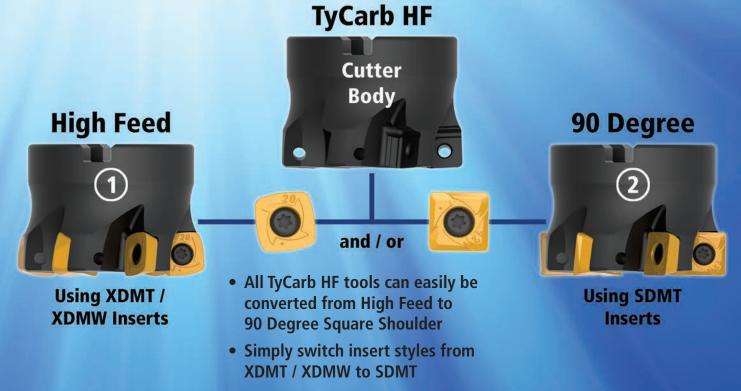
# and focus of the office of the TyCarb High Feed Milling Program

#### A Comprehensive offering of Tooling Designed for High Feed Machining

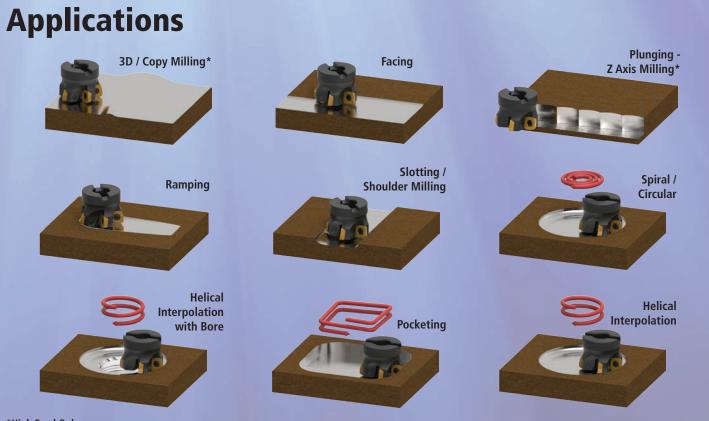
- Exceptional Material Removal
- Two Indexable Insert Sizes
  - Cost Effective 4 Corner Design
- Two Milling Cutters in One Cutter Body Design
- Solid Carbide End Mill Versions



### **Two Unique Tools** Engineered into One Cutter Body Design:



• Less cost and inventory to manage



\*High Feed Only

## **High Feed End Mills**



D

#### **HF10 End Mills**

End Mills with Weldon Shanks and Extended Length End Mills with Cylindrical Shanks

Designation	D	D1	D2	L1	L2	Ар	Flutes							
INSERTS: High Feed XDN	/IT-100415	/ XDM	W-100415	• Squar	re Shoulder	SDMT	-100408							
HF10EM-1000-5.00H2				5.00	2.72		2							
HF10EM-1000-5.00H3	1.000	1.000	.375 -	5.00	2.72	.04	3							
HF10CY-1000-8.00H2*	1.000	1.000	.575	8.00	3.00		2							
HF10CY-1000-10.00H2*				10.00	5.00		2							
HF10EM-1250-6.00J3				6.00	3.72		3							
HF10CY-1250-8.00J3*	1.250	1.250	.620	8.00	3.00	.04	3							
HF10CY-1250-10.00J3*				10.00	5.00		3							
HF10EM-1500-6.00J3	1.500	1.250	.866 -	6.00	-	.04	3							
HF10CY-1500-8.00J3*	1.500	1.200	.000 -	8.00	-	.04	3							
Insert Screw: TX9P	-3007 • F	lag Wre	nch: W-370	)48 • Sc	Insert Screw: TX9P-3007 • Flag Wrench: W-37048 • Screw Driver: W-36229									

12

- Δτ

\*End Mills with Cylindrical Shanks

#### **HF10 Thread-On End Mills**

**Thread-On End Mills with Through Coolant** 

Designation	D	D1	L1	G	Ар	Flutes			
INSERTS: High Feed XDN	/IT-100415	/ XDMW-1	00415 • S	quare Sho	ulder SDN	1T-100408			
HF10TS-1000-M12-2	1.000	.375	1.50	M12	.04	2			
HF10TS-1000-M12-3	1.000	.575	1.50	IVIIZ	.04	3			
HF10TS-1250-M16-2	1.250	.620	1.50	M16	.04	2			
HF10TS-1250-M16-3	1.230	.020	1.50	IVITO	.04	3			
HF10TS-1500-M16-3	1.500	.866	1.50	M16	.04	3			
HF10TS-1500-M16-4	006.1	.000	1.50	IVI I O	.04	4			
Insert Screw: TX9P-3007 • Flag Wrench: W-37048 • Screw Driver: W-36229									



BRIQUE AU CANP



## **High Feed Face Mills**



#### **HF10 Face Mills**

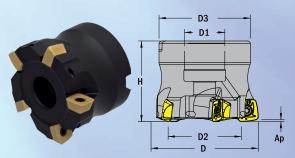
Face Mill Design with Through Coolant

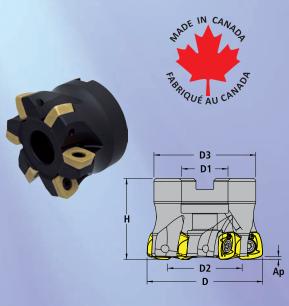
Designation	D	D1	D2	D3	н	Ар	Flutes	
INSERTS: High Feed XDN	/IT-100415	/ XDM	W-100415	• Squar	e Should	er SDM1	<b>F-100408</b>	
HF10SM-2000-1.50F5	2.000	.750	1 205	1 70	1 50	0.4	5	
HF10SM-2000-1.50F7	2.000	.750	1.365	1.70	1.50	.04	7	
Insert Screw: TX9P-3007 • Flag Wrench: W-36548 • Screw Driver: W-36229								

#### **HF14 Face Mills**

Face Mill Design with Through Coolant

Designation	D	D1	D2	D3	H	Ар	Flutes
INSERTS: High Feed XDM	/IT-140520	/ XDM	W-140520	• Square	Shoulder	SDMT	140512
HF14SM-2000-1.50F4	2.000	.750	1.122	1.70	1.50	.08	4
HF14SM-2000-1.50F5	2.000	.750	1.122	1.70	1.50	.08	5
HF14SM-2500-1.75H6	2.500	1.000	1.619	2.20	1.75	.08	6
HF14SM-3000-2.00H5		1.000	_				5
HF14SM-3000-2.00J5	2 000 -	1.250	2 4 4 0	2.75	2.00	.08	5
HF14SM-3000-2.00H7	3.000 -	1.000	2.118		2.00	.08	7
HF14SM-3000-2.00J7		1.250	-				7
HF14SM-4000-2.00J8	4.000	1.250	- 3.116 -	2.75	2.00	.08	8
HF14SM-4000-2.00L8	4.000 -	1.500	- 3.116 -	3.80	2.00	.08	8
HF14SM-6000-2.00L10	6.000	1.500	5.116	3.80	2.00	00	10
HF14SM-8000-2.50T12	8.000	2.500	7.114	5.50	2.00	.08	12
Insert Screw: TX20	-1250 • F	lag Wre	nch: W-365	535 • Scr	ew Driver:	W-455	81







## High Feed Indexable Inserts

High Feed XDI	ts	NPZOMC	NP 25 MP	NP30MC	5MP	NM40MP	NK15MC	<b>VK20MP</b>				
Designation	D	S	D1	L	Rt	NP 2(	NP 2	NP3(	NP3!	NM4	NK1	NK2
XDMT-100415ER-MH												
XDMT-100415SR-PH	.402	107	.138	.040	.089							
XDMW-100415SR-KH	.402	.187	.130	.040	.009							
XDMW-100415SR-PH												
XDMT-140520ER-MH												
XDMT-140520SR-PH	E 70	107	.217	.080	.136							
XDMW-140520SR-KH	.579	.197	.217	.080								
XDMW-140520SR-PH												

**Rt= Theoretical Radius for Programming** 

#### **Square Shoulder SDMT Inserts**

Designation	D	S	D1	L	Rad	NP2	NP2!	NP3(	NP3!	NM4	NK1	NK2
SDMT-100408ER-M												
SDMT-100408SR-K	.409	.191	.138	.409	.031							
SDMT-100408SR-P												
SDMT-140512ER-M												
SDMT-140512SR-K	.583	.205	.217	.583	.047							
SDMT-140512SR-P												

NP20MC (HC-P20) An alternative (harder) new generation CVD coated grade to NP25MP when higher abrasion resistance is required. Suitable for all steels at higher cutting speeds in stable conditions.

NP25MP (HC-P25/M25) A PVD multi-purpose grade suitable for all steels and stainless steel at high cutting speeds with or without coolant in stable conditions.

NP30MC (HC-P30) A universal grade with a tough carbide substrate and new generation CVD coating making an excellent choice for dry machining on a range of steels at moderate cutting speeds.

NP35MP (HC-P35/M35) A tough PVD coated grade for all steels and stainless steels. Most suitable for dry machining under difficult conditions at low to moderate cutting speeds.

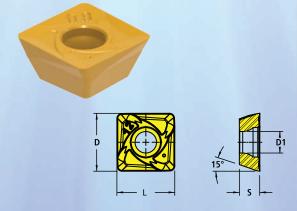
NM40MP (HC-M40) An extremely tough carbide substrate with smooth PVD coating. Suitable for austenitic and duplex stainless steels, at low to moderate cutting speeds. Suitable for use with coolant.

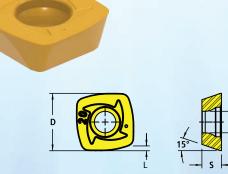
NK15MC (HC-K15) A hard new generation CVD coated grade for dry machining in all cast irons including grey, nodular and compacted graphite cast iron.

NK20MP (HC-K20/P10) A tough carbide substrate with a thick PVD coating makes this grade most suitable for machining of cast materials, but also hardened steel up to 54 Rc.

**XDMT** Best suited in straight high feed facing applications **XDMW** Best suited in pocketing applications







## **High Feed Technical Data**

## The focus

#### **TyCarb High Feed DOC & Programming Info**

Inser	t	Rt	Ар	Х	b
XDM10	0415	0.089	0.04	0.024	0.316
XDM14	0520	0.136	0.08	0.037	0.428

Rt= Theoretical Radius for Programming

#### Programming

#### **Theoretical Radius**

• CAD / CAM systems will require a defined radius dimension in order to program for cavity machining. The "Rt" noted in the table above is defined as the Theoretical Radius to be used for programming of each XDMT/XDMW insert size.

X= Material Uncut

#### **Overcutting and Material left Uncut**

• When programming for high feed inserts with a Theoretical Radius, overcutting is a normal occurrence. The "X" value as detailed in the table indicates the value of material that will remain uncut.

#### **TyCarb High Feed Ramp Angles & Interpolation Info**

Incost	Dia.	Linear Ramp	Helica	Ramp	Z Axis Milling
Insert	Dia.	Angle 'a'	Min Dia	Max Dia	Step Over
	1.00	4.5°	1.30	1.92	0.315
XDMT-100415	1.25	3.0°	1.80	2.42	0.315
XDMW-100415	1.50	2.3°	2.30	2.92	0.315
	2.00	1.7°	3.30	3.92	0.315
	2.00	3.0°	3.10	3.92	0.413
	2.50	2.3°	4.10	4.92	0.413
	3.00	1.6°	5.10	5.92	0.413
XDMT-140520 XDMW-140520	4.00	1.3°	7.10	7.92	0.413
XDIWIW 140320	5.00	0.9°	9.10	9.92	0.413
	6.00	0.7°	11.10	11.92	0.413
	8.00	0.5°	15.10	15.92	0.413

#### **Application Recommendations**

#### **Extended Length Tools**

• When using TyCarb High Feed tools with extended lengths (such as HF10CY tools or HF10TS tools threaded onto long extensions), reduce the cutting conditions to 70% of recommended cutting data of standard length tools.

#### Machine Power and Work Piece Rigidity

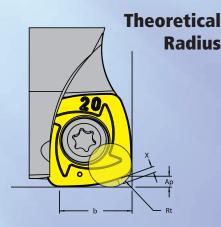
 As machining conditions vary greatly based on machine power and workpiece stability, begin by using half of the recommended values in the Cutting Data tables and progressively increase values as the machine proves to operate within normal conditions.

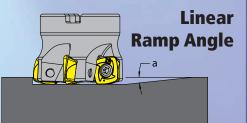
#### **Cutting Forces of High Feed vs Round Copy Mills**

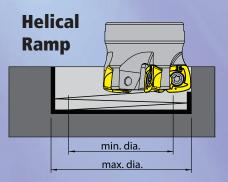
• TyCarb High Feed milling tools are designed to transfer the majority of the cutting forces axially to ensure the most stable cutting conditions. Typical milling with the use of round copy milling style cutters exert greater tangential forces, thereby increasing vibration and lowering productivity.

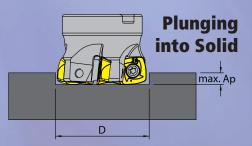
#### Air Blast

 Effective high feed machining will create large amounts of metal chips – use air blasts to prevent re-cutting of chips when pocketing or slotting.









Insert	Max Ap Plunging into Solid
XDM100415	0.030
XDM140520	0.035

## **Cutting Data for HF10/HF14 Milling Cutters**



								HIGH P	ERFORM	/IANCE	COATED				
	Cutting Data for HF10/HF14	High Feed Milling	Cutter		NP20M0	2		NP25MF	)		NP30M	c	1	VP35MI	,
	Carbide Insert	Max ap						fee	d per to	oth *(ir	nch)				
	XDMT/XDMW 100415	0.040"		.028	.035	.063	.028	.035	.063	.028	.039	.063	.028	.039	.063
	XDMT/XDMW 140520	0.080"	HFC	.028	.055	.087	.028	.055	.087	.028	.055	.098	.028	.055	.098
	SDMT 100408	0.350"		.003	.006	.010	.003	.006	.010	.003	.006	.010	.003	.006	.010
P	SDMT 140512	0.472"	90	.004	.006	.011	.004	.006	.011	.004	.006	.011	.004	.006	.011
	Work Material	Types							Vc	SFM					
	Steel, unalloyed, low carbon	A36, 1020, 1030, 1141		620	780	950	560	720	850	420	625	800	390	590	780
	Steel, low to medium carbon	1045, 4140, 4340, 8620		525	650	750	475	590	710	500	590	710	475	580	690
	Steel, alloyed and Tool Steels	H13, A2, D2, M2		475	590	710	425	525	625	425	500	620	400	490	590
	Heat Treated Steels, Stainless Steels	410, 410S, 420		360	460	560									
								HIGH PI	ERFORM	ANCE	COATED	)			
	Cutting Data for HF10/HF14	High Feed Milling	Cutter	1	NP25MF	>		NP35MF	>	r	MM40M	P			
	Carbide Insert	Max ap						fee	d per to	oth *(ir	nch)				
	XDMT/XDMW 100415	0.040"		.028	.035	.063	.028	.035	.063	.028	.035	.063			
	XDMT/XDMW 140520	0.080"	HFC	.028	.055	.087	.028	.055	.087	.028	.055	.087			
M	SDMT 100408	0.350"		.003	.004	.006	.003	.004	.006	.003	.004	.006			
	SDMT 140512	0.472"	90	.004	.007	.009	.004	.007	.009	.004	.007	.009			
	Work Material	Types							Vc	SFM					
	Austenitic	303,304,316		295	425	490	260	360	460	325	425	525			
	Heat treated Austenitic	17-4, 15-5		190	260	360	1			230	325	390			
	Duplex	310mod,329								170	230	300			
	Cutting Data for UE10/UE14	Uigh Food Milling	Cuttor					HIGH PI	ERFORM	ANCE (	COATED	)			
	Cutting Data for HF10/HF14	High Feed Milling	Cutter	I	NK15MI	<b>,</b>		NK20MI	2		NP25MI	Р			
	Carbide Insert	Max ap						fee	d per to	oth *(ir	nch)				
	XDMT/XDMW 100415	0.040"		.028	.039	.063	.028	.039	.063	.028	.039	.063			
	XDMT/XDMW 140520	0.080"	HFC	.028	.055	.098	.028	.055	.098	.028	.055	.098			
	SDMT 100408	0.350"		.003	.007	.012	.003	.007	.012	.003	.007	.012			
K	SDMT 140512	0.472"	90	.004	.010	.013	.004	.010	.013	.004	.010	.013			
	Work Material	Hardness							Vc	SFM					
	Crew Cast Iron	Ferritic		600	800	1200	550	750	1050	460	720	980			
	Grey Cast Iron	Pearlitic		530	650	850	490	620	750	380	570	690			
	Dustila Iran	Ferritic		1						360	475	590			
	Ductile Iron	Pearlitic								340	440	560			
	Nodular Graphite Iron	Pearlitic		380	500	650	360	475	590	320	425	525			
	Cutting Data for HF10/HF14	High Food Milling	Cuttor					HIGH PI	ERFORM	IANCE	COATED	)			
				1	M40M	P									
	Carbide Insert	Max ap					r	fee	d per to	oth *(ir	nch)				
	XDMT/XDMW 100415	0.040"	HFC	.028	.035	.063									
S	XDMT/XDMW 140520	0.080"		.028	.055	.087									
	SDMT 100408	0.350"	90	.003	.004	.006									
	SDMT 140512	0.472"		.004	.007	.009				<u> </u>					
	Work Material	Турез					<u> </u>		Vc	SFM					
	Nickel/cobalt based Alloys	A-286, Inconel, Hasteloy, W	laspaloy	90	160	230	ļ								
	Titanium alloys	TiAL64v		90	160	260									
	Cutting Data for HF10/HF14	High Feed Milling	Cutter		NK20MI	>	1	HIGH PI		IANCE (	CUATED				
	Carbide Insert	Max ap								l ooth *(ir	nch)				
	XDMT/XDMW 100415	0.040"	1	.014	.025	.040	.014	.020	.040		,				
	XDMT/XDMW 140520	0.040	HFC	.020	.025	.040	.020	.020	.040						
H	SDMT 100408	0.350"		.003	.040	.008	.003	.040	.008						
	SDMT 140512	0.472"	90	.003	.005	.010	.003	.005	.010						
	Work Material	Hardness								I SFM					
		45-49 HRc		230	325	390	190	260	360						
	Hardened Steel	49-54 HRc		90	160	250									



- TyCarb High Feed end mills are designed for roughing to semi-finish applications
- · Significantly reduces machining time in hardened materials
- TyCarb High Feed end mills are capable of feed rates up to 0.029 IPT
- Effective for Z axis machining including pocketing, face milling, helical ramping as well as circular interpolation
- Now available with next generation AlCrN PVD coating
- Excellent in long reach applications

#### **High Feed End Mills**

Designation	D1	D	Rt	х	Max ap	L	L3	D³	Flutes	TL30 Coated
HF4RC-DR0250-034	1/4	1/4	.034	.006	.013	2.50	.750	.210	4	
HF4RC-DR0312-042	5/16	5/16	.042	.008	.017	3.00	1.00	.270	4	•
HF4RC-DR0375-051	3/8	3/8	.051	.010	.020	3.50	1.25	.340	4	•
HF4RC-DR0500-070	1/2	1/2	.070	.013	.028	4.00	1.50	.460	4	•
HF4RC-DR0625-085	5/8	5/8	.085	.016	.033	4.00	1.50	.590	4	
HF5RC-DR0625-085	5/8	5/8	.085	.016	.033	4.00	1.50	.590	5	•
HF5RC-DR0750-100	3/4	3/4	.100	.019	.040	5.00	2.00	.710	5	



ors and/or printing errors will be accepted

Rt= Theoretical Radius for Programming

X= Material Uncut

#### **High Feed End Mills - Technical Programming Information**

Cutter Dia.	Max an	Rt	Shoulder	RCN	x	Circular Int	terpolation	Length of t	ravel to max	ap per deg.
Inch	Max. ap	ĸ	Snoulder	ĸĊŇ	^	Smallest	Largest	deg.	2 deg.	3 deg.
1/4	.013	.034	.020	.064	.006	.378	.500	.762	.381	.254
5/16	.017	.042	.024	.080	.008	.472	.625	.953	.476	.317
3/8	.020	.051	.030	.096	.010	.567	.750	1.143	.572	.381
1/2	.027	.070	.040	.126	.013	.752	1.000	1.525	.762	.508
5/8	.033	.085	.049	.160	.016	.945	1.250	1.906	.953	.635
3/4	.040	.100	.059	.192	.019	1.134	1.500	2.287	1.143	.762
All dimensions are show	All dimensions are shown in inch						eduction:	100%	70%	50%

#### **Recommended Cutting Parameters**

Work Material	Axial DOC	Radial DOC	Speed		Recommended Feed (Inches Per Tooth)					
			Min.	Max.	1/4	5/16	3/8	1/2	5/8	3/4
Medium Carbon Steels <= 38 Rc 4140, 4340	0.05 x D	0.50 x D	500	650	.010014	.012016	.016020	.020025	.022027	.024029
Tool and Die Steels <= 38 Rc A2, D2, O1, S7, P20, H13	0.05 x D	0.50 x D	480	600	.010014	.012016	.016020	.020025	.022027	.024029
Tool Steels 39 Rc to 48 Rc	0.05 x D	0.50 x D	375	525	.006010	.008012	.012014	.016020	.017022	.018024
Easy to machine stainless steel 416, 410, PH Stainless	0.05 x D	0.50 x D	250	375	.006010	.008012	.012014	.016020	.017022	.018024
Hardened Tool Steels 48 - 53 Rc	0.05 x D	0.50 x D	350	500	.008012	.010014	.014018	.018022	.020024	.020027



TYSON TOOL COMPANY LIMITED 75 ORMONT DRIVE, TORONTO, ONTARIO, M9L-2S3 TEL: (416) 746-3688 ~~ FAX: (416) 746-5415 INTERNET: www.tysontool.com ~~ E-MAIL: sales@tysontool.com Available From: