WHITE PAPER

Cycle Time Reduction

Joint Production Technology

Corporate Headquarters
15381 Hallmark Ct.
Macomb, MI 48042-4016
Phone: 586-786-0080
www.jptonline.com

Automotive Part Manufacturing

Faster cycle times are easy to achieve. Every company can do it. Just run everything faster! What could be easier? Beat the competition's price, get the customer's order and make lots of money. But ask yourself, "Is it really that easy"? Sometimes it really can be done that way!

A simple change in cutting tool geometry, add more cutting teeth, or switch to a different cutting tool material such as coated carbides, cubic boron nitride (CBN), or polycrystalline diamond (PCD) grades and you are done. This way of optimization can be done economical as well.
More often though, just running everything faster… Commonly comes with unfavorable results and unexpectedly higher real costs.

What is cycle time reduction (CTR)?

CTR is the time, as measured in minutes, seconds or even hours which will be saved over the current cycle time to complete a task.

Example:

- **The existing process takes 3 minutes or 180 seconds to machine.**
- **The new process will now take 2.4 minutes or 144 seconds to machine.**
- **CTR for this example is 20%.**

Many managers responsible for their companies manufacturing costs, more often than not, make processing decisions based on theoretical savings by focusing on CTR without regard to total real costs. Intangible costs commonly associated with CTR initiatives are in reality paid or expensed within other functions or even other departments within the organization.

Doesn't making your parts faster save you money?

We will examine in greater detail this statement as well as the advantages and many disadvantages of just looking at reducing cycle time as a way to boosting company revenues and profits.

Cycle time reduction (continued)

There is a myriad of ways to achieve CTR for the machining of automotive parts. Below is a list of possible solutions along with Lead-Time reduction opportunities for your Company;

- Increase machine rapid rates where possible.
- Increase machine RPM speeds and feed rates where possible.
- Add redundant operations or equipment.
- Add more cutting edges.
- Replace current carbide tools with cubic boron nitride (CBN), ceramic, silicon nitride, polycrystalline diamond (PCD) or other advanced cutting tool materials.
- Combine existing individual dedicated tools with special multi-function tools.
- Change or update existing process workflow.
- Change or update machine spindles to faster revolution per minute (RPM).
- Change or update cutting fluid lubricity capacity.
- Change or update fixturing for greater rigidity.
- Change or update tooling to reduce spindle lengths.
- Change or update process to reduce vibration.
- Machine tool change positions.
- Elimination of operations or stations.
- Overlap operations.
- Reduce stock to be machined with more accurate castings.

ENTIRE PROCESS

Raw Material > Machining Process > Inspection > Finished Part

But what are the real costs associated with CTR solutions?

Does CTR pay for itself?

How long will it take?

Does CTR result in additional or lesser production?

Making production automotive parts faster by utilizing CTR seems on the surface to be very logical and inexpensive. Just speed everything up.

But in many circumstances CTR may actually cost you money. And lots of it.

How you say?

There are many expensive intangible costs that are often times not part of the original analysis when CTR is proposed.

Cycle time reduction (continued)

Often times CTR Optimization is mandated by management.

Below we will address some costly items that are routinely overlooked by management when CTR Optimization is demanded as a way to save money.

First, CTR Optimization actions often begin as an efficiency objective to reduce theoretical costs without regard to a formal lean or continuous improvement program. Testing is routinely conducted in isolation from processes up and down stream. Additional costs to farther down stream processes are never analyzed during the experimental phase.

A Lean or Continuous Improvement program is really what needs to be conducted by your Company to effectively analyze everything.

Let's look at some real life examples;

CTR Optimization increased down time, decreased tool life and increased tooling inventory in this case study example.

Management proposed eliminating the current rough and finish pass of a boring operation by increasing the already optimized speeds and feeds to complete the process in one pass from the current two pass process. Expected savings from CTR was targeted at 20%.

The experiment was considered a success after the successful machining of 125 parts and was immediately pushed into production. Here is the result of this experiment when it hit the production environment;

- Tool life went from a repeatable 4,000 to 500 parts or less.
- Damaged and not repairable tools increased 25%.
- 800% increase in Machine Tool down time for broken and worn out tools.
- Increased set-up times due to the increased frequency of tool changes.
- Increased spindle failure because of increased tooling pressures.
- Increase tool inventory float from 8 to over 50.
    - Many un-repairable tools further adding to costs.
- Increased aggregate tooling costs while individual costing models showed tooling decreasing. (50 tools are cheaper to purchase than 8 when the individual price is all that is considered).
- Increased scrap rate.
- Decreased part through-put because of increased idle time. (This is really contrary to what should occur but we routinely find it.)

A complete and total failure, the customer when confronted with actual real cost results from all activities in the production environment decided to return to the original two pass boring process.

Motion Tool to machine
Full Sphere Diff-Case

Conclusion:

We have all read about the fantastic results accomplished by just reducing cycle time on production automotive parts by simply changing an inexpensive interchangeable component. But what really needs to be analyzed before your Company just speeds everything up is what are the costs, including all the ancillary activities, such as the changes in expenditures associated with maintenance, labor, machine tool down time, frequency of set up times, tool life, coolants, inspection, process predictability and all quality matters.

Frequently the costs of CTR Optimization are greater than the original process costs when all expenditures are considered. The process needs to be operating in a Lean Environment before analyzing any cycle times. Often times slowing the process down from the current methods can yield fantastic part through-put and superior quality parts. Good examples of slower cycle times that can save money are grooving and other single point processes. Historically we find these kinds of operations are machined at faster rates then optimal. So be very diligent in making sure you really are saving money by changing your processes.

The JPT Way

We are Joint Production Technology, “JPT” for short.

Our name means we utilize technologies to jointly produce your production products.

We create innovative production part solutions through intensive engineering oriented solutions. Then we make your products.

We desire to be your partner for life because we are not just another me too supplier.

Let us help you with your Part Processing projects today !

For more information, please contact us:

- Call: 586.786.0080 or Fax: 586.786.0088
- Email: JPT@JPTonline.com
- Visit our website: www.jptonline.com

Joint Production Technology

Let us help you with your Differential Case Housing project today !

Corporate Headquarters
15381 Hallmark Ct.
Macomb, Michigan 48042-4016

Tel: 586-786-0080
www.jptonline.com
JPT@JPTonlilne.com