

Case: GM Baltimore Tool-X In Hobbing operation manufacturing ring gears. Material: Tool-X Oil MWF.
Length of Production: Over 48 months.

Over the last 48 months Tool-X has been in production at GM Baltimore **6 hobbing machines** for ring gears this is a summary of GM Baltimore own production data with Tool-X. Tool-X has demonstrated the following:

- Increased Tool life from 867 parts per tool to 3813 parts per tool.
- 340 % increase in tool life.
- Produced over 300,000 ring gears
- Decrease scrap savings by \$3072 per machine/year.
- Productivity savings with Tool-X \$22,624 per machine/year.
- Annual cost savings with Tool-X per machine **\$69,304** per machine with scrap savings.
- Tool *inventory savings* on annual new tool usage per machine before Tool-X 5.5, with Tool-X only 1.26 tools, annual regrinds before Tool-X at 74 regrinds to 17 regrinds with Tool-X.
- Proved that Tool-X is consistent and predictable in production lines with same machines and operations in over 1.2 million GM Vehicles
- Hobbing operation at GM has in total 15 machines @ \$69,304/machine conversion of line, will produce an additional \$1,039,560 in new cost savings. Savings per part produced would be 6% per cost of part.

Parameter	Ring 1	Ring 2	Ring 3
% Tool-Life Increase	340%	340%	340%
Current Tool Life	848	876	876
Tool-X Tool Life (Units per Regrind)	3731	3854	3854
Current Tool Frequency (Units per Regrind)	153	148	174
Tool-X Frequency (Units per Regrind)	35	34	39
Current # Regrinds/Year	142	137	163
Tool-X # Regrinds/Year	32	31	37
Current Tools per Year	10.91	11.38	10.85
Tool-X Tools per year	2.48	2.59	2.47
Total Potential Annual Cost Saved	\$70,533.00	\$75,252.00	\$76,144.00
Total Annual Investment for Project Cost Of Tool-X	\$4,673.00	\$4,673.00	\$4,673.00
ROI (USD/Year)	\$65,861.00	\$70,580.00	\$71,471.00
Payback Period (Years)	0.07	0.06	0.06
Payback Period (Months)	0.79	0.75	0.74

Total Cost Savings 6 Machines With Scrap Savings	\$443,859
Total Savings 6 Machines After Cost of Tool-X	\$415,824

Case: **General Motors Field Study** at FormTech (American Axle) Tool-X in CNC operation manufacturing metal castings input gears for 9-speed transmission.
 Material: **Tool-X Multi-Use Water Coolant**.
 Length: 12 months and still running.

Over the last 9 months Tool-X has been in production at FormTech's two CNC machines for input gears, this is a summary of GM commissioned supervised production test data with Tool-X. Tool-X has demonstrated the following:

- Increased Tool life from 88 parts per tool set to 252 parts per tool set.
- 250% increase in tool life and still going.
- Produced over 300,000 input gears by manufacturing with Tool-X
- Productivity savings with Tool-X \$47,355 per machine.
- Annual cost savings with Tool-X per machine \$163,339 after cost of Tool-X.
- Tool *inventory savings* annual new tool usage per 2-machine cell before Tool-X, 5193 tools, with Tool-X only 2036 tools, tools are \$10 inserts avg 6 per tool holder or \$60 per set.
- Cost savings are typical on CNC machines with low cost carbon inserts due to volume of tools and R/R tool labor cost saved.
- Proved that Tool-X is consistent and predictable in production lines with same machines and operations.

Cell # 4 Machines 25 & 26 Parameter	Before Tool-X	After Tool-X	Savings Difference
% Tool-Life Increase	0%	250%	250%
Tool Life Per Parts Produced	88	252	164
Tool Frequency (Tools R/R Per 8 hr Shift)	6.36	2.22	4.14
Parts Produced Per 8 hr Shift	560	632	72 (12% Increase)
Annual Tools clusters Used for Production	5193	2036	3157
Annual Labor Cost R/R Tools 15 min per tool R/R @ \$120 per hr	\$155,790	\$61,080	\$94,710
Annual Tool Cost (\$60/Tool cluster)	\$311,564	\$122,184	\$189,380
Annual Parts Produced	456,960	515,712	58,752
Total Evaluated Cost Per Part	\$2.65	\$2.02	\$0.63
Total Annual Cost Saved		\$345,177 Per Cell 2 Machines	\$172,589 Per Machine
Total Annual Investment for Project (Tool-X)		\$18,500	\$9250 Per Machine
ROI (USD/Year)		\$326,677	\$163,339 Per Machine
Payback Period (Years)		0.05	
Payback Period (Months)		0.60	

Sheet1

Tool-X Impact Study

GM Bay City Deep Hole Tool <i>Only</i> Production 1 Machine Does Not Evaluate Other Tools In Operation	Costs Without Tool-X	New Tool	With Tool-X
	No Tool-X	No Tool-X	
	Original Tool 40 Cams/Tool	New Tool 60 Cams/Tool	New Tool 200 Cams/Tool
		Production Same	Production 20% Increase

Tool and Coolant Costs

Annual Tool Cost 1Machine 3 Shifts	\$2,016,000	\$1,612,800	\$604,800
Tool Change Out 15min/tool	\$60,480	\$40,320	\$7,560
Annual Coolant Cost Henkel Free	\$0	\$0	\$75,900
Total Tools/Coolant Cost	\$2,016,000	\$1,612,800	\$680,700

Production

Parts per shift per 1 machines	96	96	120
Shifts per day	3	3	3
Annual Days	280	280	280
Lost production R/R Tool/shift hours	504	336	126
Total Parts Produced/yr.	80,640	80,640	100,800
Additional Parts Produced	0	0	20,160

Labor Overhead

Machine Days per Year	280	280	280
Labor / Overhead per day3 shift	\$2,880	\$2,880	\$2,880
Total Labor/Overhead 40 hr.	\$806,400	\$806,400	\$806,400
Labor Overtime			

Cost per Part

Tool Cost	\$25.00	\$20.00	\$6.00
Coolant Cost	\$0.00	\$0.00	\$0.75
Tool R/R In labor/overhead Line 21	\$0.75	\$0.50	\$0.08
Tool and Coolant Cost	25.00	20.00	6.75
Labor/Overhead/ per Part	10.00	10.00	8.00
Overtime on Weekend parts	\$0.00	\$0.00	\$0.00

Total Evaluated Costs per Part	\$35.00	\$30.00	\$14.75
<i>Total Evaluated Cost Savings per Part</i>		\$5.00	\$20.25

Total 1machine Cost savings 3 shifts		\$403,200	\$2,040,900
Annual Total Cams Production	967,680	967,680	1,209,600
12 machines Production Cost	\$33,868,800	\$29,030,400	\$17,845,200
Savings From Original		\$ 4,838,400	\$16,023,600

Key: Per Machine	New Tool without Tool-X	Savings with 241,920
Coolant Usage 1265 Gallons	Tool Cost. 1 tool @ \$1000/60 parts	Additional parts made
Henkel Coolant Free	Tool Cost. 7 tools @ 60 parts/tool shift	
Tool-X Coolant @ \$60 /gallon	43 sec cycle/part plus 12sec pilot =55 sec/part	
3 X 8 hr. shifts/day	New Tool with Tool-X	
Labor/Overhead \$120 Hr.	Tool Cost 1 tool @ \$1000/195 plus	
Overtime \$140 Hr.		

Tool-X Impact Study

HI VOL Copper Coating Stamping Machine

Production Line 2 Machines

	Costs without Tool-X	Cost With Tool-X 10% Increase Production	Cost With Tool-X 20% Increase Production
Tool and Coolant Costs			
Annual Tool Cost plus R/R labor/OH	\$1,008,335	\$1,119,990	\$1,260,000
Copper Coating	\$3,500,000	\$0	\$0
Annual Oil Cost Plus boosters/topadd	\$55,640	\$184,960	\$184,960
Total Tools/Coolant Cost	\$4,563,975	\$1,304,950	\$1,444,960
Production			
parts per shift per machine	33600	37333	42000
shifts per day	2	2	2
Annual Days	150	150	150
# machines	2	2	2
Total Parts Produced/yr	20,160,000	22,399,800	25,200,000
Labor Overhead			
Machine Days per Year	150	150	150
Labor / Overhead per day	\$2,400	\$2,400	\$2,400
Total Labor/Overhead	\$360,000	\$360,000	\$360,000
Cost per Part			
Tool Cost	\$0.050	\$0.050	\$0.050
Coolant Cost	\$0.003	\$0.008	\$0.007
Copper Coating	\$0.174	\$0.000	\$0.000
Too/Coolant/Coating Cost	0.23	0.058	\$0.057
Labor/Overhead/ per Part	0.018	0.016	0.014

Total Evaluated Costs per Part	\$0.24	\$0.07	\$0.07
<i>Total Evaluated Cost Savings per Part</i>		\$0.170	\$0.173
Saved expenses at increase production:		\$3,806,084	\$4,350,009
Savings per machine		\$1,903,042	\$2,175,004

Key:

- Coolant Usage 2140 Gallons
- Fuchs @ \$13 gallon
- Tool-X @ \$32/gallon
- 2 X 8hr shifts/day
- Labor/Overhead \$150 Hr
- Tool Cost \$0.05 per pc without Tool-X
- Tool Cost with Tool-X \$.024
- Avg parts per tool 6500 Fuchs
- Avg parts per tool 13500 ToolX
- Tool Cost \$250 each

CASE # 3

1. Increase Speeds and Feeds
2. Eliminate Copper Coating
3. NO Tool Savings

Tool-X Impact Study

CNC Automotive

Production Line 14 Machines

	Costs without Tool-X	Cost With Tool-X 15% Increase Production	Cost With Tool-X 30% Increase Production
Tool and Coolant Costs			
Annual Tool Cost	\$416,500	\$208,250	\$208,250
Tool Cost Upcharge 25%	\$0	\$0	\$69,420
Annual Coolant Cost	\$0	\$280,000	\$340,000
Total Tools/Coolant Cost	\$416,500	\$488,250	\$617,670
Production			
parts per shift per machine	42	49	60
shifts per day	2	2	2
Annual Days	250	250	250
# machines	14	14	14
Total Parts Produced/yr	294,000	343,000	420,000
Labor Overhead			
Machine Days per Year	250	250	250
Labor / Overhead per day	\$33,600	\$33,600	\$33,600
Total Labor/Overhead	\$8,400,000	\$8,400,000	\$8,400,000
Cost per Part			
Tool Cost	\$1.417	\$0.607	\$0.661
Coolant Cost	\$0.000	\$0.816	\$0.810
Subtotal	\$1.417	\$1.423	\$1.471
Labor/Overhead/ per Part	28.571	24.490	20.000
Total Evaluated Costs per Part	\$29.99	\$25.91	\$21.47
<i>Total Evaluated Cost Savings per Part</i>		\$4.07	\$8.52
Saved expenses at increase production: 14 Machines		\$1,397,667	\$3,577,330
Savings per machine		\$99,833	\$255,524
		ROI 5 to 1	ROI 11 to 1

Key:

Coolant Usage 7000 Gallons (estimated)
 Fuchs @ \$0 FREE NO CHARGE VS \$119,000
 Tool-X @ \$40/gallon
 2 X 10hr shifts/day
 Labor/Overhead \$120 Hr
 Tool Cost \$29,750/machine (estimated)
 without Tool-X
 Tool-X Tool Savings @ 100%
 Improvement
 Cycle Time No Tool-X=690sec@15%=587 @30%= 498sec