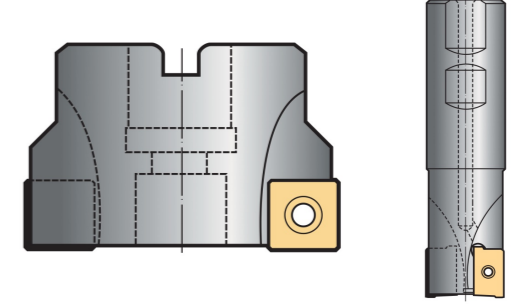




Tool Performance Report

Indexable Milling



Customer

| | |
|---------------|--|
| Company: | |
| Contact: | |
| QTS Employee: | |
| Date: | |

Machine

| | | | |
|----------------------|--|---------------------------------|---------------------------------|
| Machine Description: | HAAS VF5 XT | | |
| Spindle: | <input checked="" type="checkbox"/> CV40 | <input type="checkbox"/> CV50 | <input type="checkbox"/> Other: |
| Condition: | <input checked="" type="checkbox"/> Good | <input type="checkbox"/> Medium | <input type="checkbox"/> Poor |

Material

| | | | | |
|---------------|---|--|--|-----------------------------------|
| Type: | <input checked="" type="checkbox"/> Steel | <input type="checkbox"/> Stainless Steel | <input type="checkbox"/> Hi Temp Alloy | <input type="checkbox"/> Aluminum |
| Material No.: | 4145 | | | |
| Condition: | <input checked="" type="checkbox"/> Clean | <input type="checkbox"/> Heavy Scale | <input type="checkbox"/> Flame Cut | <input type="checkbox"/> Casting |
| Hardness: | 30 Rockwell | | | |

Workpiece

| | | | |
|--------------|---|---------------------------------|------------------------------|
| Description: | Transmission Knuckles | | |
| Drawing #: | | | |
| Rigidity: | <input checked="" type="checkbox"/> Good | <input type="checkbox"/> Medium | <input type="checkbox"/> Bad |
| Operation: | <input checked="" type="checkbox"/> Rough | <input type="checkbox"/> Finish | |
| Dimensions: | Length | Width | Height |
| Comments: | 4.75 OD, 1.44 Length of cut | | |

Tool Data

| | Current | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|---------------|---------------------------|-----------------------|--------|--------|--------|--------|
| Manufacturer: | Iscar | Walter | | | | |
| Tool Type: | Shoulder Mill | Shoulder Mill | | | | |
| Tool P/N: | T490 ELN D1.00-3-C1.0-08B | F5041.UZ26.026.Z03.08 | | | | |
| Tool Dia.: | 1.00 | 1.00 | | | | |
| # of Teeth: | 3 | 3 | | | | |
| Insert P/N: | T490 LNMT 0804PNR | LNHU090408R-L55T | | | | |
| Insert Grade: | IC830 | WSP45S | | | | |
| Index Time: | 10m | 10m | 0m | 0m | 0m | 0m |
| Lead Angle: | 90 | 90 | | | | |

Machining Data

| | Current | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|-----------------|---------|--------|--------|--------|--------|--------|
| Speed (SFM): | 470 | 625 | | | | |
| RPM: | 1795 | 2388 | | | | |
| Feed Per Tooth: | 0.004 | 0.0035 | | | | |
| IPM: | 22 | 25 | | | | |
| Cutting Width: | 1.0 | 1.0 | | | | |
| Cutting Depth: | 0.150 | 0.150 | | | | |
| MRR cu in/min: | 3.2 | 3.8 | | | | |

Machining Results

| | Current | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|--------------------------------|----------------------|--------------------|--------|--------|--------|--------|
| Part count: | 7 | 15 | | | | |
| Cycle Time: | 14m 0s | 8m 0s | 0m 0s | 0m 0s | 0m 0s | 0m 0s |
| Surface Finish: | 125 | 125 | | | | |
| Spindle Load: | 35% | 32% | | | | |
| Failure Mode: | Thermal Deformation | Flank wear | | | | |
| Criteria for end of tool life: | Loss of chip control | Normal insert wear | | | | |

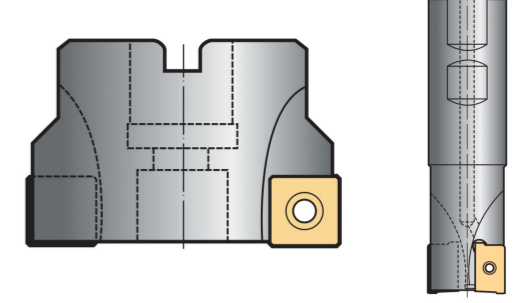
Comments

In conjunction with increasing IPM we also improved the tool path which led to 43% cycle time reduction also improving surface finish.



Tool Performance Report

Indexable Milling



Tool Costing

| | Current | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|---------------------------|---------------------------|------------------------|--------|--------|--------|--------|
| Manufacturer: | Iscar | Walter | | | | |
| Cutter P/N: | T490 ELN D1.00-3-C1.0-08B | F5041.UZ26.026.Z03 .08 | | | | |
| Cutter Price: | \$0.00 | \$544.00 | | | | |
| Parts Per Cutter: | 10000 | 10000 | | | | |
| Insert P/N: | T490 LNMT 0804PNR | LNHU090408R-L55T | | | | |
| Insert Grade: | IC830 | WSP45S | | | | |
| Insert Price Ea: | \$0.00 | \$21.90 | | | | |
| Number of Inserts: | 3 | 3 | 0 | 0 | 0 | 0 |
| Cutting Edges Per Insert: | 4 | 4 | | | | |
| Parts Per Index: | 7 | 15 | 0 | 0 | 0 | 0 |
| Annual Part Production: | 2000 | 2000 | | | | |
| Tooling Cost Per Part: | \$0.00 | \$1.15 | | | | |
| Tooling Cost Annually: | \$0.00 | \$2298.80 | | | | |

Machining Cost

| | Current | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Machine Description: | HAAS VF5 XT | HAAS VF5 XT | HAAS VF5 XT | HAAS VF5 XT | HAAS VF5 XT | HAAS VF5 XT |
| Hourly Rate: | \$125.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 |
| Cycle Time: | 14m 0s | 8m 0s | 0m 0s | 0m 0s | 0m 0s | 0m 0s |
| Index Time: | 10m | 10m | 0m | 0m | 0m | 0m |
| Machining Cost Per Part: | \$29.21 | \$17.52 | | | | |

Total Machining Time

| | Current | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|----------------------|----------|------------------|--------|--------|--------|--------|
| Total Time Per Part: | 15m 26s | 8m 40s | | | | |
| Total Annual Time: | 514h 17m | 288h 53m | | | | |
| Total Time Savings: | 0h 0m | -225h 24m | | | | |

Total Cost

| | Current | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|----------------------|------------|-------------------|--------|--------|--------|--------|
| Total Cost Per Part: | \$29.21 | \$18.67 | | | | |
| Total Annual Cost: | \$58416.67 | \$37347.47 | | | | |
| Total Savings: | \$0.00 | \$21069.20 | | | | |