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ATTENTION – Requires immediate attention! General Issue

Tooling Research and Application Department
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Part and Feature: [redacted]

Tool: Two-flute carbide drill [redacted]

Problem: Hole runout

Failure mode: Excessive tool wear

Preliminary Information

Figure 1 shows the failed tool and its tool tag. The tool is new. As can be seen, the tool ran 1,300 cycles. The tool life set for this tool is 1,500 cycles, i.e., the tool almost made the tool life. Further investigation shows that if the tool is used for standard D or C variants, it drills 15 holes per cycle, for B – 6 holes, if for DuraMax – 19 holes per cycle although the tool life is set the same for all variants. Moreover, it is a tap drill, i.e., it directly affects the performance (tool life included) of the tap that follows.

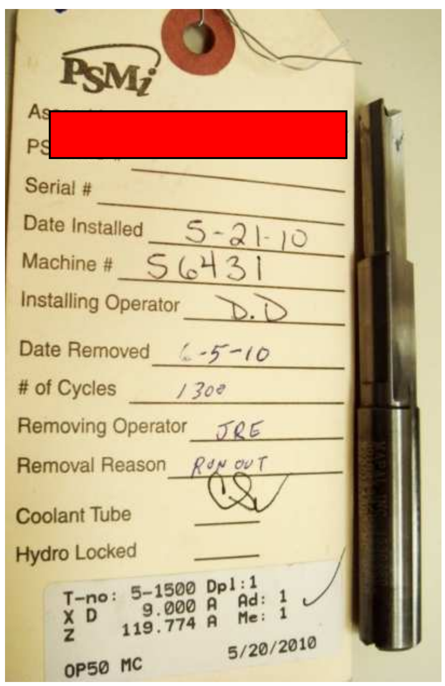

Figure 1. Failed tool and its tool tag

Executive summary of the analysis: **The direct root cause** of tool failure is an excessive tool wear caused by dry machining as the coolant did not reach the drilling part of the tool. This is because two slots-coolant passages were made on the tool shank that attracted all the coolant available in the tool holder. As this problem is common and extends even to XX-X program, it should be resolved with XXXXX as soon as possible.

Short analysis

Figure 2 shows excessive wear of the drilling part of the tool. In my opinion, the tool with this amount of wear is not capable of producing decent tap holes. As a result, the tab that follows this tool will definitely suffer, and thus may produce "tight" threaded holes or may even break. In other words, the tool is a way overrun.

Figure 3 shows the chamfering part of the tool. As see, very small wear is seen there.

Figure 4 shows the cause for the difference in tool wear of the drilling and chamfering parts of the tool. Addressing the complaint about the burr produced by the dulled chamfering cutting edges, XXXXX made two deep slots on the tool shank to introduce the coolant to these edges. As the hydraulic resistance of these slots is a way smaller that the regular coolant channel of the drilling part, almost all the coolant goes to the chamfering part of the tool while the drilling part runs almost dry. In other words, one minor problem is solved while another major problem was introduced by additng these two slots on the tool shank.

Suggestions:

1. NEVER use coolant slots on the shank
2. Re-design drill for this application. It should be standard (not brad as it is now) point PCD drill

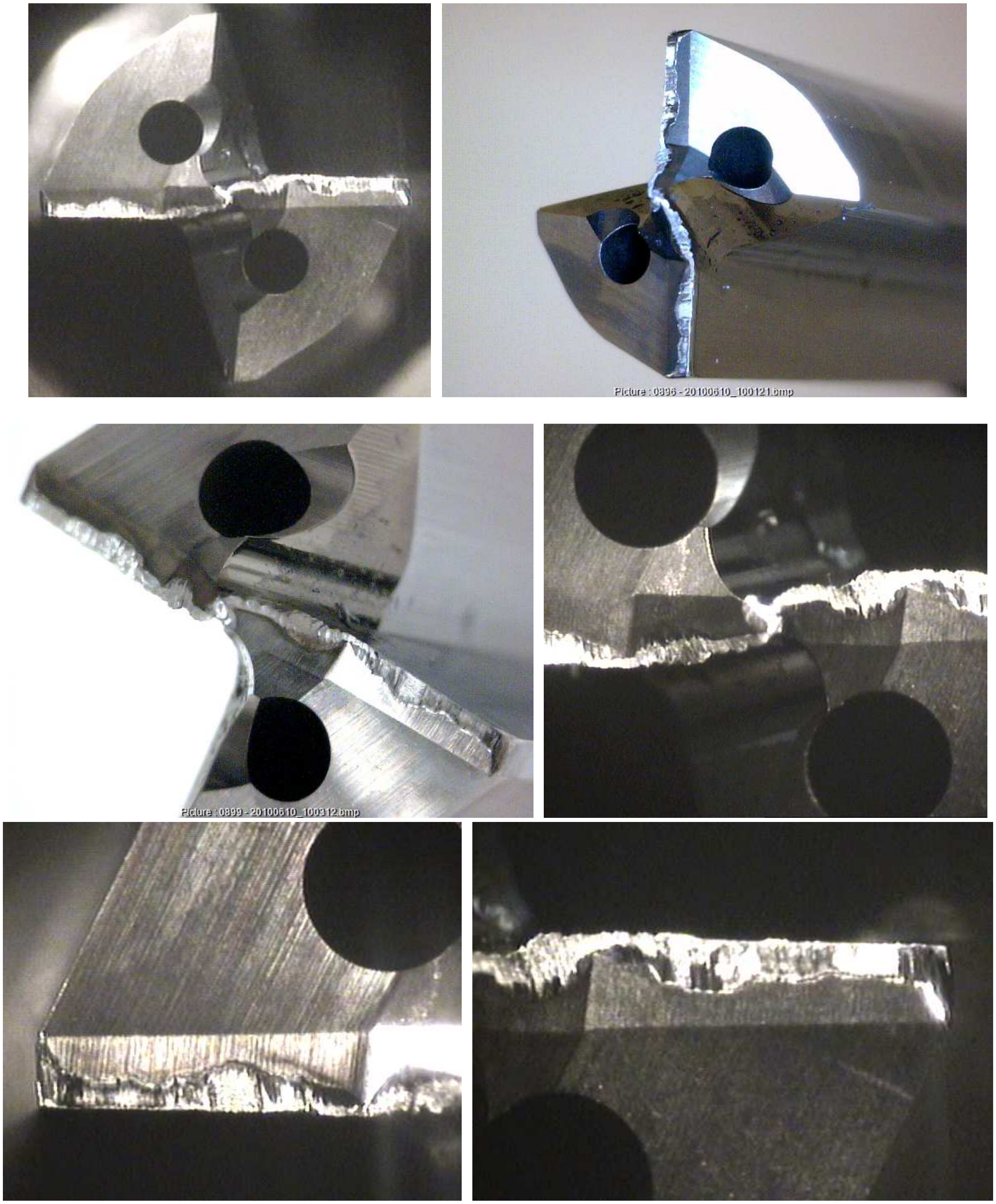

Figure 2. Excessive wear of the tool drilling part

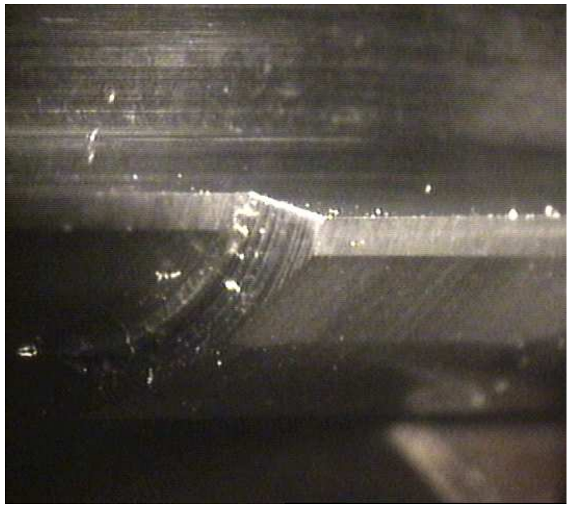

Figure 3. Small wear of the chamfering part

Figure 4. Slots-coolant passages made on the shank to provide the coolant to the chamfering part of the tool