



High Quality Tooling or Rock-Bottom Cost?

It's THE Hot Issue for Extrusion Operators, and Many Factors Weigh-In

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Why do so many companies make inappropriate business decisions regarding extrusion tooling replacement?

More often than not, supervisors are pressured to keep tooling expenditures down. "Don't buy anything you can live without!" they hear. So, they keep making product with what they have.

Often, the production and engineering staff know they are using tooling that is substantially worn or damaged, but shrug off the resulting inefficiencies and live with them. For most manufacturers, not only are these costs hidden, they are never calculated. When companies take the time to measure these costs, the result is usually a real eye-opener.

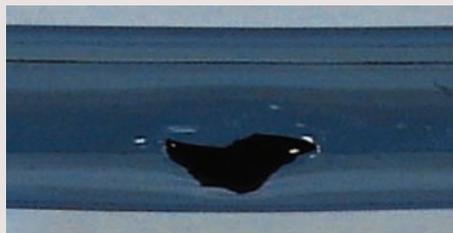
I spent the first 21 years of my career in electrical wire manufacturing, heavily involved with every aspect of melt and paste extrusion. What I have observed in those two decades, and what I've seen since I started consulting several years ago, is that most companies have forgotten just how much tooling directly impacts – for better or worse – their bottom line.

"Hidden operating costs are the enemy of profit."

If the management team is aware of these hidden costs and their impact, companies can make better decisions that will improve productivity, reduce operating costs, and increase gross profit.

The use of substandard tooling increases many operating costs. Some are clearly visible, such as scrap and the extra labor costs required for frequent cleanings. Other costs are not so apparent, and determining these costs requires a bit of investigation. These hidden costs include excess material, inspection, work-arounds, troubleshooting, reduced productivity/capacity due to slow line speed,

"Worn or damaged tooling forces operators to back-off line speeds to stay within tolerance."



Burned material is discharged into the product wall creating a material defect.

downtime, and lost business due to inferior product quality.

A major hidden cost that is a direct result of using worn or damaged tooling is excess material. When tooling begins to wear or is cleaned with abrasive material, the OD of the tip is reduced, and/or the ID of the die increases.

In this case, operators often run on the high side of OD tolerance because it is easier to overcome extrusion problems. Since most tolerance specs have a reasonably wide range, a manufacturer's ability to hold tight tolerances on the low end can significantly reduce material cost.

In this case, the raw material savings alone often justifies an investment in optimal tooling, particularly for those making large quantities or extruding high-priced material, such as PFA or FEP.

The most visible problem caused by worn or damaged tooling is product quality. When a tool set is worn, or acquires dents, nicks and scratches, it will hold material. This material will burn over time, eventually slip out and create black spots in the insulation. These spots often become enough of a problem to require an extra inspection. In virtually every case, the result is added labor cost and scrap.

To solve this, you might choose to clean more often. That seems to make sense, except it means you have to stop the machine, take the crosshead apart, clean the tooling, put it back together, and restart. So, you save \$1,000 by not replacing the damaged tool set. However, the costs associated with having your extruder out of commission for 30 minutes to two hours every time it needs to be cleaned can be staggering.

Over time, the avoidable costs of downtime will substantially exceed the cost of new tooling.

For jacketing and sleeving applications, another hidden cost that is worth investigating comes from using an unbalanced tool set.

Due to management pressure to reduce costs, operators often fill orders using tooling that is readily available in-house. They presume that with an unbalanced tip and die set they can get a drawdown ratio that is "close enough." However, this thinking has unintended consequences.

Typically, the material flow will not be uniform, resulting in product quality problems such as tears in the insulation, pin-holes, shrink-back, poor adhesion, ID/OD variation, and poor surface finish. Depending on the degree of material stress, not all of these problems may show up immediately, but they are a time bomb.

One final issue that senior management often fails to consider is the affect that worn or damaged tooling can have on a company's extrusion capacity.

Most companies are interested in running their extrusion lines faster. However, if they are using worn or damaged tooling, operators have to "back-off" on their lines speeds to



Improper tooling maintenance leads to excessive cleaning and downtime.

achieve the required product dimensions. The extrusion process is simply too unstable at high line speeds to perform successfully with sub-optimal tooling. Consequently, line operators do "work-arounds." Specifically, they run at slower speeds, hold a thicker wall, and clean the tooling more often.

Companies in this category are inefficient and their capacity is significantly impacted.

Periodically, I consult with companies who believe they need to add an additional extrusion line to meet demand. In several instances, I have shown that replacing worn or damaged tooling with new tooling that is optimized for the extrusion process generates the required capacity, and produces substantial savings.



A worn or damaged tip can impact product quality, reduce productivity, and create hidden costs that include material wastage, troubleshooting and inspection.

In summary, the right tooling eliminates improper size issues, does away with burned spots, enables production to reach optimum speed, minimizes inspections, and takes care of most product quality issues. Simply put, my best advice is to uncover your hidden costs and determine the savings.

A \$1,000 high temp tip and die set might save you \$10,000 in total direct costs over a year's time, giving it the fastest ROI of anything in your shop. Be sure to consider all costs that can be significantly reduced or eliminated with high quality tooling that's optimized for your extrusion process: scrap, excess material, cleaning labor, inspection labor, time spent troubleshooting, downtime, and lost productivity.

Hidden operating costs are the enemy of profit, and most companies mask them, rather than fix them. Take the time to expose these excess costs. In virtually all cases, it is far less costly, long-term and short-term, to replace worn, damaged tooling with new tooling that provides superior product quality and production efficiency.



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