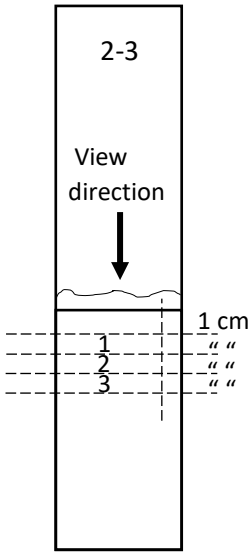
Notes on microscopy

Procedure

Microscopy on tested specimens 2-3 (25 mm/min) en 2-6 (5 mm/min). Cut at 3 locations in the contact area using a water-cooled diamond blade saw, schematically illustrated in figure below. An additional cut at around 1 cm from the right side was required in order to fit the cross-section in the mold for embedding with epoxy. The arrow in the figure denotes the viewing direction, with the numbering denoting the different cross-sections. Labelling: [unique label specimen]_[cross-section nr].



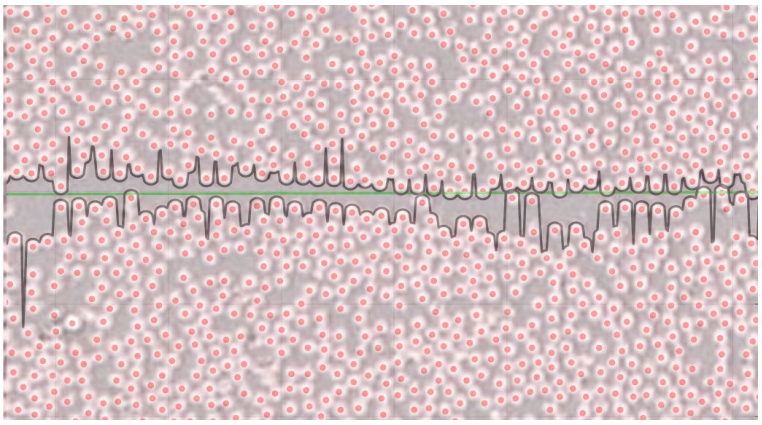
Cross-sections were later on analyzed in a Keyence digital microscope with (mostly) 400x for zoomed micrographs (in labelling supplemented by L (left), M (middle) or R (right) designating more or less the position within the micrograph) and 200x for stitched overview micrographs.

Microscopy on Toray C/LM-PAEK specimen measured at 5 mm/min, (17-5). Same procedure as specimens above and same labelling. Only zoom micrographs, thus on 400x at different positions in the cross-sections.

Later on, additional micrographs are made to be used in the aforementioned paper (same day, same conditions, same lightning etc.) to reflect typical difference between C/PEEK and C/LM-PAEK specimens. Not further analyzed nor included in the dataset.

Analysis

Micrographs were analyzed to find the fiber center locations using ImageJ by smoothing and using the find maximum function. The obtained XY coordinates per micrograph are stored in the .txt files denoted with ROI (region of interest) in the folder 'Microscopy_data'. The fiber center locations were then loaded in Matlab and further analyzed to obtain the matrix interlayer thickness distribution in the ply-ply interface. See Fig. 7 in the aforementioned paper for an example, as well as the figure below:



The following values were used in the analysis in the script 'Fig7_C_PEEK_process_fiber_locations' (see folder 'Data and scripts' -> 'scripts') to obtain the matrix interlayer thickness distribution in the upper and lower ply-ply interface per micrograph:

Micrograph	*x_L*	*x_R*	*y_t_L*	*y_t_R*	*y_b_L*	*y_b_R*	*y_t_m*	*y_b_m*	*Meas*
2_3_1_R	810	821	641	624	331	317	634	324	428
2_3_2_L	785	836	875	831	290	248	852	270	429
2_3_2_R	734	758	816	768	221	185	790	218	425
2_3_3_R	886	896	696	699	92	97	694	94	435
2_3_3_R_2	981	990	787	791	199	200	791	199	437
Micrgraph	*x_L*	*x_R*	*y_t_L*	*y_t_R*	*y_b_L*	*y_b_R*	*y_t_m*	*y_b_m*	*Meas*
2_6_1_R	876	886	712	714	289	281	713	289	420
2_6_2_R	890	903	772	785	392	409	778	395	415
2_6_3_R	934	950	789	828	359	402	808	387	422
Micrograph	*x_L*	*x_R*	*y_t_L*	*y_t_R*	*y_b_L*	*y_b_R*	*y_t_m*	*y_b_m*	*Meas*
17_5_1_L	0	0	1285	1266	210	188	1280	198	443
17_5_1_M	0	0	1290	1246	219	175	1264	189	437
17_5_1_R	0	0	1072	1077	14	21	1074	20	430
17_5_2_L	0	0	1327	1330	219	229	1330	229	449
17_5_2_M	0	0	1106	1087	27	1	1089	11	440
17_5_2_R	0	0	1269	1224	217	180	1245	197	426
17_5_3_L	0	0	1114	1130	19	37	1120	27	446
17_5_3_M	0	0	1272	1278	195	198	1273	193	441
17_5_3_R	0	0	1084	1087	40	39	1086	39	427