

P. Schmage¹, I. Nergiz¹, F. Sito², U. Platzter¹ & M. Rosentritt³

¹ Department of Restorative and Preventive Dentistry, University of Hamburg; ² Private Office, Hamburg; ³ Department of Prosthetic Dentistry, Regensburg University Medical Center, GERMANY

INTRODUCTION

Sometimes crown preparation is not performed immediately after tooth reconstruction. When core build-up materials are exposed to the oral environment, wear might occur.

This investigation evaluated wear, surface roughness and structure of 10 core build-up composites, 2 glassionomer cements and 4 posterior restorative composites.

MATERIAL and METHODS

Test samples were fabricated of 16 materials (n=9, table 1).

ACTA testing was performed using a three body wear device (Willytec, München, Germany; 200 000 cycles in millet seed) after water storage (14 d, 20°C).

Wear at the right and left side of the track and surface roughness R_A (DIN 4768) after wear were measured using a profilometer.

Surface structures were evaluated using SEM.

Statistical analyse (Mann-Whitney U-test, $\alpha=0.05$)

	Material	Company	Curing Mode	Type
Glassionomer Cements (GIC)	Ketac-Bond	3M Espe, Seefeld, Germany	self curing	normal
	Ketac-Bond Plus	3M Espe	self curing	packable
Core Build-up Composites (CBC)	Build-It	Jeneric Pentron, Wallingford, CT, USA	auto curing	flowable
	Chroma Core	Morita Europe, Dietzenbach, Germany	dual curing	normal
	Core Paste	Dent Mat, Santa Maria, CA, USA	auto curing	packable
	LuxaCore	DMG, Hamburg, Germany	dual curing	normal
	LuxaCore Smart Mix	DMG	dual curing	flowable
	Multicore Flow	Ivoclar Vivadent, Schaan, Liechtenstein	dual curing	flowable
Posterior Restorative Composites (PRC)	Reblida D	Voco, Cuxhaven, Germany	dual curing	normal
	Reblida LC	Voco	light curing	normal
	Reblida DC	Voco	dual curing	flowable
	Ti-Core	EDS, South Hackensack, NJ, USA	auto curing	packable
Posterior Restorative Composites (PRC)	Ecusit	DMG	light curing	normal
	Grandio	Voco	light curing	normal
	Quixfil	Dentsply DeTrey, Konstanz, Germany	light curing	normal
	Tetric Evo Ceram	Ivoclar Vivadent	light curing	packable

Tab. 1: List of tested materials

RESULTS

Wear and surface roughness values are presented in figures 1 and 2, their significant differences are listed in tables 2 and 3. Wear of posterior restorative composites was significant lower than that of all core materials except for Reblida LC compared to Ecusit, Quixfil and Tetric Evo Ceram as well as Build-It, Chroma Core and Reblida DC compared to Quixfil. Wear of Ti-Core was significantly higher than of all other materials. R_A of core build-up composites except for Core Paste and Ti-Core were significantly lower than glassionomer cements and posterior restorative composites except for Ecusit.

Build-It, Multicore Flow, Reblida LC, Ecusit and Tetric Evo Ceram demonstrated homogenous surface structures (figure 3).

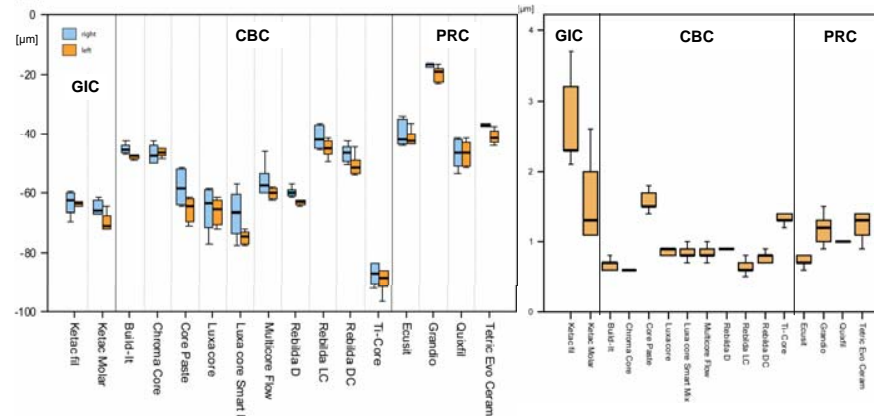


Fig. 1: Wear of the 16 materials

	Ketac-Bond Plus	Ketac-Bond	Build-It	Chroma Core	Core Paste	LuxaCore	LuxaCore Smart Mix	Multicore Flow	Reblida D	Reblida LC	Reblida DC	Ti-Core	Ecusit	Grandio	Quixfil	Tetric Evo Ceram	
Ketac-Bond Plus																	
Ketac-Bond	**																
Build-It	**	**															
Chroma Core	**	**	**														
Core Paste	**	**	**	**													
LuxaCore	**	**	**	**	**												
LuxaCore Smart Mix	**	**	**	**	**	**											
Multicore Flow	**	**	**	**	**	**	**										
Reblida D	**	**	**	**	**	**	**	**									
Reblida LC	**	**	**	**	**	**	**	**	**								
Reblida DC	**	**	**	**	**	**	**	**	**	**							
Ti-Core	**	**	**	**	**	**	**	**	**	**	**						
Ecusit	**	**	**	**	**	**	**	**	**	**	**	**					
Grandio	**	**	**	**	**	**	**	**	**	**	**	**	**				
Quixfil	**	**	**	**	**	**	**	**	**	**	**	**	**	**			
Tetric Evo Ceram	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**		

Tab. 2: Significant differences of wear between materials (** p<0.01, * p<0.05, n.s. p>0.05)

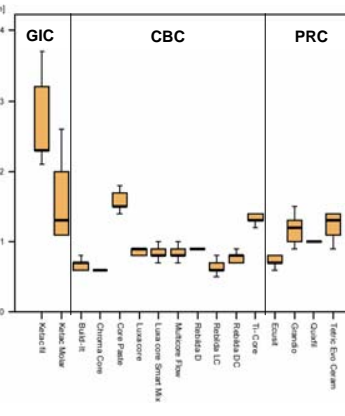


Fig. 2: Surface roughness R_A after wear

	Ketac-Bond Plus	Ketac-Bond	Build-It	Chroma Core	Core Paste	LuxaCore	LuxaCore Smart Mix	Multicore Flow	Reblida D	Reblida LC	Reblida DC	Ti-Core	Ecusit	Grandio	Quixfil	Tetric Evo Ceram	
Ketac-Bond Plus																	
Ketac-Bond	**																
Build-It	**	**															
Chroma Core	**	**	**														
Core Paste	**	**	**	**													
LuxaCore	**	**	**	**	**												
LuxaCore Smart Mix	**	**	**	**	**	**											
Multicore Flow	**	**	**	**	**	**	**										
Reblida D	**	**	**	**	**	**	**	**									
Reblida LC	**	**	**	**	**	**	**	**	**								
Reblida DC	**	**	**	**	**	**	**	**	**	**							
Ti-Core	**	**	**	**	**	**	**	**	**	**	**						
Ecusit	**	**	**	**	**	**	**	**	**	**	**	**					
Grandio	**	**	**	**	**	**	**	**	**	**	**	**	**				
Quixfil	**	**	**	**	**	**	**	**	**	**	**	**	**	**			
Tetric Evo Ceram	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**		

Tab. 3: Significant differences of surface roughness R_A after wear between materials (** p<0.01, * p<0.05, n.s. p>0.05)

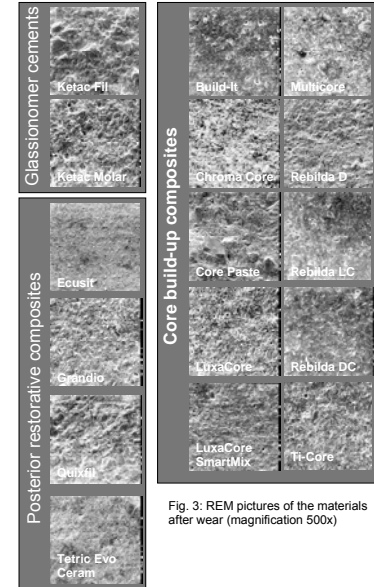


Fig. 3: REM pictures of the materials after wear (magnification 500x)

CONCLUSION

Wear of core build-up composites differed widely and was higher than that of posterior restorative composites for most materials. Whereas the roughnesses of core build-up composites was relatively low and their surfaces smoother except for Core Paste and Ti-Core compared to posterior restorative composites.