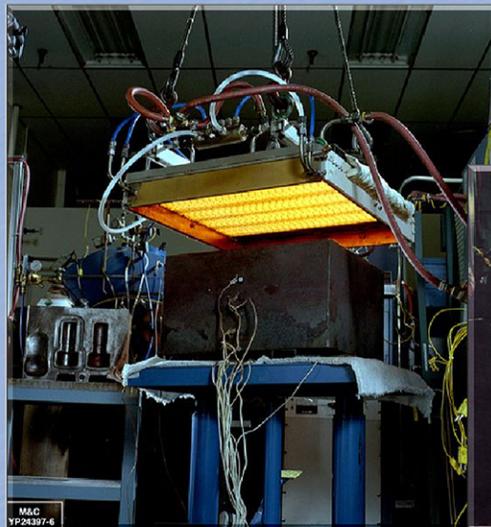


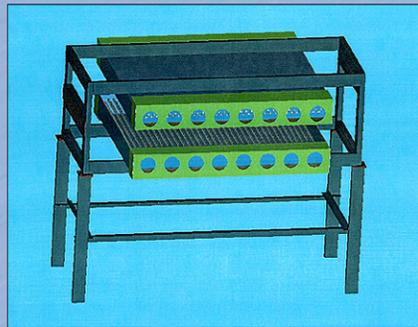
Advanced High Intensity Infra-Red Preheating of Steel Strip

Objective: Develop an energy efficient, on line, rapid heating system for preheating of steel strip

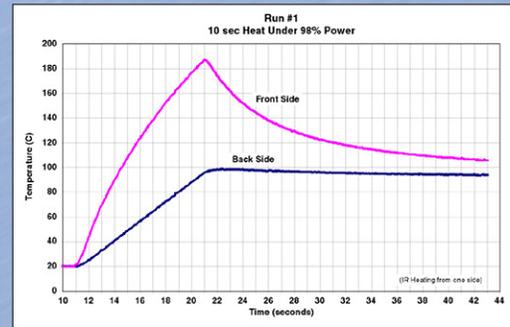
- Benefits:**
- high energy efficiency – high electrical energy conversion (greater than 90% to heat)
 - Improved productivity – enables increased throughput and more flexible processing



Prototype high intensity infra-red heating technology developed at Oak Ridge National Laboratory



Design of infra-red preheating system for in-line testing and evaluation at Weirton Steel Corporation



- Status:**
- feasibility demonstrated at **oml**
 - preheating system design completed
 - system being developed

Participants:



Research and Development Sponsored by
 Steel Vision, and Industrial Materials for the Future (IMF) Program
 Office of Industrial Technologies, Energy Efficiency and Renewable Energy;
 U.S. Department of Energy



Advanced High-Intensity Infrared Preheating of Steel Strip

Goal: Develop an energy efficient, on line, rapid heat-up system for preheating of steel strip.

Steel strip undergoes a hydrogen anneal prior to the galvanizing process. The steel strip is annealed in a hydrogen furnace at temperatures ranging from 700 to 760°C. The hydrogen environment is needed to produce steel sheet surfaces free from any oxide. The hydrogen annealing furnaces are extremely long in order for steel strip to reach the needed time at temperature and still meet the production speed requirements. Any further increase in strip production will require an online, compact, rapid preheating system. The Oak Ridge National Laboratory (ORNL) developed infrared based systems offer one such system for online rapid preheating of strip. The feasibility of strip preheating has been demonstrated at ORNL. The strip preheating using infrared furnaces was accomplished in air and any minor oxide formed during the air preheating is expected to be reduced in the hydrogen annealing furnace.

The preheating system for installation at Weirton Steel for online testing has been designed and is currently being fabricated.

The successful use of rapid infrared online preheating system has the potential of delivering several benefits including, high-energy efficiency (high electrical energy to radiant energy conversion, > 90% to heat), improved productivity and more flexible processing.

The **Oak Ridge National Laboratory** and **Weirton Steel** are partners in this project.

Contacts:

Craig Blue
Oak Ridge National Laboratory
1 Bethel Valley Rd.
Oak Ridge, TN 37831-6083

Phone: (865) 574-4351
E-mail: blueca@ornl.gov

Peter Angelini
Oak Ridge National Laboratory
1 Bethel Valley Rd.
Oak Ridge, TN 37831-6065

Phone: (865) 574-4565
E-mail: angelinip@ornl.gov

Vinod Sikka
Oak Ridge National Laboratory
1 Bethel Valley Rd.
Oak Ridge, TN 37831-6083

Phone: (865) 574-5112
E-mail: sikkavk@ornl.gov

Charles A. Sorrell
Department of Energy
EE-23
1000 Independence Ave. SW
Washington, DC 20585

Phone: (202) 586-1514
E-mail: charles.sorrell@hq.doe.gov