THE ADDED COST OF SCRAP

I've told the story many times about the big boss at the circuit board shop I worked at years ago. After several months of high productivity but low profitability he called me into his office for a discussion. He asked me how I thought things were going and my response was something like, "Great! We are meeting our production goals every day". He then asked me one question, 'How can we make money when we're doing things twice?' This caught me off-guard and I wasn't sure what he meant by his comment. After looking into it more closely I realized that even though my department was meeting the production goal, our yields were far from acceptable. Doing things a second time was more costly than I could imagine. It didn't take me long to change the way we did things. By doing things the right way the first time with the best practices and products we made our company more profitable. This made the bosses happy and also made it much easier for the shop to plan its production moving forward.

Every shop and situation is different but I know there is no substitute for quality and value.

The theme of my presentation was "Improve Profitability"; the bullet points below outline the key talking points of that discussion. We must remember that this information was gathered over two years ago and some of the information may be somewhat outdated. The actual presentation showed much better than this printed version with all of the photos and colored theatrics, but the ideas are still sound.

THERE ARE <u>MANY</u> WAYS TO IMPROVE PROFITABILITY
- One way
    - Whatever you're doing, do it right the first time
- The costs associated with producing rework or scrap goes far beyond the visible costs to repair or replace the affected pieces
- How much <u>money</u> does it cost to produce scrap?
    - Replace substrate
    - Redo all processing steps required
    - Use of all involved equipment
    - Use of manpower
    - Use of chemistry
    - Use of time
    - What about the work you're not doing?

- How much does it <u>really</u> cost to produce scrap?
    - Lost production time
    - Lost premium dollars
    - Lost customer confidence
    - Lost future opportunities
    - Expedited shipping costs

- o Tarnished relations
- o Repeat shipments
- Real numbers from real PCB manufacturers
  - o 3,500 panels per month
  - o 18x24 / 21x24 panels
  - o 11,000 board square feet
  - o Half of production is screen printed, half is sprayed
  - o 260 kilos of mask per month
  - o As much as 400 kg's of material in stock
  - o ~$30 per kilo, plus shipping
  - o 10 screen mesh panels per month
  - o 20 screen mesh panels in stock
  - o $36 / $42 per screen, plus shipping
  - o Squeegee rubber, $100 per month
  - o $200 squeegee rubber in stock, plus shipping
  - o Filter material (spray), $100 per month plus shipping
  - o $200 filter material in stock, plus shipping
  - o 10 rolls of tape per month, plus shipping
  - o 8 bulbs per year for the exposing units, 2 bulbs in stock
  - o Over $210 per bulb, plus shipping
  - o 1,500 pieces of film per month, 1,500 pieces in stock
  - o $3.50 per sheet, plus shipping
  - o 2 rolls of Mylar per year, 1 roll on stock
  - o $300 per roll, plus shipping
  - o 70 gallons of developer concentrate per month, 70 gallons in stock
  - o $6 per gallon, plus shipping
  - o 7 gallons of antifoam per month, 5 gallons in stock
  - o $34 per gallon, plus shipping
  - o 2,500 / 3,500 gallons of water through the developer per month
  - o Remove and clean spray nozzles once per week, 60 minutes
  - o Dump and clean developer once per month, 3 hours
  - o Warehouse space, $5 per square foot
  - o Employee cost, $15/$20 per hour

There are obviously more costs involved, you know them better than I. This information focuses strictly on the solder mask area and does not even detail costs for pre-clean, drying, baking, cleaning equipment, making screens, exposing and developing screens. There is also the very important and costly final finish, routing and inspection. Let's not forget about all the processing required to get panels to the solder mask area. Since I work for an ink operation I thought it would be prudent to stick to that arena during the actual presentation.