



NEW TBX COBALT DRILL BITS – 4 FACET POINT

A concentration of technology....
A Tivoly Exclusive

▶ ▶ ▶ OV, 07/2012

**NEW TBX COBALT DRILL BITS – 4 FACET
POINT – leading edge technology**



TBX 4 Facet Point

TIVOLY

-pushing the limit-

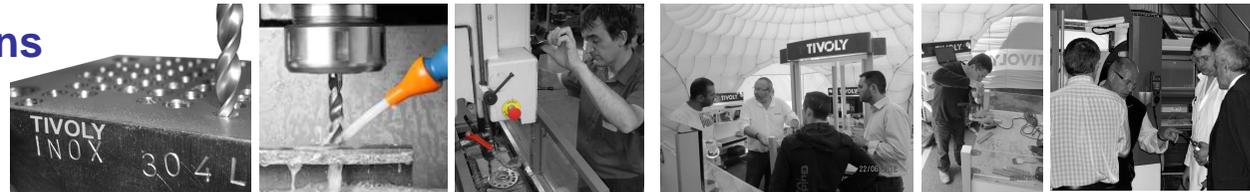
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NEW TBX COBALT DRILL BITS – 4 FACET POINT

Drilling Innovation - a continuous process

■ User driven process

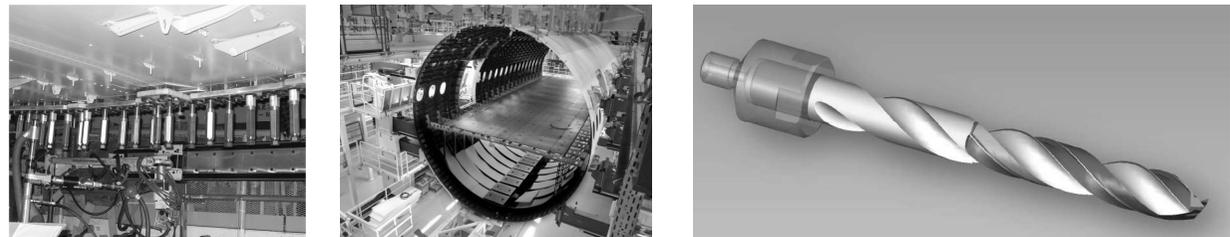
- Consultation
- Understanding applications
- Defining needs
- Prioritisation



Our close contacts with industry enable us to define the broad range of users requirements very precisely and respond with targeted product solutions

■ Industrial Market – Driver of research & development

- Problem analysis
- Research & Development
- Defining solutions
- Manufacturing



Tivoly's is a major supplier of hand held drilling products to the aerospace industry. We develop customer specific product solutions for high volume industrial production and within tight production cost constraints

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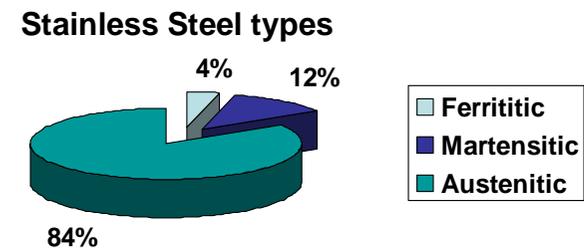
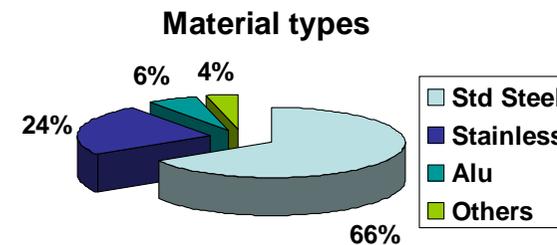
Stainless Steel – an application with specific requirements

- New Generation Drill bit TBX-4F designed for drilling austenitic stainless steels (type 304L & 316L)

Stainless represents 24% of steel drilling applications

Austenitic Stainless steels represent 84% of of stainless drilling applications

Stainless Steel types	Composition	Features	Applications
FERRITIC	Chromium (12-30%)	TB Corrosion resistant Poor heat and cold resistance	Interior Decor Pumps
MARTENSITIC	Chromium (12-18%) Carbone (0,05-1,2%)	Mechanical properties GradeB Corrosion resistance B	(18-0) Cutlery
AUSTENTITIC	Chrome (16-35%) Nickel (7-26%) Carbone (0,1%)	Ductility (Hot/cold) TB Weldability B Low surface roughness Corrosion resistance TB	18/8(304) Food industries , Decorative, exterior protective surfaces, vats & tubes(316L) Biomedical

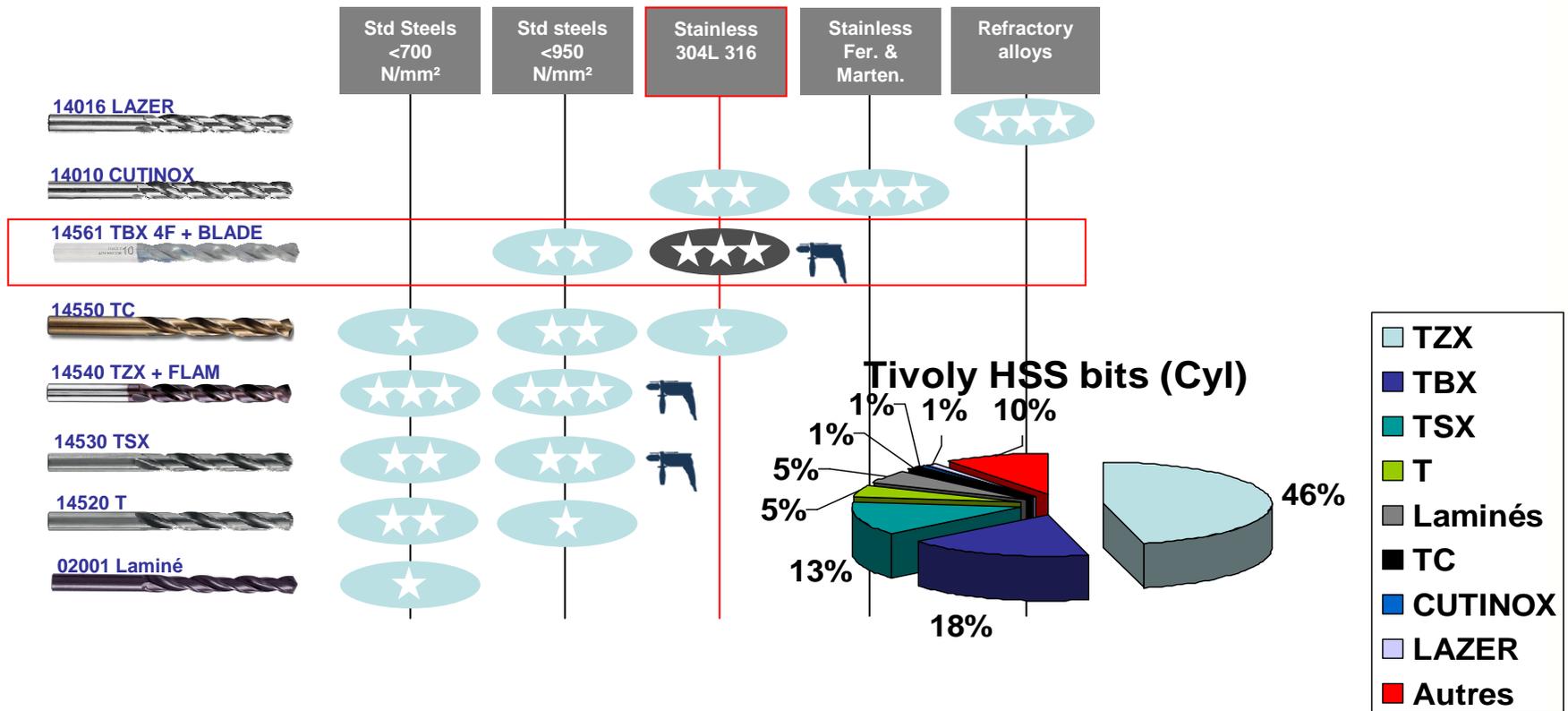


With a production quantity of 600k pieces per annum , TBX represents the second most important drill bit category stocked and sold by our distributors

NEW TBX COBALT DRILL BITS – 4 FACET POINT

A range positioned to achieve optimum performance

■ New TBX 4F drill bits are at the very heart of the drilling range



With the TZX and the NEW TBX-4F Tivoly offers a core range of metal drill bits with genuine added value. These innovations reinforce the Tivoly Distributor's position as a true specialist, providing the necessary technical and commercial tools guaranteed to ensure sales growth

NEW TBX COBALT DRILL BITS – 4 FACET POINT

Demanding High Performance

■ Drilling in stainless steel grades 304L & 316

Drilling in stainless steel poses a number of serious challenges for cutting tools

- Strength and Flexibility** : greater cutting force/speed is required to avoid the creation of a long continuous steel chip and produce smaller fragments. The cutting edges are therefore exposed to greater abrasion forces.
- **Low thermal conductivity** : heat dissipates slowly from the workpiece and from the cutting chips. The drill bit is subjected to excess heat leading to more rapid deterioration and wear.

Current drill bits available in the market all suffer from excessively rapid wear as well as requiring significant additional drilling effort to obtain a relatively clean and precise hole

Key objective for the TIVOLY TBX development team - design a drill bit to overcome these major end user obstacles focussing on the following aspects of performance :-

- Product Life
- User comfort & ease of drilling
- Productivity
- Hole accuracy



NEW TBX COBALT DRILL BITS – 4F

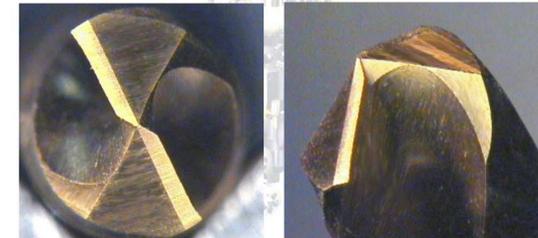
A new generation of tip design



■ 4 Facet Point Project Plan « a concentration of technology »

SCOPE

- User needs (hand held and stationary drilling)
- Production capacity (600k pieces)
- Design vs Cost



TIVOLY R&D Centre CRAOC – development output :

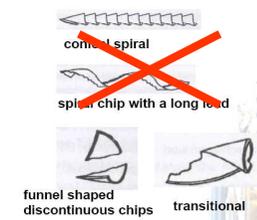
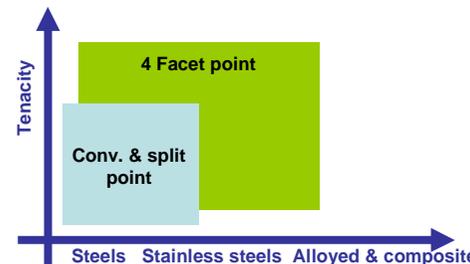
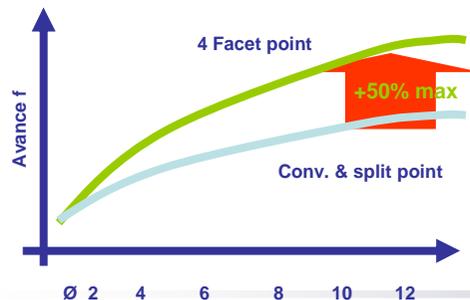
A drill bit which combines several flat main cutting angles (Tivoly exclusive) relief and draft angles leading to a thinner web and combined with a highly resistant cobalt base material



- Geometric Stability
- Stronger tip
- Wear distribution across relief angle
- Chip breaking



- Easier drilling
- Increased bit life
- Improved cutting conditions
- Increased productivity
- Greater control of diametrical accuracy
- Wider application 'window'



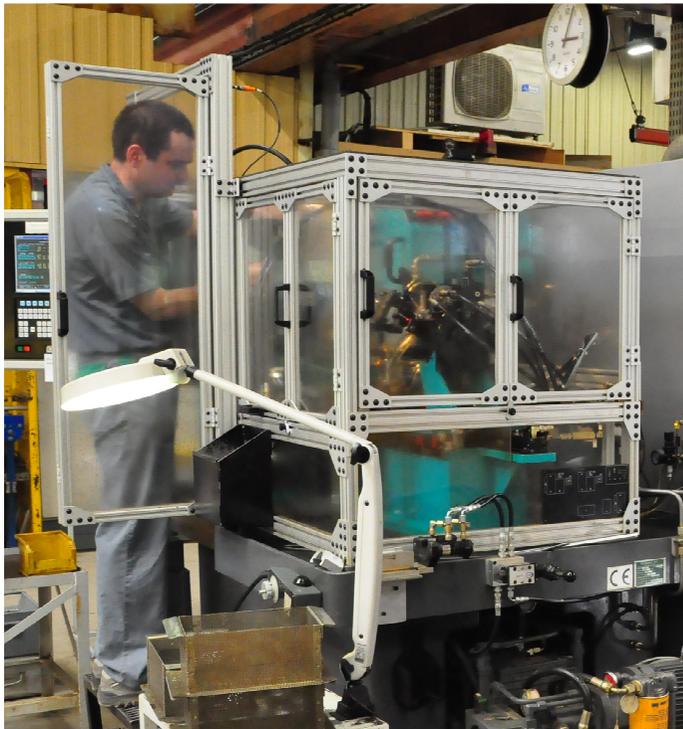
NEW TBX COBALT DRILL BITS – 4F

A world manufacturing exclusive

- Over the last 3 years TIVOLY has made major investments in exclusive automated technology at its Albertville manufacturing site in France. Developments include ..



- grinding for main cutting angles , for draft and relief angles and for web thickness reduction without additional tool modification
- manufacturing capacity and efficiency requirements for volume drill bit production



Tivoly is the first worldwide manufacturer to offer a range of HSS drill bits with a four facet tip grind to the maintenance distribution sector



NEW TBX COBALT DRILL BITS – 4F

New levels of technical performance

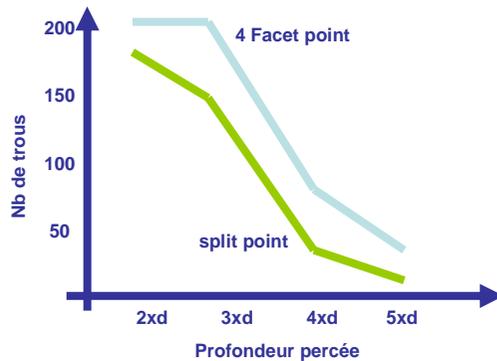
A winning combination

- New 4 face « flat » tip grind
- Blade drill bit protective coating
- Cobalt metal bit body HSCOB

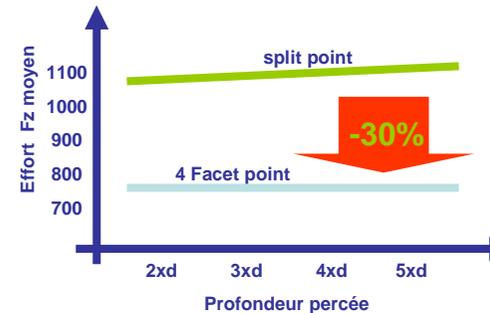
TIVOLY 'BLADE' COATING

Multiple layers TiAlN + TiCN

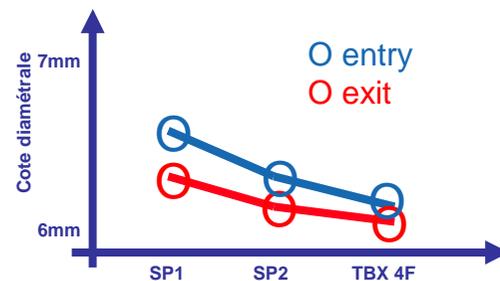
3300 HV hardness – resists abrasion and creates an anti-friction barrier prolonging tool life and performance. Surface heat treatment of 700° creates a thermal anti rust protection on the working part of the bit. A friction coefficient of 0.4 helps to reduce the effects of adhesion between bit and workpiece and allows easier drilling



Drilling life with lubricant d= 6 mm – 304L
Vc = 12 m/mn – N = 637 tr/mn – f = 0.10 – vf = 63.70 mm/mn



Measurement of drilling force with lubricant d= 6 mm – 304L
Vc = 12 m/mn – N = 637 tr/mn – f = 0.10 – vf = 63.70 mm/mn



Hole geometry without lubricant d= 6 mm – 304L
Vc = 8 m/mn – N = 426 tr/mn – f = 0.1 – vf = 42.46 mm/mn



NEW TBX COBALT DRILL BITS – TBX4F

A new level of environmental performance

TBX 4F, The first 4 face « flat grind » tip drill bit made specifically for professional users in metalworking, locksmithing, general mechanical and maintenance tasks **has been designed and manufactured in France to be as environmentally friendly as possible .**

TIVOLY manufacturing

- uses recyclable materials
- minimises amount of material removal
- recycles manufacturing waste
- maintains lower energy consumption

As well as benefiting from the **TBX 4F « Blade »** coated bit drilling performance the **ENDUSER** assists Tivoly's efforts towards sustainable development

- Operator saves time and effort
- Reduced power consumption (esp cordless)
- Increased tool life
- Increased battery life
- Increased equipment life

