Toroidal transformer development case study.

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Overview:

Well established company had a product on the market place that been successfull for over 10 years. Product is well recognised by the brand name and a particular look. The disadvantage to the company is that this product experience issues with toroidal transformer failures well above company's standards. The technical research indicated that new casing have to be designed to overcome thermal issues (overheating). At the same time, market research indicated that change of the appearance of the machine will have negative impact on sales. Â As a part of general research company contacted P&A International for quotes for electrical transformer as alternative supplier.

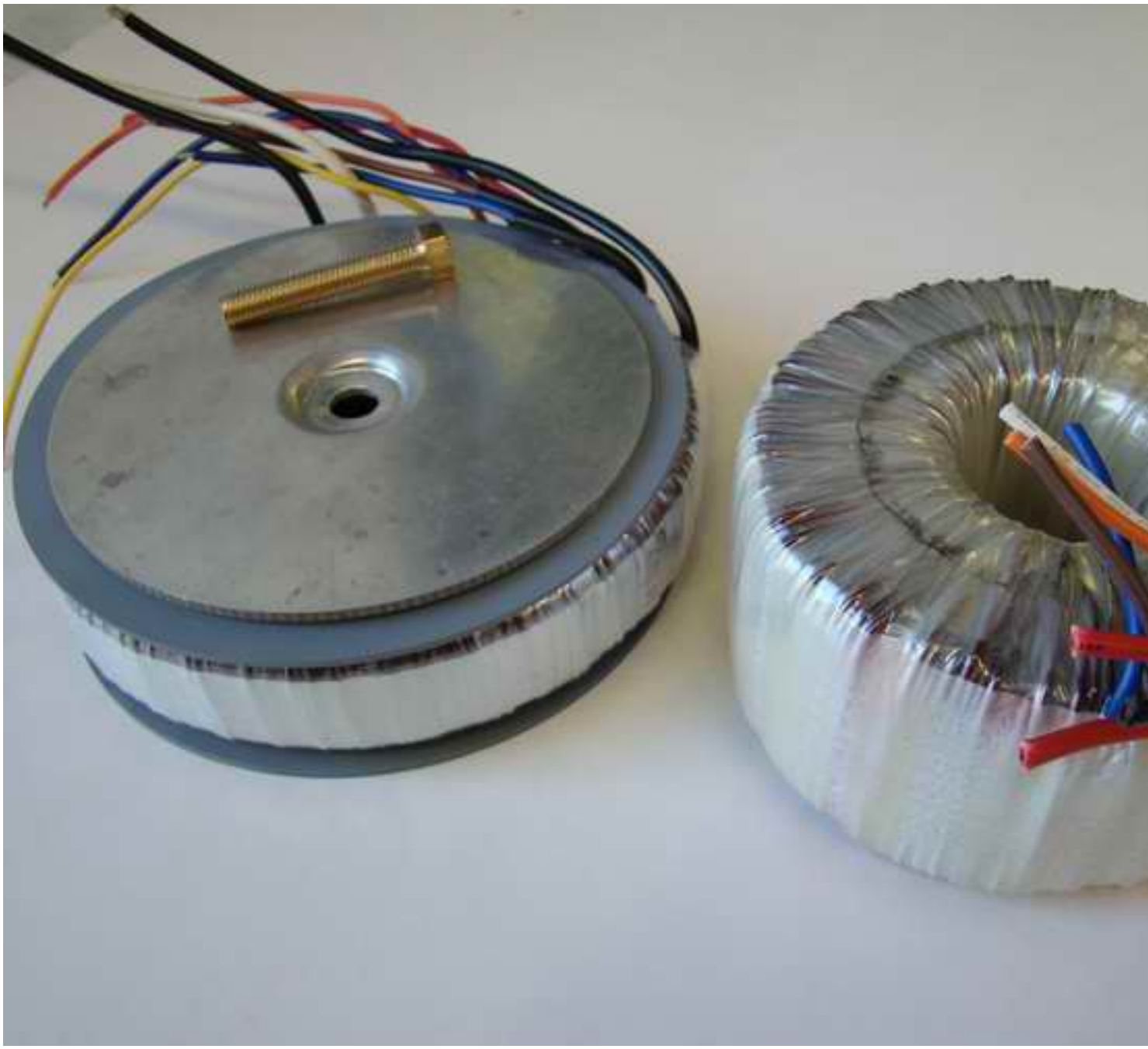
Solution:

Upon the contact, our team obtained technical data on electrical toroidal transformer and requested customer to outline reasons for change of supplier as well as technical feedback on part performance. It was quickly realised that more work needs to be done to the transformer's specification to address thermal issues. Our team carefully assessed performance of the original power transforme r in the existing casing. Â The result was obvious: transformer operated at elevated temperatures of 100C for extended periods of time. Those operating conditions caused wiring insulation to detoriate at much faster rate therefore significantly reducing lifespan. Once all limiting factors where understood, our C hina'sÂ transformer manufacturing facility R&D team offered few ways to reduce thermal load while keeping cost of the part down. With no changes allowed to improved casing ventilation via airflow, steps where taken to allow toroidal transformer to transmit the heat to the casing thereby dramatically reducing it's operatng temeprature. This was done in number of ways:

- Increased diameter and reduced the thickness of the toroidal transformer to create larger contact area between transformer winding and chassis of the machine to improve thermal transmission
- Removed soft insulating mounting pads and replaced them with soft silicon thermal conductor to allow heat to travel from transformer winding to other parts it comes in contact with

- We replaced steel mounting 'hat' that forms part of the transformer mounting with 3mm thick aluminium plate that allowed us to absorb heat at the opposite side of the transformer

- We replaced steel mounting bolt with brass bolt to allow transformer new aluminium mounting hat to transmit absorbed heat to the chassis of the machine



Result:

As tested, we managed to reduce temperature rise of the transformer from 80C above ambient to 55C. Reduction in 25C allowed winding insulation of the transformer to last

twice as long. Therefore double the lifespan. In the process we also slashed cost of the transformer when compared to old supplier by 25%.

Tags: toroidal transformer