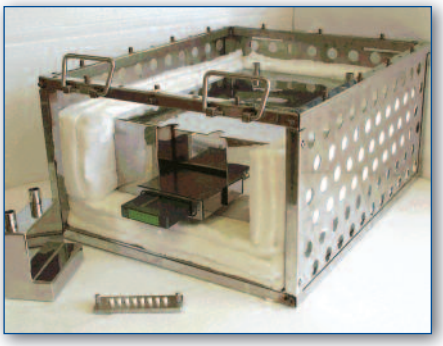
Data analysis is made easy with Datapaq's user friendly Insight analysis software, available in Chinese and Japanese as well as English and many other languages.

If your process requires real-time temperature monitoring, a telemetry option is available which remotely transfers data through radio frequency transmission.

For companies like Teksid Aluminum, which aim to achieve competitive excellence for their processes/products, using systems like this is a must.

To summarise, the Datapaq system allows you to:

- Guarantee that heat treatment specifications are adhered to
- Check thermal consistency during the various cycle stages
- Prevent defects attributable to the way heat treatment is performed
- Meet all the requirements laid down in the EN ISO 9001 and ISO/TS 16969 standards
- Streamline the heat treatment process to achieve relative quality which can be sustained in the long term (cost/benefit trade-off), rather than quality at any price



Datapaq offers complete, user friendly and reliable solutions for most heat treatment processes. A Datapaq system enables 'in-process' parameter monitoring and allows you to streamline the manufacturing process with your product and, therefore your end customer in mind.

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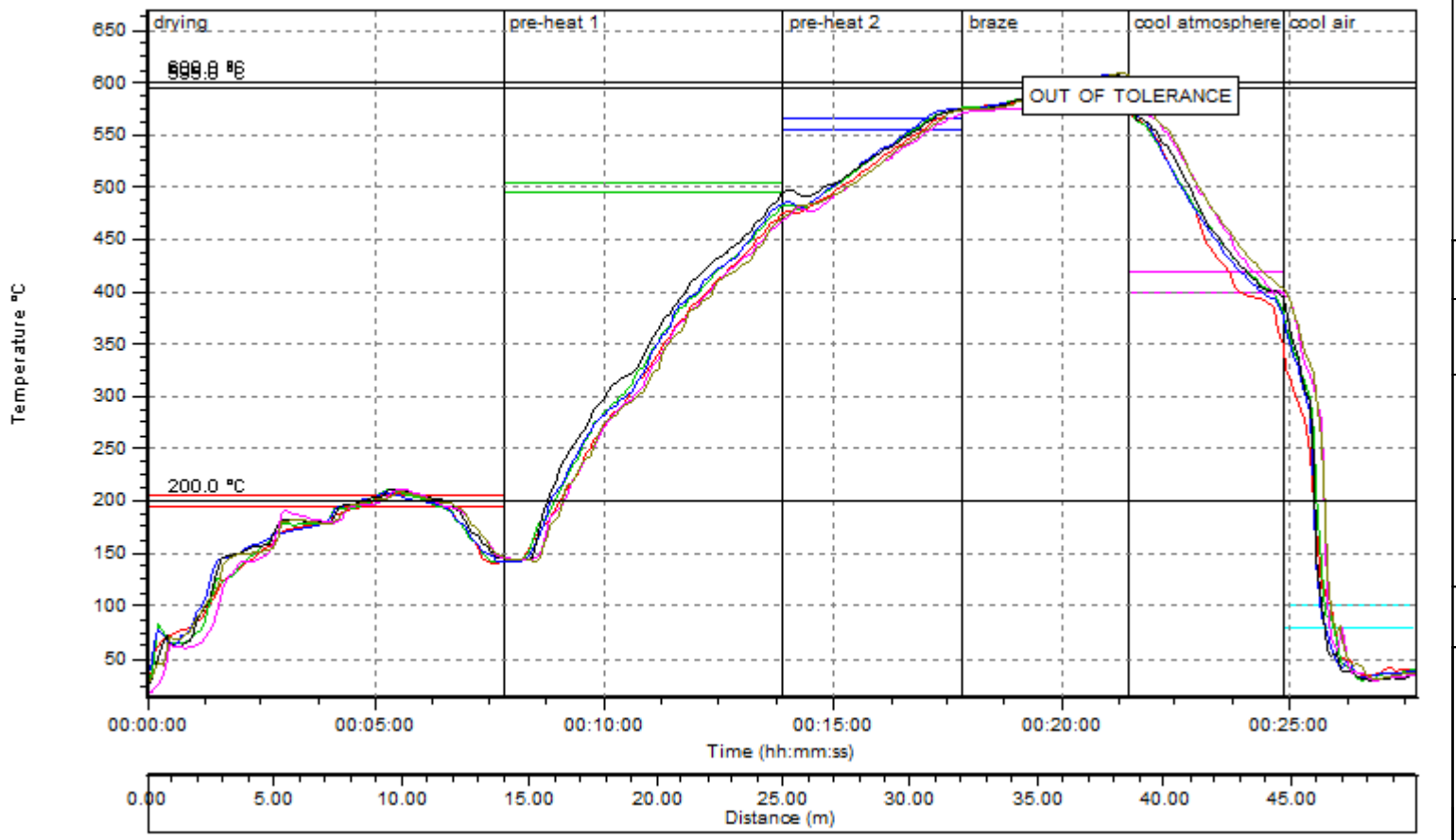
File: Aluminium Braze - Nocolok.paq	Company: Datapaq	
Site: Cambridge / Process:	Product: condensor	Data Collection Details:



Line Speed:	Zone:	drying	pre-heat 1	pre-heat 2	braze	cool atmosphere	cool air
1.80 m/min	Length (m):	14.05	10.97	7.02	6.50	6.13	5.36
	Upper (°C):	205.0	505.0	565.0	600.0	420.0	100.0
	Lower (°C):	195.0	495.0	555.0	595.0	400.0	80.0

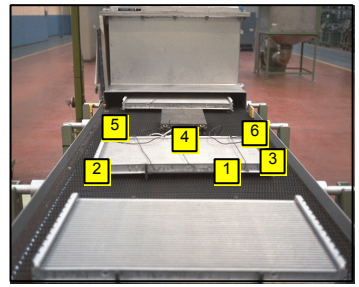
Created By	Download
Number of Probes	6
Sample Interval	0:05.00 (mm:ss.t)
Data Loaded	17/06/2011 13:15:00
Collection Started	17/06/2011 11:08:28
Max. Internal Temp.	95.3 °C
Logger ID	#1057
Operator	EEC
Process	
Furnace	
Recipe	
Product	condensor
Time Printed	17/06/2011 11:01:55

Notes:

Typical run in furnace for
brazing aluminium condensors
Drying/Pre heat section in this furnace

DATAPAQ
A Fluke Company

Probe Map:



Probe	Maximum / Minimum				Time at Temperature				Slopes		Peak Difference			Area Under Curve	
	Maximum (°C)	Max. Reached (hh:mm:ss)	Mean (°C)	Deviation From 0.0°C	Time Above 600.0°C (hh:mm:ss)	Time To Reach 600.0°C (hh:mm:ss)	Time Above 595.0°C (hh:mm:ss)	Time To Reach 595.0°C (hh:mm:ss)	Positive Slope (°C/min)	Mean Slope (°C/min)		Peak Difference (°C)	Time Reached (hh:mm:ss)	Area (°C)hr	Area (Zoom) (°C)hr
#1 (°C) OUT PIPE	604.1	00:21:00	331.3	+604.1	00:00:35	00:20:40	00:00:50	00:20:30	138.60	10.29				150.01	147.01
#2 (°C) FORWARD LEFT	606.7	00:21:05	336.6	+606.7	00:00:55	00:20:30	00:01:20	00:20:05	291.00	10.59				152.38	149.49
#3 (°C) FORWARD RIGHT	607.1	00:21:00	336.6	+607.1	00:00:55	00:20:25	00:01:30	00:19:55	187.20	10.22	90.1	185.5	00:25:40	152.51	149.47
#4 (°C) CENTER	606.7	00:21:10	340.1	+606.7	00:00:55	00:20:30	00:01:25	00:20:05	195.00	10.24				154.12	151.11
#5 (°C) REAR LEFT	603.6	00:21:20	335.0	+603.6	00:00:35	00:21:00	00:01:05	00:20:35	175.20	11.35	275.6			151.88	148.74
#6 (°C) REAR RIGHT	608.0	00:21:15	337.9	+608.0	00:01:05	00:20:35	00:01:40	00:20:05	178.20	11.38				153.16	150.10