

**HEAT TREATMENT**

# **APM TUBES - TUBOTHAL CASE HISTORIES**

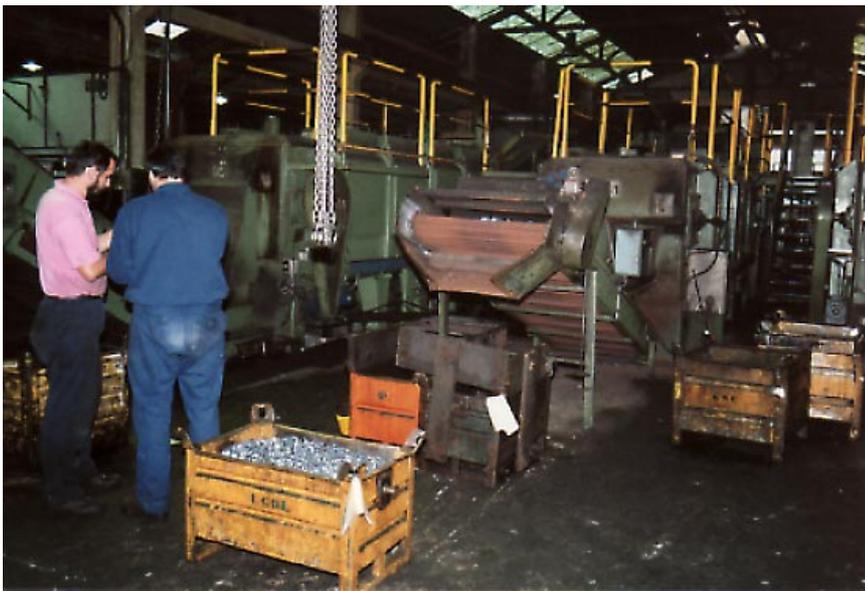
## **Tubothal and APM tubes help TTT to higher production and productivity**

GRUPO T.T.T., in the Bilbao area of Spain, is a group of companies specialised in heat treatment and surface treatment of metals.

One of their plants in Bergara, Tratamientos Térmicos T.T.T., S. A., is equipped with 15 different furnaces, among them 4 sealed quench for carbonitriding, 4 continuous link-belt for smaller parts like nuts and bolts and

a further 7 furnaces for various processes.

The company is certified according to UNE/EN/ISO-9002 and is mainly servicing the automotive and general engineering industry. The environmental program for the area promotes the use of electricity and since TTT is also a net producer of electricity, all furnaces except 4 are electrically heated.



*There are four electrically heated link-belt furnaces at T.T.T. for hardening of nuts and bolts. Each furnace has 12 Tubothal elements in the first zone rated at 5 kW in vertical position.*

### **Short life elements and tubes caused production problems**

The previous heating system used in most furnaces with nickel-chromium tubes and metallic spiral elements in grooved ceramics did not work



*Tubothal electric element with APM extruded radiant tube.*

because of numerous shut-downs to cool down the furnaces and change tubes and elements.

Kanthal in Bilbao was contacted to find a solution to the problems and they proposed the Tubothal-APM radiant tube system. This system comprises a high power, multi-shank, heavy gauge APM wire heater combined with a Kanthal APM radiant protection tube.

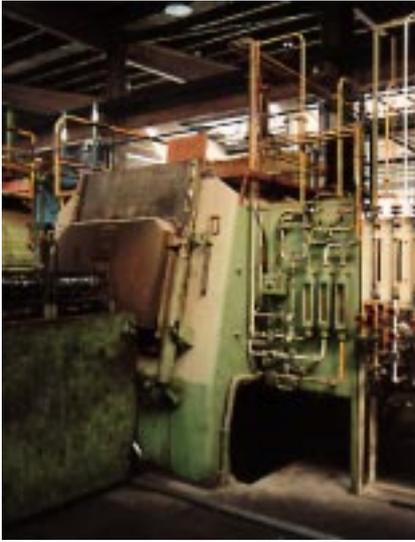
The first Tubothal-APM tubes were installed in December 1994 and since then, most furnaces have been converted



step-by-step to this system. Even the gas heated sealed quench furnaces are equipped with APM radiant tubes.

### Long life and high power

A primary advantage of the Tubothal-APM tube system is the formation of a



*This gas heated Ipsen TQ-11 is equipped with 14 APM tubes, 83 mm outer dia and 1640 mm long. The tubes have been in continuous operation since December 1994 and none of them is exchanged.*

cohesive aluminium oxide film on both the inner and outer surface of the radiant tube and on the heater material itself, thus the Tubothal elements remain free from contamination by internal scaling of the tube. The adherent alumina film formed on the outside of the tube is an extremely effective barrier against carbon activity and makes the tubes highly resistant to carburisation even in cases where free carbon is allowed to accumulate on the tubes. The system is thus ideal for use in heat treatment atmosphere furnaces.

The change over is very uncomplicated. The same tube diameter or closest standard diameter is chosen and the Tubothal heaters are calculated to the same or a higher power. The elements are connected directly on the mains supply and the same regulation system is used.

After three years of operation, it is quite clear that Tubothal and APM tubes have solved the problems for TTT. The production is running to schedule 24 hours per day without any unexpected down-time for tube- or element



*Two continuous hardening furnaces at 850°C with 6 Tubothal at 6.3 kW in the first zone and 6 at 4.2 kW. APM tubes 87 mm dia.*



*One rotating furnace with 24 Tubothal x 3.6 kW in the two first zones. The APM tubes are of 87 mm outer diameter.*

breakdowns. The system is also designed for a higher power, which contributes to faster furnaces and higher production.

The actual life of the system is not yet possible to calculate, since they are still in operation, but the lifetime so far outperforms nickel-chromium completely.

# KANTHAL

Kanthal AB

Box 502, SE-734 27 Hallstahammar, Sweden

Phone: +46 220 21 000 • Fax: +46 220 163 50

E-mail [info@kanthal.se](mailto:info@kanthal.se) Internet <http://www.kanthal.se/>

A Sandvik Company

© KANTHAL is a registered trademark of Kanthal companies in Sweden and other countries.