

Press Release

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Inovatools with tool concepts for the aviation and aerospace industries

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Modern tools in use on titanium, alu, composites etc.

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Make a productive start with application-optimized solutions

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1 Extreme temperatures and
2 hardness, material mix, built-
3 up edges – the cutting of ma-
4 terials in the aviation and
5 aerospace industries is a
6 special discipline. The chal-
7 lenges of light and hybrid
8 materials, highly heat-
9 resistant steels, super alloys
10 and titanium are faced with
11 the demand for outstanding
12 quality in surface accuracy
13 and dimensional accuracy in
14 extremely narrow tolerance
15 bands. Anyone who occa-
16 sionally manufactures safety-
17 relevant components in ac-
18 cordance with high-quality
19 requirements, is dependent
20 on special application- and
21 material-optimized milling
22 cutters, drills and special
23 solutions – and thus on a
24 reliable, competent tool spe-
25 cialist such as Inovatools,
26 which can deliver these very
27 tools worldwide at short no-
28 tice, 24 hours a day.

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29 The aviation and aerospace
30 industry is an important key
31 industry and a major growth
32 engine of Europe's economy.
33 Thanks to the rapid speed of
34 innovations, e.g. in the use of

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35 new materials and their pro-
36 cessing methods, the industry
37 is setting strong development
38 impulses for other branches of
39 industry as well. The tool indus-
40 try is one such example.

41 Thanks to the process and ma-
42 terial experience that has
43 grown up over decades, the
44 tool manufacturer Inovatools
45 from Bavaria, Germany, sup-
46 ports the aviation and aero-
47 space industry with progressive
48 tool concepts so it can develop
49 its full optimization potential.

50 In addition to a very wide prod-
51 uct range for the most varied of
52 applications and materials, the
53 company also offers the engi-
54 neering of special tools custom-
55 ized to an individual application.
56 Douglas Kline, Managing Direc-
57 tor at Inovatools USA LLC: "In
58 close, trusting consultation and
59 cooperation with the manufac-
60 turer, our specialists precisely
61 adapt the milling cutters, drills,
62 gages and special solutions to
63 the cutting tasks in question.
64 From the first prototypes right
65 up to use in production, the
66 focus here is on increasing
67 productivity and efficiency."

68 **Ultra-modern production and**
69 **development conditions**

70 Thanks to very high vertical
71 integration with progressive
72 grinding, measurement and
73 coating technology, Inovatools
74 checks and influences all rele-
75 vant quality factors of the tools.
76 In the new research and devel-
77 opment center in Bavaria, all
78 tools are tested immediately
79 and run-in on the workpiece.

80 This allows the optimum cutting
81 values for the application in
82 question to be calculated in
83 advance. This saves valuable
84 time on a day-to-day basis in
85 production.

86 Inovatools maintains a globally
87 dense network of service and
88 sales representatives. Not only
89 does this guarantee consistent-
90 ly high tool quality around the
91 globe, it also ensures very short
92 delivery times, even for special
93 tools, for the purpose of pro-
94 duction reliability.

95 **Engineering** 96 **for an enhanced performance**

97 One example of successful
98 engineering for a customer is
99 the processing of a component
100 from aircraft aluminum with a
101 special VHM milling cutter
102 adapted to the application, with
103 internal cooling (cutting data: U
104 = 15,000 rpm; $f_z = 0.2$ mm; $v_f =$
105 10 m/min; $v_c = 760$ m/min; $a_e =$
106 16; $a_p = 4.0$). Jochen Eckerle,
107 Head of Production at
108 Inovatools Germany: "Com-
109 pared with the tool previously
110 used in this application, which
111 itself had a very good service
112 life of two hours, the applica-
113 tion-focussed Inovatools tool
114 now has a service life of three
115 hours."

116 **Coping with titanium** 117 **and composites**

118 Inovatools tools achieve con-
119 siderable success in machining
120 composites and titanium. Tita-
121 nium and/or titanium alloys are
122 being used more frequently in
123 combination with composites in

124 lightweight construction as no
125 contact erosion arises, and as a
126 result, both materials can be
127 used together without any prob-
128 lems. Jochen Eckerle: "As a
129 result, the demand will increase
130 further for tools that can effec-
131 tively and efficiently master the
132 difficulties in titanium machin-
133 ing. The thermally induced ten-
134 sions caused by the extreme
135 temperature stress of the cut-
136 ting edge due to poor heat dis-
137 sipation through the chips is
138 one example that can be given
139 here. The enormous threshold
140 loads due to the lamellar chips,
141 as well as the high pressure
142 loads to which parts of the cut-
143 ting edges are subjected due to
144 the material hardness, make
145 life difficult for the tools."

146 Inovatools counteracts this with
147 application- and material-
148 optimized solutions. Examples
149 of these are VHM milling cutters
150 for roughing and finishing. Dur-
151 ing development, the tool spe-
152 cialists place a special focus on
153 the cutting edge as, without a
154 precisely defined rounding of
155 the cutting edges in conjunction
156 with the microgeometry, high-
157 tech materials such as titanium
158 can no longer be machined
159 efficiently. Jochen Eckerle:
160 "Thanks to our systematic edge
161 preparation in conjunction with
162 coating and end finishing, our
163 tools are getting ever better at
164 cutting titanium. The special
165 geometry with an uneven spiral
166 angle and uneven cutting edge
167 spacing assists in this. During
168 use, this ensures quiet opera-
169 tion and prevents vibrations
170 and rattling."

171 Inovatools variably adapts the
172 rake angle to meet the material
173 challenges. This guarantees
174 optimum chip-breaking and
175 rapid chip clearance. Specially
176 selected corner radius geome-
177 tries with narrow radius toler-
178 ances guarantee increased
179 contouring accuracy, improve
180 the cutting performance and
181 reduce the burden on the cut-
182 ting edges. Depending on the
183 application, high-performance
184 coatings such as Varacon en-
185 sure additional protection
186 against wear and tear and
187 guarantee long service life.

188 Douglas Kline: "Up to now, our
189 specialists have always been
190 able to help the cutter in the
191 aviation and aerospace industry
192 to increase productivity and
193 achieve even better surface
194 quality for their components by
195 means of comprehensive con-
196 sultancy and application-
197 optimized engineering."

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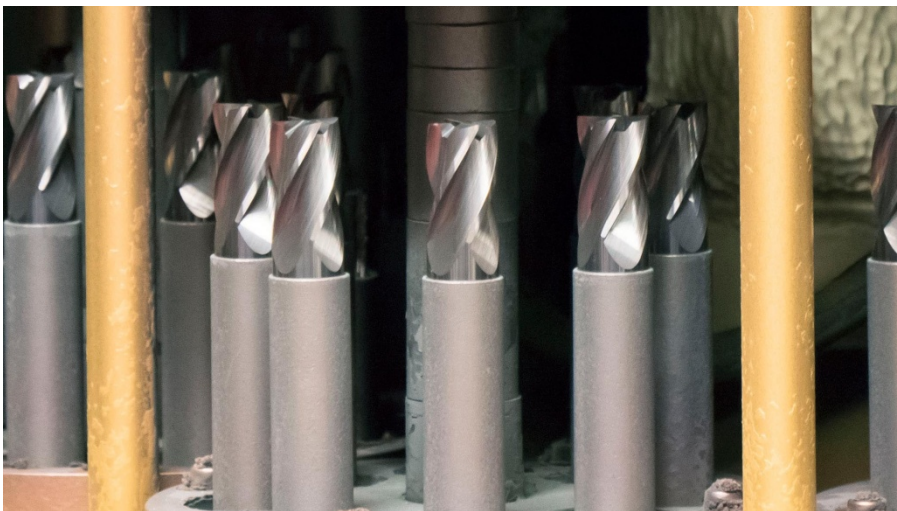
228 ***Inovatools specialists design***
229 ***customized tools and adapt***
230 ***the milling cutters, drills,***
231 ***gages and special solutions***
232 ***precisely to the cutting tasks***
233 ***in question. From the first***
234 ***prototype right up to use in***
235 ***production, the focus here is***
236 ***on increasing productivity***
237 ***and efficiency.***



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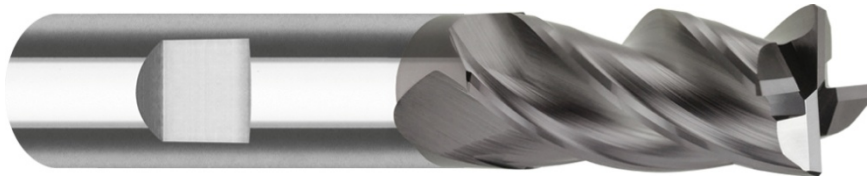
Modern grinding technology, operated by expert specialists, forms the basis for high-quality tool manufacturing.



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Thanks to the high vertical integration with dedicated coating systems, Inovatools has all relevant value creation and quality factors under its own control.



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One example from the wide range of tools for use in the aviation and aerospace industry: the SC end mill Flutemax provides very good results thanks to special edge preparation in conjunction with the microgeometry as well as uneven spacing, an irregular angle of twist, shaped groove and polished Varacon high-performance coating in difficult to cut materials such as stainless steel, titanium, Inconel and Nimonic.



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Jochen Eckerle, Head of Production at Inovatools: “In addition to a very wide product range for the most varied of applications and materials, the company also offers the engineering of special tools customized to an individual application.”



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Douglas Kline, Managing Director at Inovatools USA LLC: “Up to now, our specialists have always been able to help the cutter in the aviation and aerospace industry to increase productivity and achieve even better surface quality for their components.”

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Photos: Inovatools Eckerle & Ertel GmbH