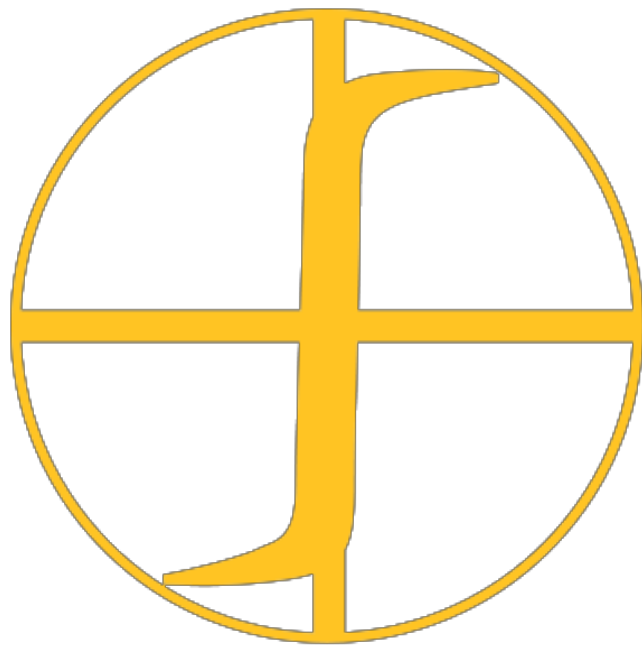




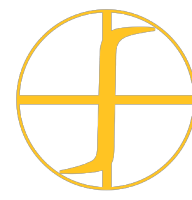
Advanced Induction Materials and Technology



O n l i n e I n d u c t i o n H e a t i n g C o u r s e

8 Case Story - Wheel Hub Heat Treating

by. Dr. Valentin Nemkov



Problem Description

Heated part:

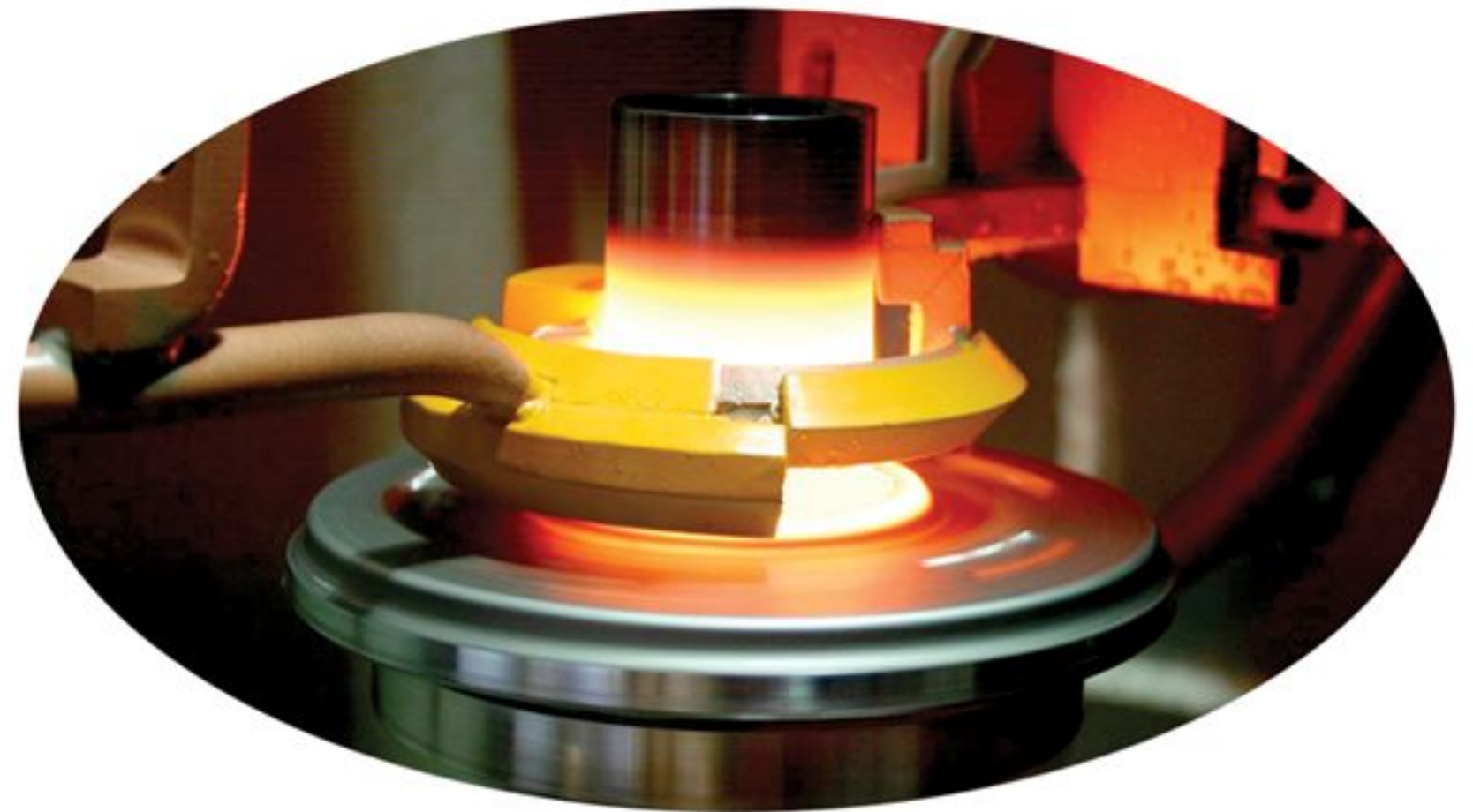
Single-race wheel hub

Problem:

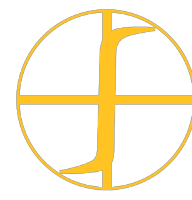
The Customer made contact due to the following:

- Short coil life – (8,000 – 13,000 pieces) resulting in:
 - Machine downtime
 - Unacceptable personnel time due to extended set-up
 - Scrap parts

Note: Inductor repair costs not a problem in this case due to manufacturer warranty



Typical process of induction heating of wheel hubs



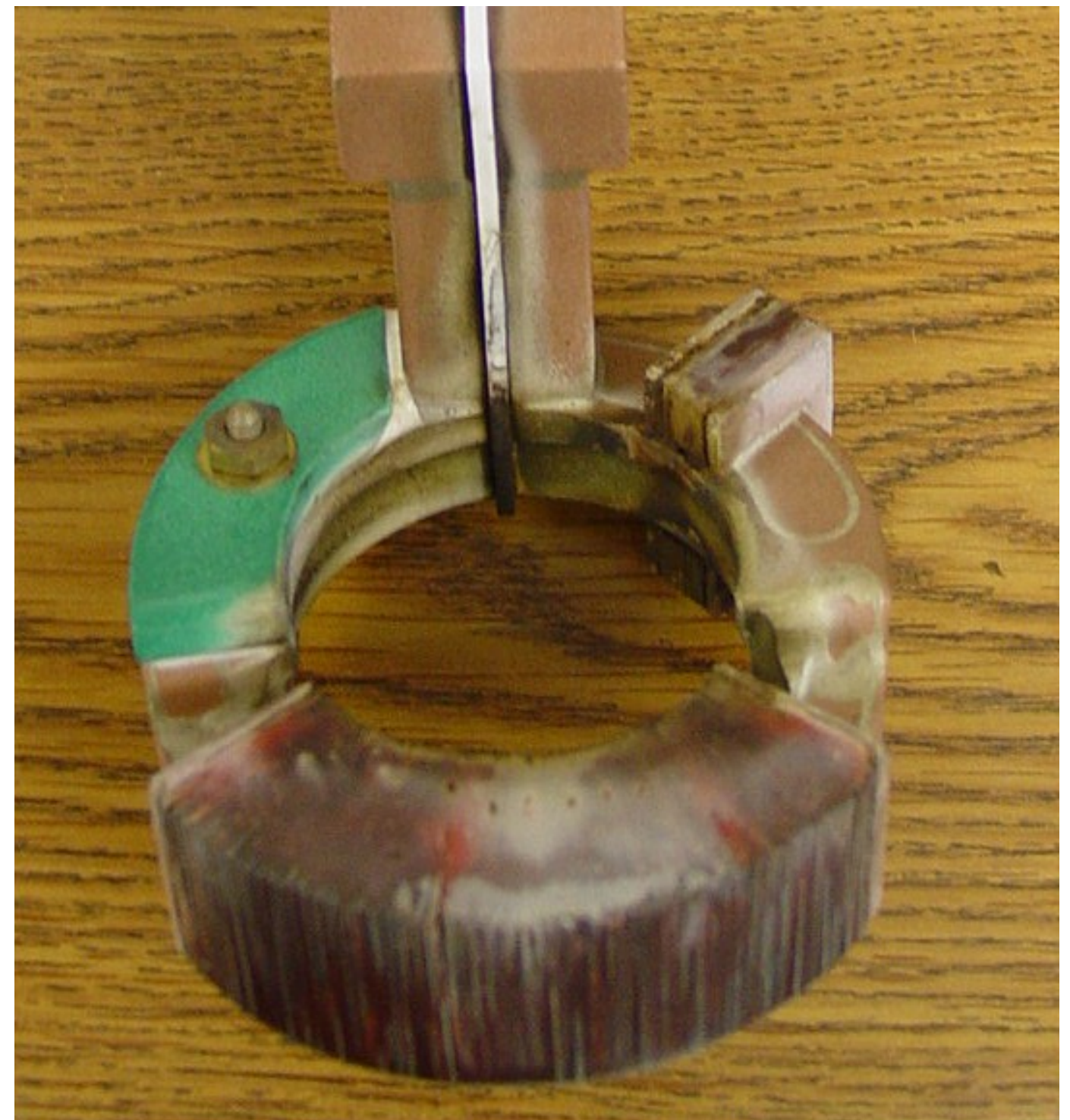
Step 1: Analysis of Inductor Failure

Coil failure modes:

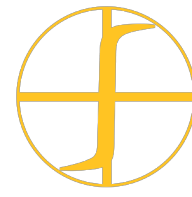
- Copper cracking under laminations due to overheating
- Lamination degradation

Previously attempted actions:

- Very high water pressure and flow rate did not solve the problem
- Partial installation of **Fluxtrol** “A” concentrator instead of laminations improved the situation but did not solve the problem

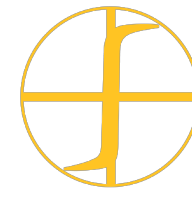


Old coil with partial replacement of laminations with **Fluxtrol** “A”

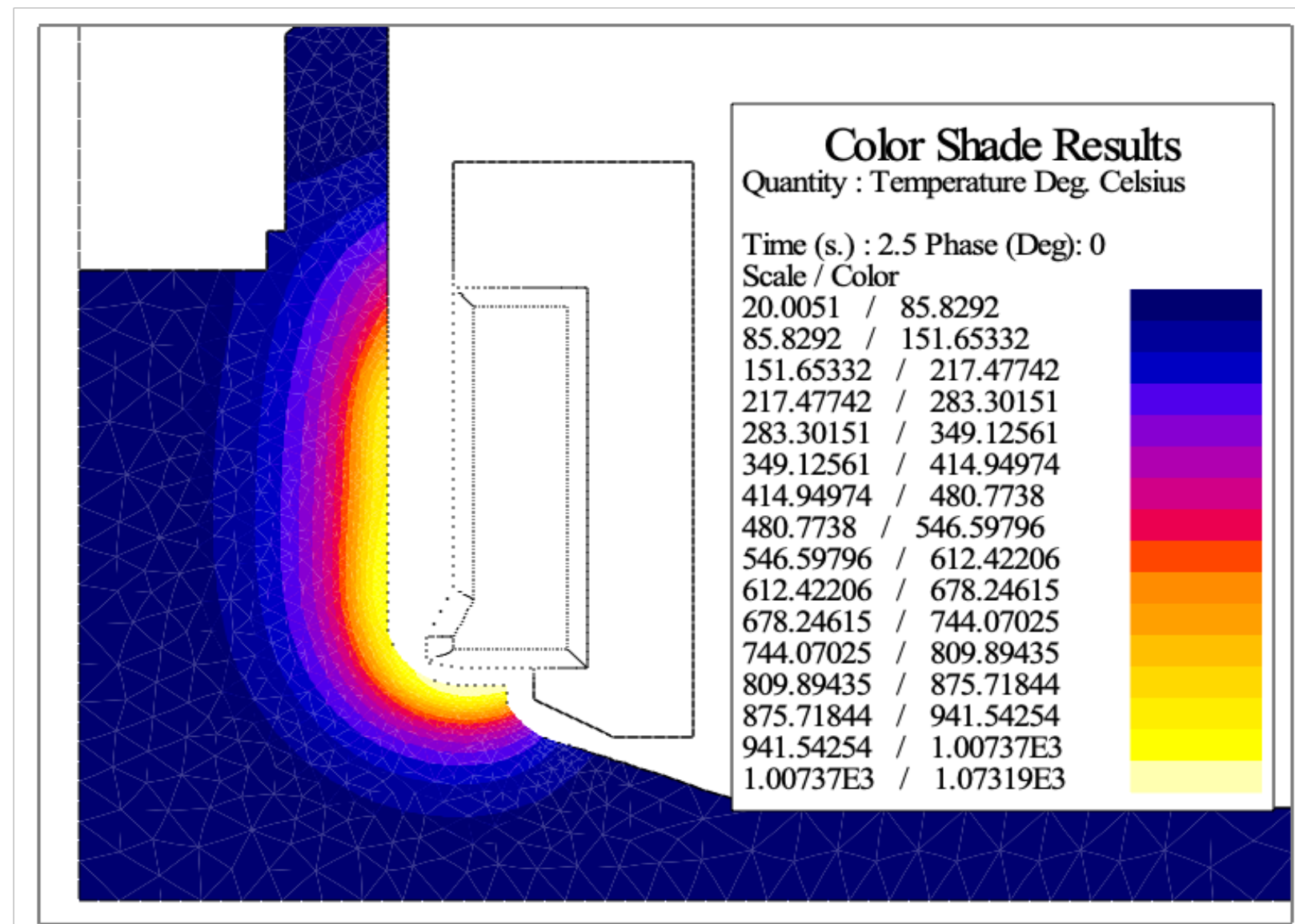


Development Strategy

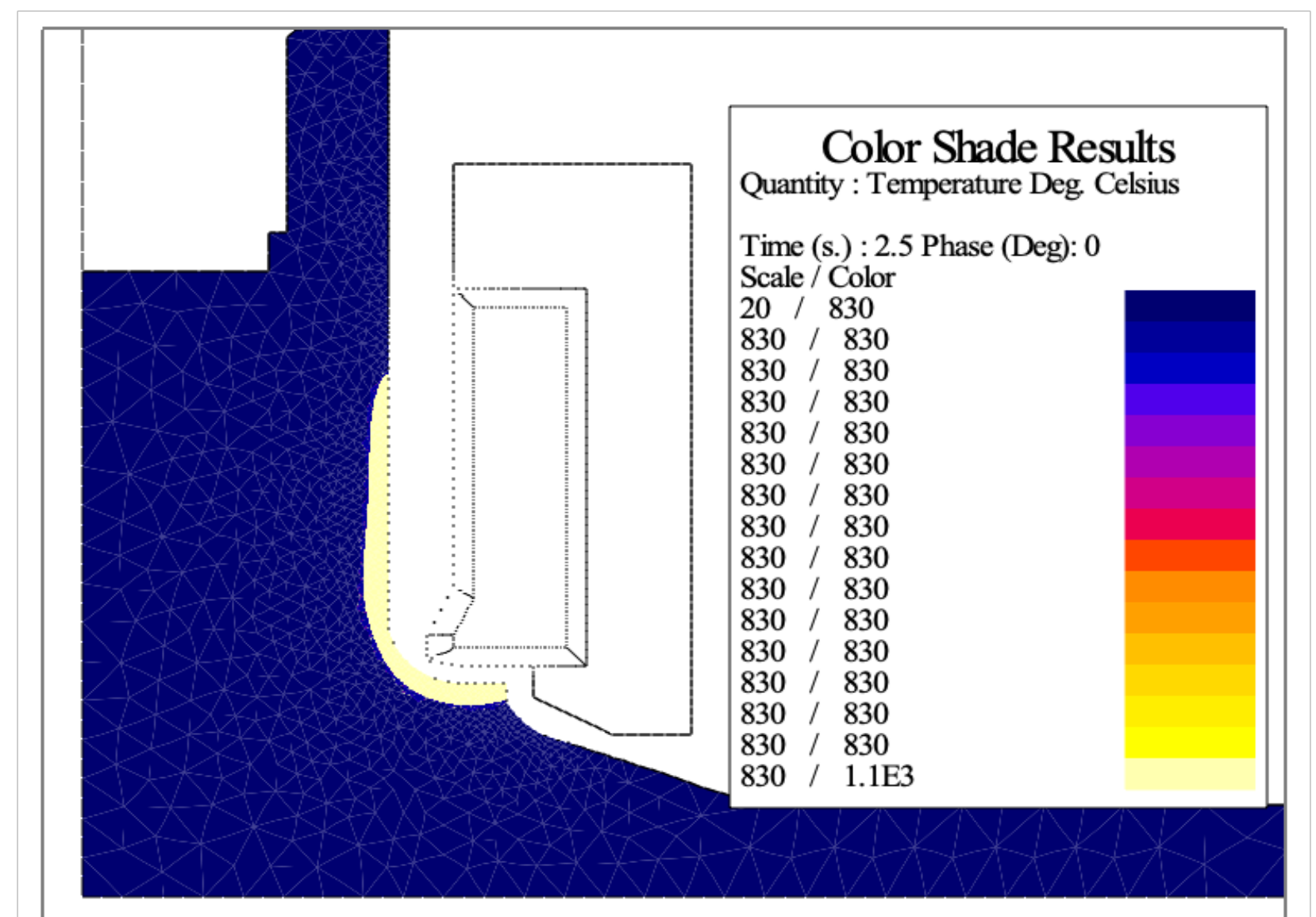
- **Step 2. (Band Aid)**
 - Complete replacement of laminations with **Fluxtrol “A”** on existing coil resulted in:
 - Lower local concentration of power in copper
 - Same heat pattern and machine settings
 - Coil Lifetime increased to 15,000 – 25,000 pieces
- **Step 3. (Optimal Solution)**
 - Design new coil with lower power concentration in copper using computer simulation
 - Build and test new coil



Step 3: Development of New Induction Coil Using Computer Simulation

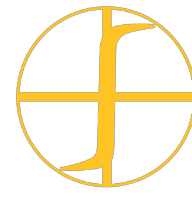


Temperature distribution in part
with new coil design



Predicted hardness pattern

Flux 2D program



Tests of New Coil

New coil with **Fluxtrol "A"** concentrator was designed, manufactured and tested in production line.

Heat pattern and coil performance were very close to parameters predicted by computer simulation.

Coil life and part production increased to >170,000 hits without coil copper failure or concentrator degradation.



New induction coil after 170,000 heating cycles

