

NEWSPEC GA n. 604168 – FINAL REPORT – Figures and Tables

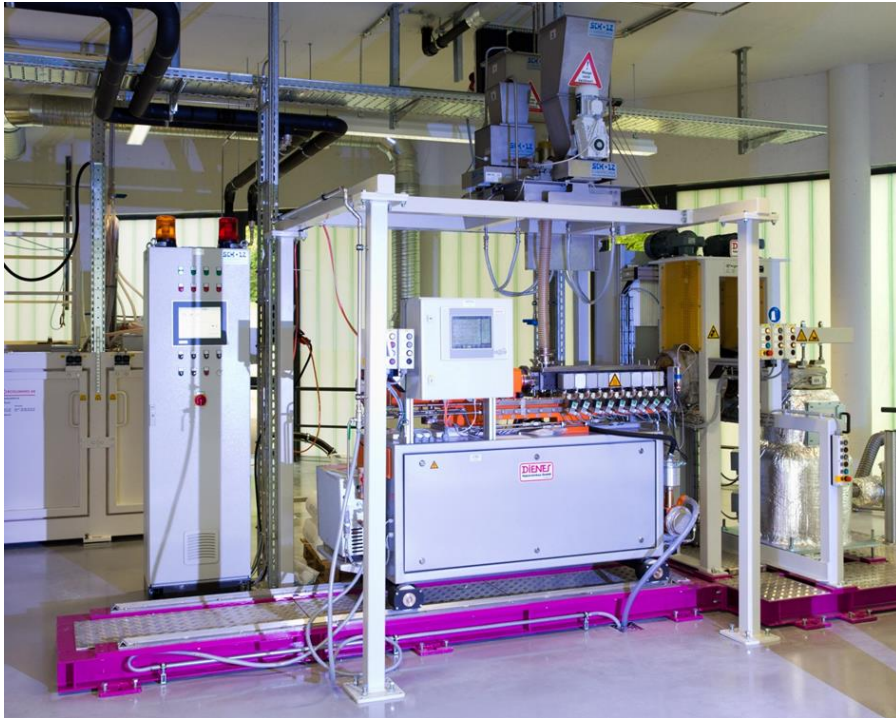


Figure 1 Melt-spinning pilot line for PE-precursor at the HPFC



Figure 2 Joining of PE-precursor fibers in two steps from 0.3K up to 12K precursor fiber



Figure 3 Winding of 12K precursor fiber



Figure 4 Some of the PE precursor spools produced at the HPFC pilot line during NEWSPEC

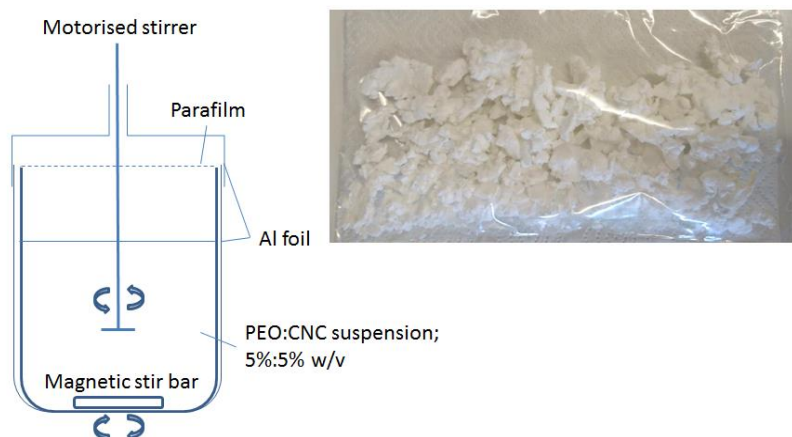


Figure 5 Method for dispersing PEO:CNC into the PE matrix

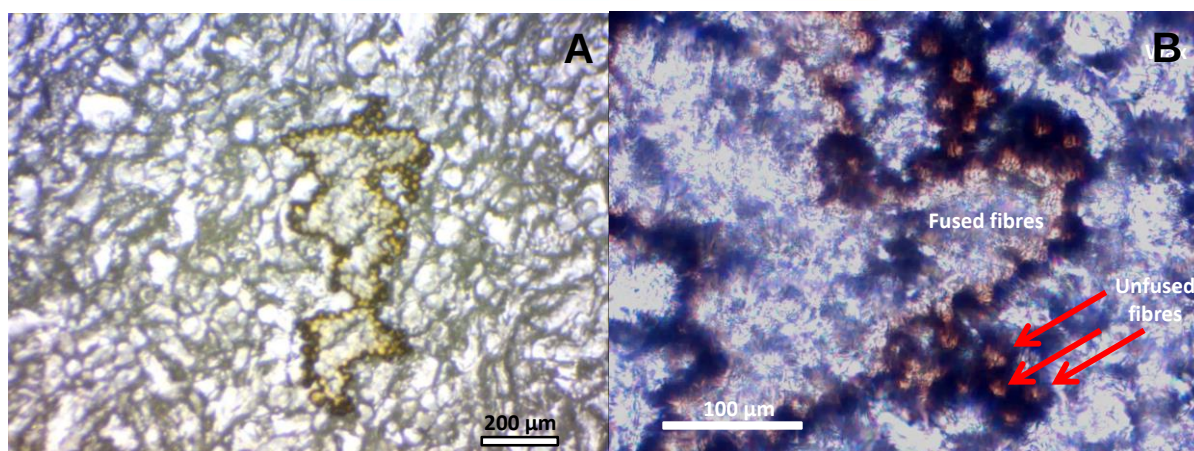


Figure 6 Spool of stabilized PE precursor with CNC additives (top) and light microscopy image of PE1639, 0.125%CNC/PEO fibers after sulfurization - microtome cross section after embedding in paraffin wax (bottom)

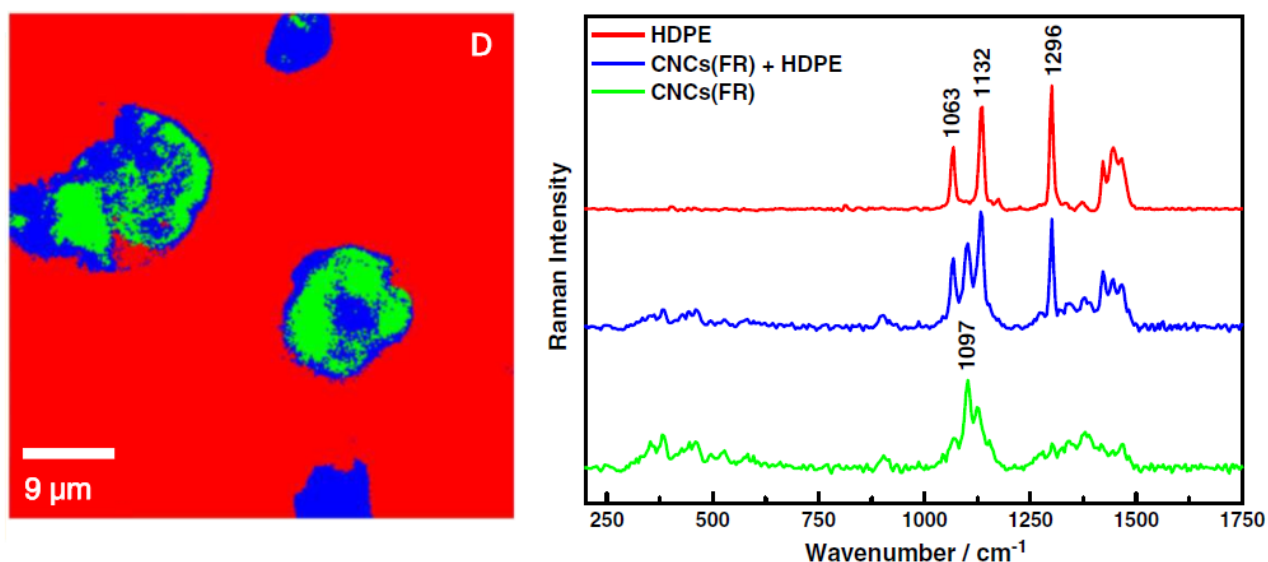


Table 1. Average area fraction of the component of chemical images quantified using Image J software

Composite	Area fraction			Ratio of fraction	
	Red (μm^2)	Blue (μm^2)	Green (μm^2)	CNCs/HDPE	Green/Blue
2.5% CNCs(FR)-HDPE	2194 $\pm$ 112	238 $\pm$ 98	35 $\pm$ 26	0.13 $\pm$ 0.06	0.16 $\pm$ 0.11
5.0% CNCs(FR)-HDPE	2216 $\pm$ 150	164 $\pm$ 91	60 $\pm$ 67	0.12 $\pm$ 0.08	0.25 $\pm$ 0.21
2.5% CNCs(SP)-HDPE	2265 $\pm$ 85	105 $\pm$ 40	97 $\pm$ 81	0.09 $\pm$ 0.04	1.27 $\pm$ 1.48
5.0% CNCs(SP)-HDPE	2220 $\pm$ 101	148 $\pm$ 54	100 $\pm$ 66	0.11 $\pm$ 0.05	0.72 $\pm$ 0.43

Red indicates fraction area corresponding to HDPE. Blue indicates fraction area corresponding to CNCs + HDPE; Green indicates fraction area corresponding to CNCs.

Figure 7 (top) Raman maps and intensity plots on HDPE:CNC compounds (bottom) Average area fraction of the component of chemical images.

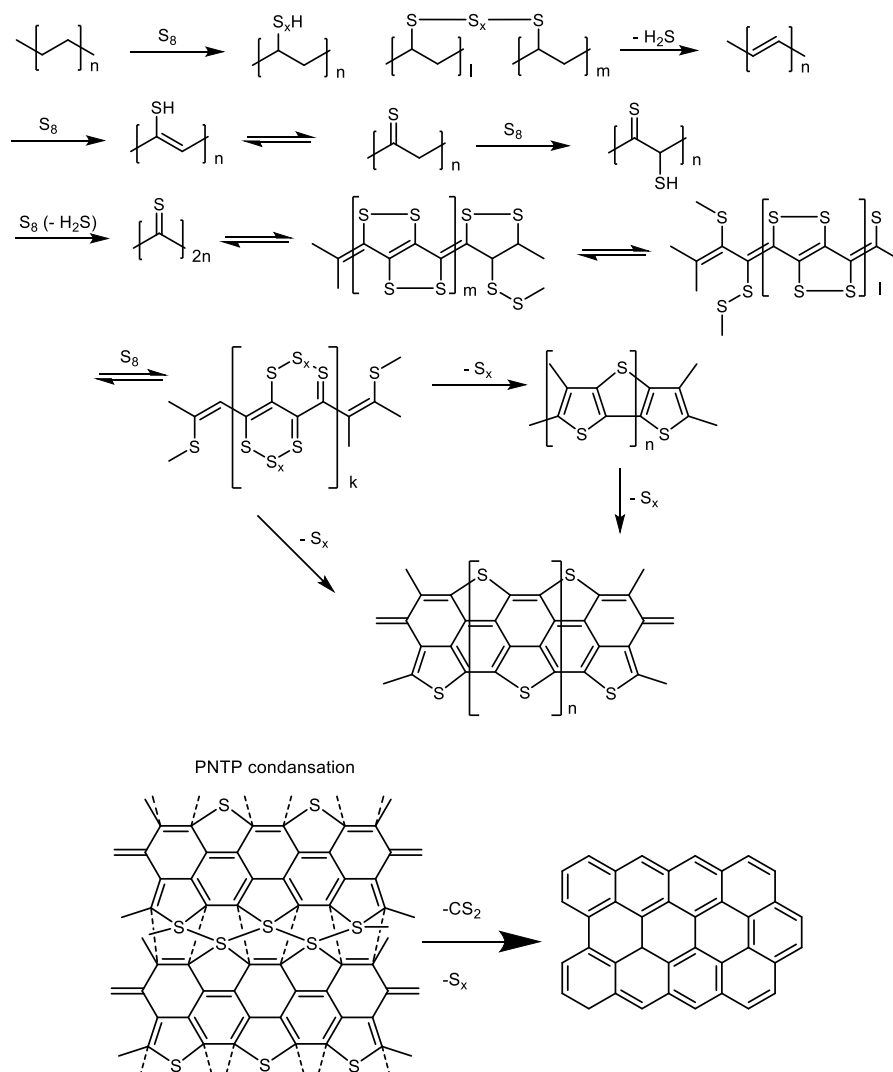


Figure 8: Sulfurization of PE and formation of polynaphthathiophene (PNTTP) as precursor of crystalline carbon structure



Figure 9 (left) SULFI equipment, (right) waste-gas treatment plant

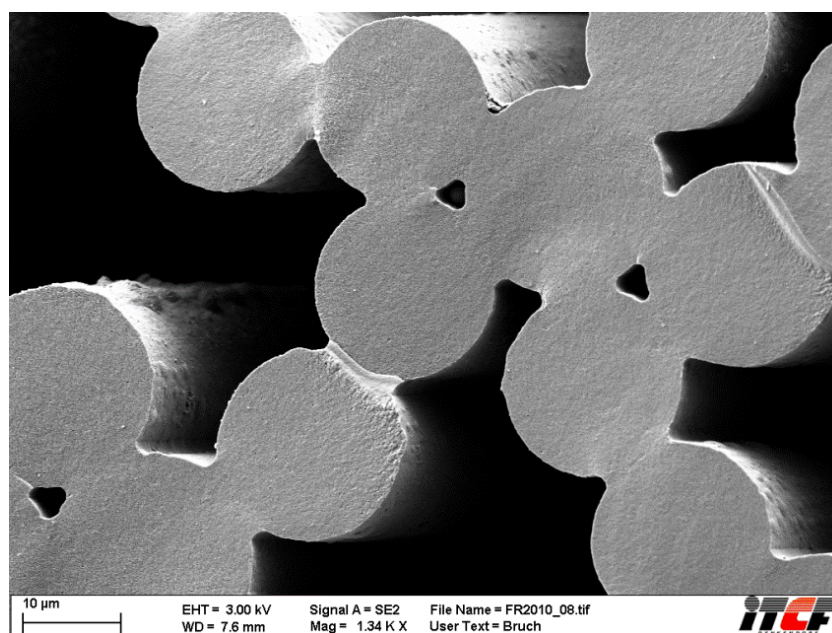


Figure 10 SEM image of carbonized fiber bundles from PE precursor showing the fiber sintering



Figure 11 Mass spools with the produced bicomponent PE fibers

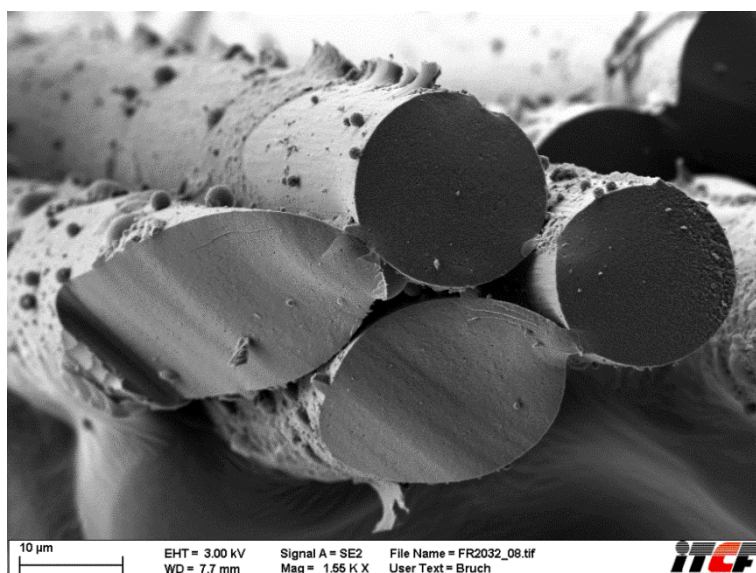


Figure 12 Cross section of the PE fiber (KM0254-01) stabilized at 260°C after the carbonization

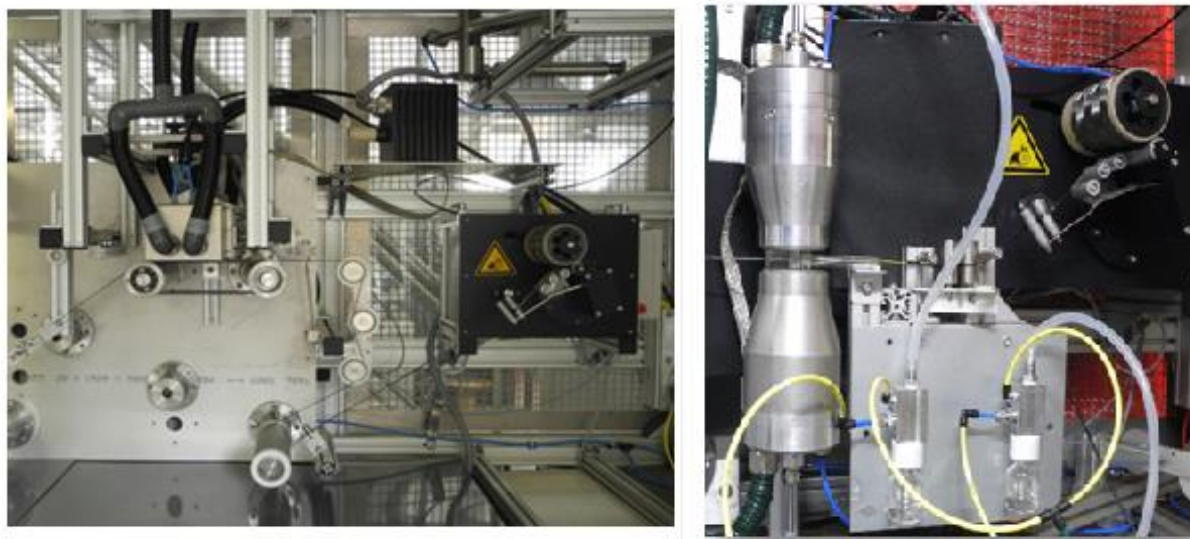


Figure 13 Double-spot pilot prototype for plasma treatment of CFs

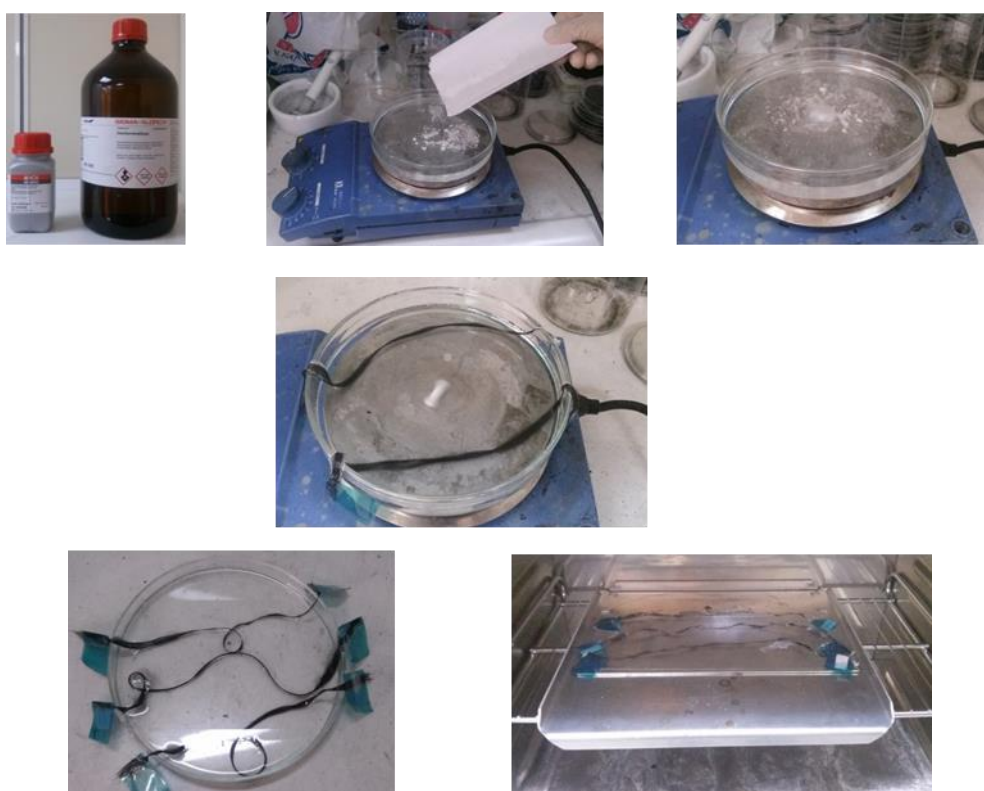


Figure 14 Lab scale methodology for RT oxidation of CFs

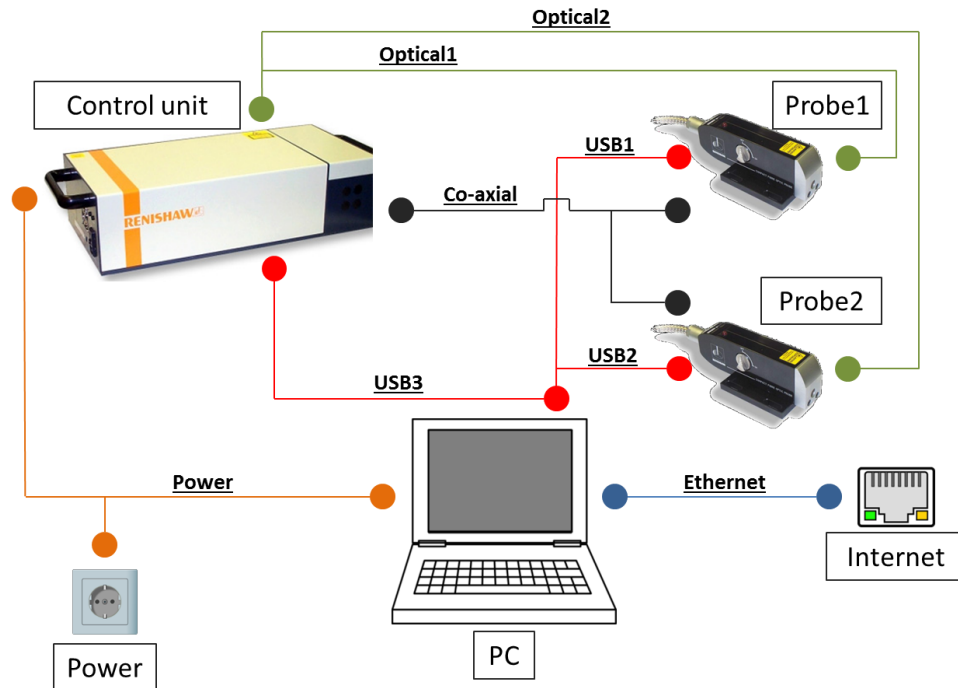


Figure 15 Overview of the Raman system layout

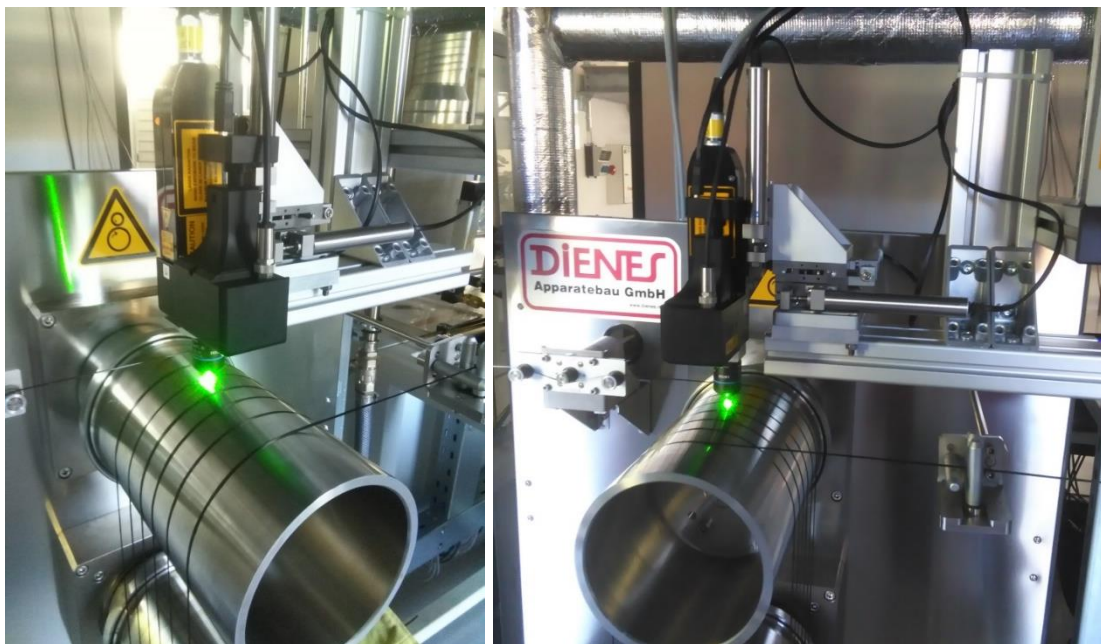


Figure 16 Remote Raman probes in operation at HPFC

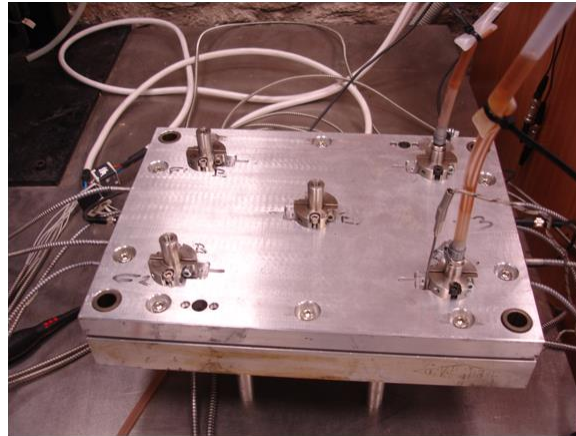


Figure 17 Starting and ending figures of the resin transfer moulding.

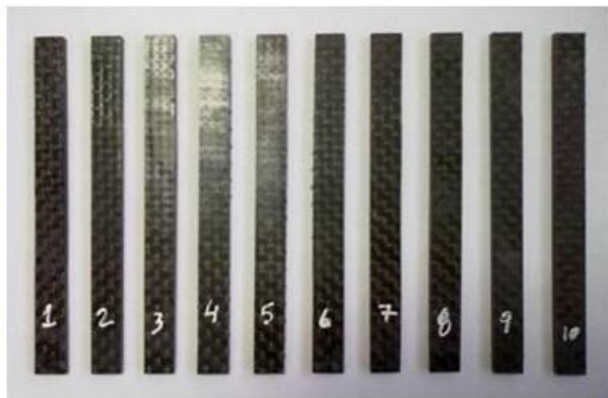
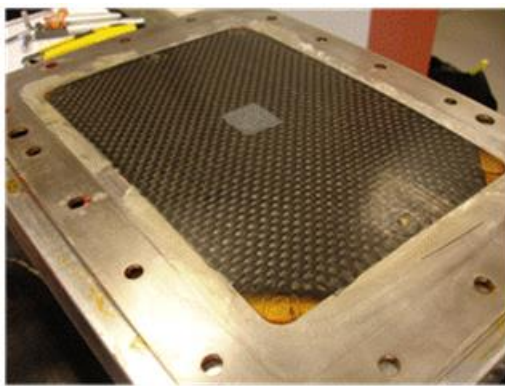


Figure 18 Moulded composite plate and realized specimens for tests

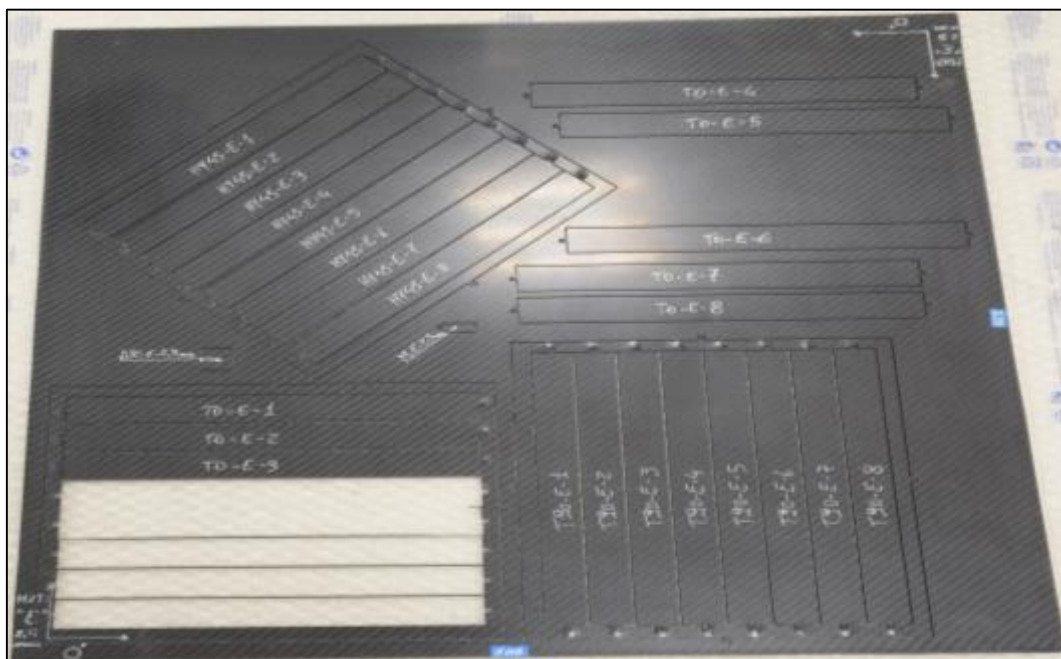


Figure 19 Test specimens obtained by water-jet cutting of 2,5mm plate.

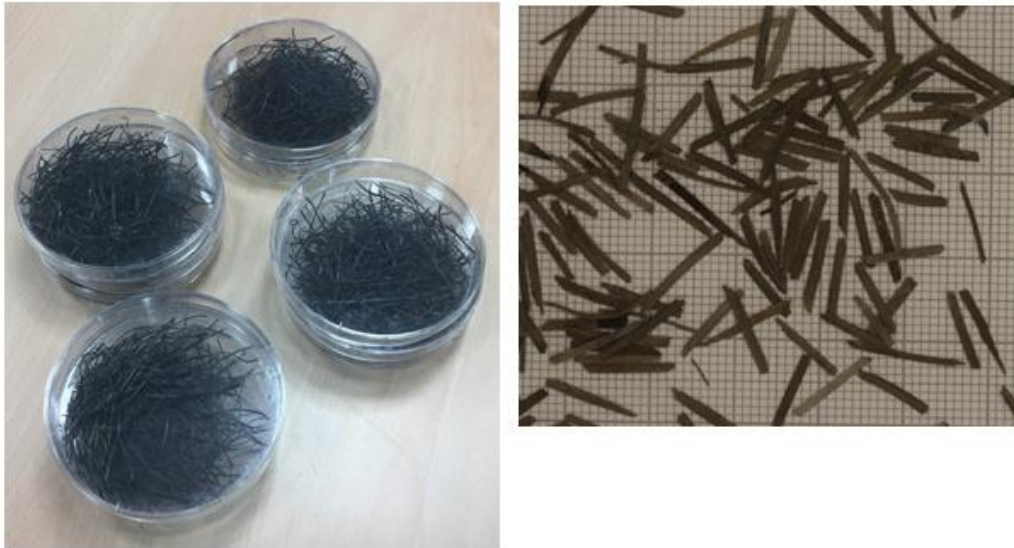


Figure 20 PE-CFs as received from DITF (left), chopped PE-CFs (right)

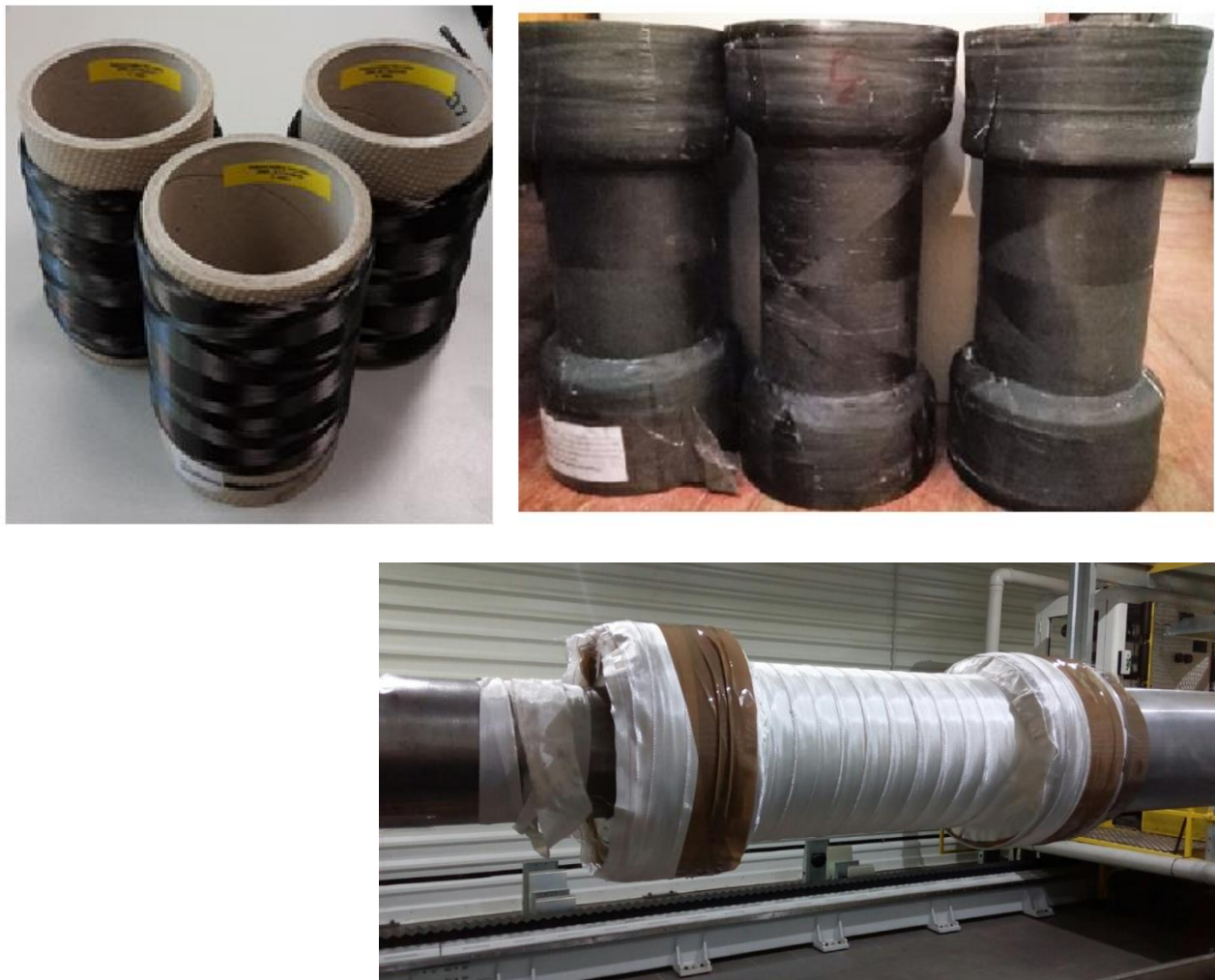


Figure 21 (upper left) New functionalized CFs (upper right) Produced high pressure natural gas storage vessels and picture of semi-finished demonstrator on the mandrel with winded technological shell (bottom right).

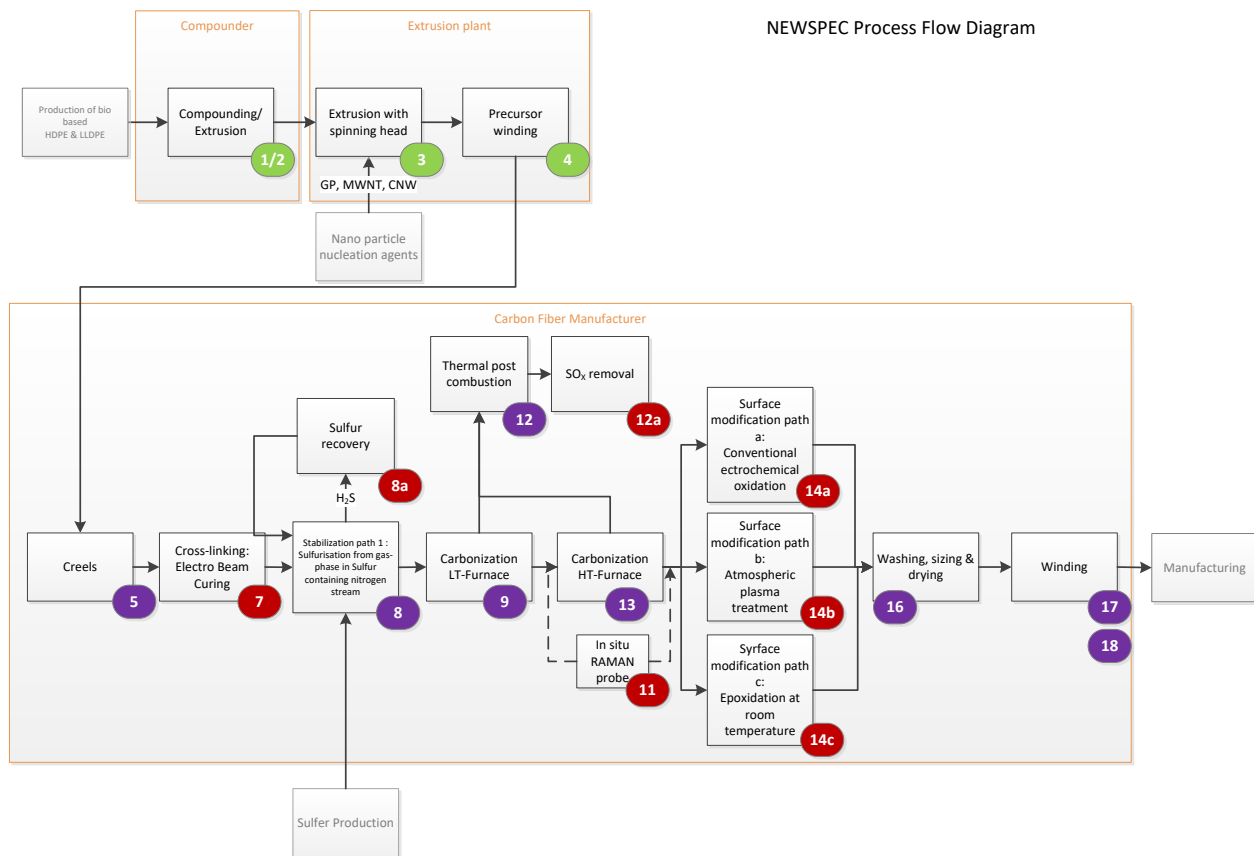


Figure 22 Process flow diagram of the NEWSPEC production process for PE based carbon fibres

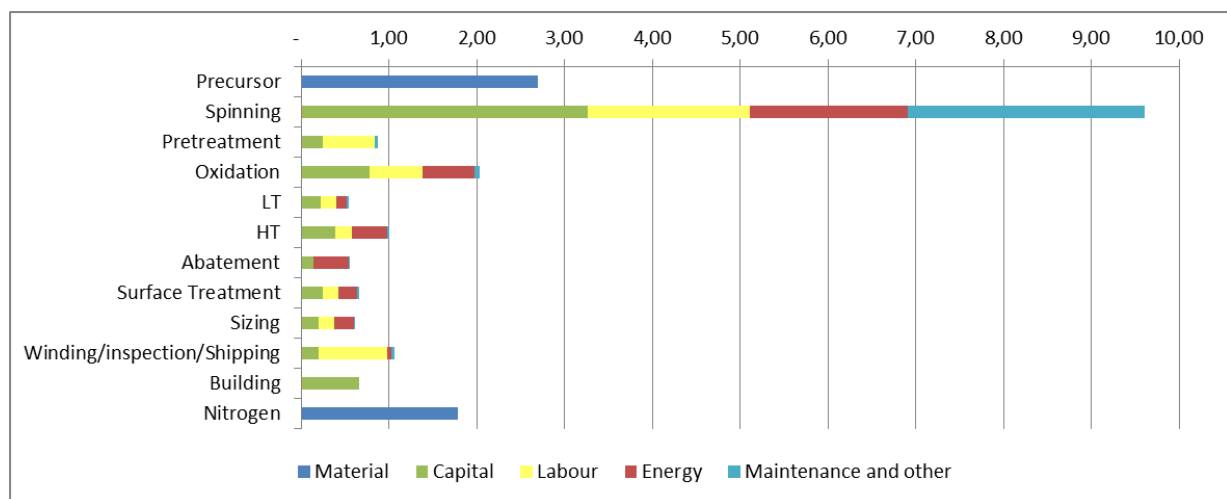


Figure 23: Estimated production costs for the conventional PAN based CF production

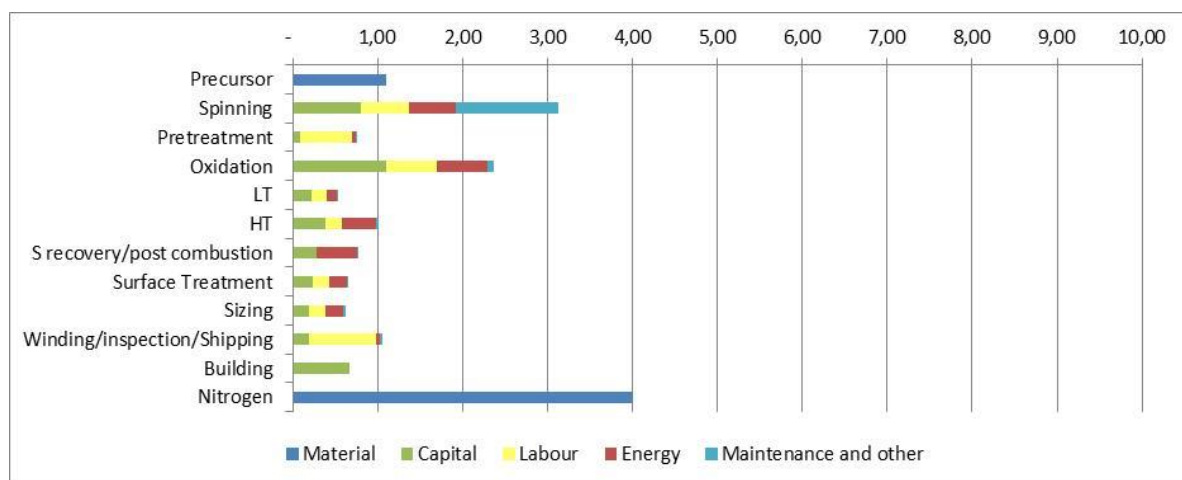


Figure 24: Estimated production costs for the NEWSPEC production process when low SRUs and abatement technologies are included

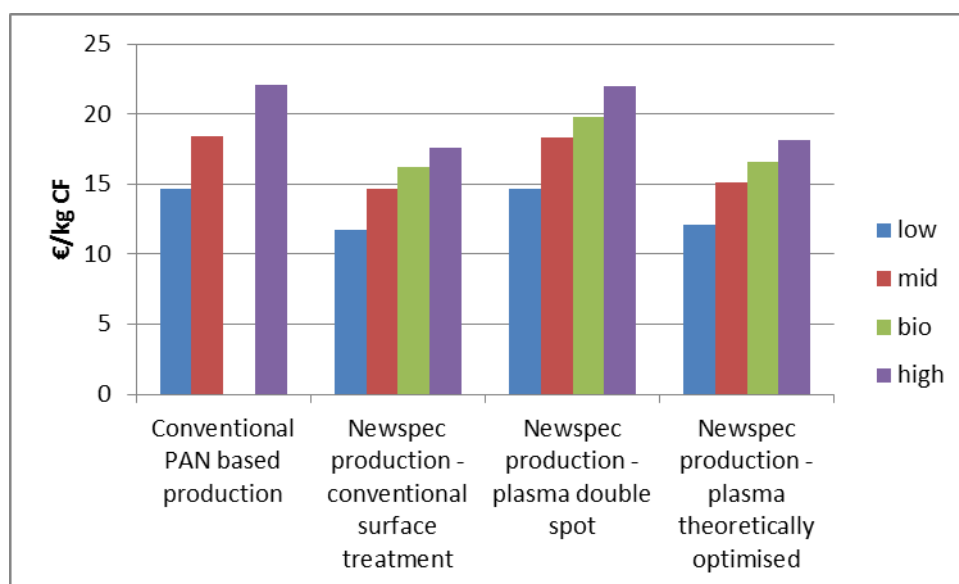


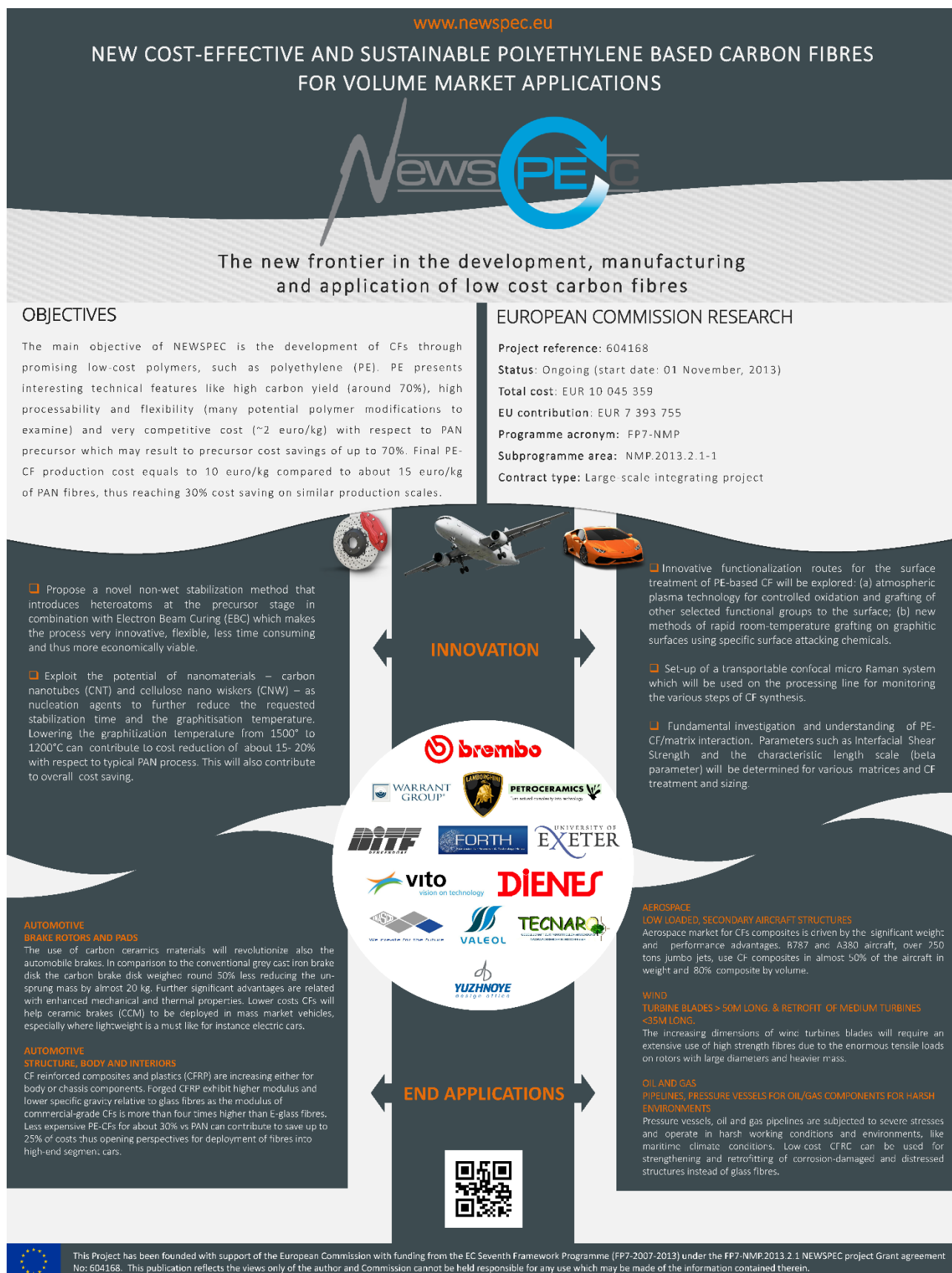
Figure 25: Results of cost estimates for the production of CF



Figure 26 NEWSPEC logo



Figure 27 NEWSPEC brochure



This Project has been founded with support of the European Commission with funding from the EC Seventh Framework Programme (FP7-2007-2013) under the FP7-NMP.2013.2.1 NEWSPEC project Grant agreement No: 604168. This publication reflects the views only of the author and Commission cannot be held responsible for any use which may be made of the information contained therein.

Figure 28 NEWSPEC poster

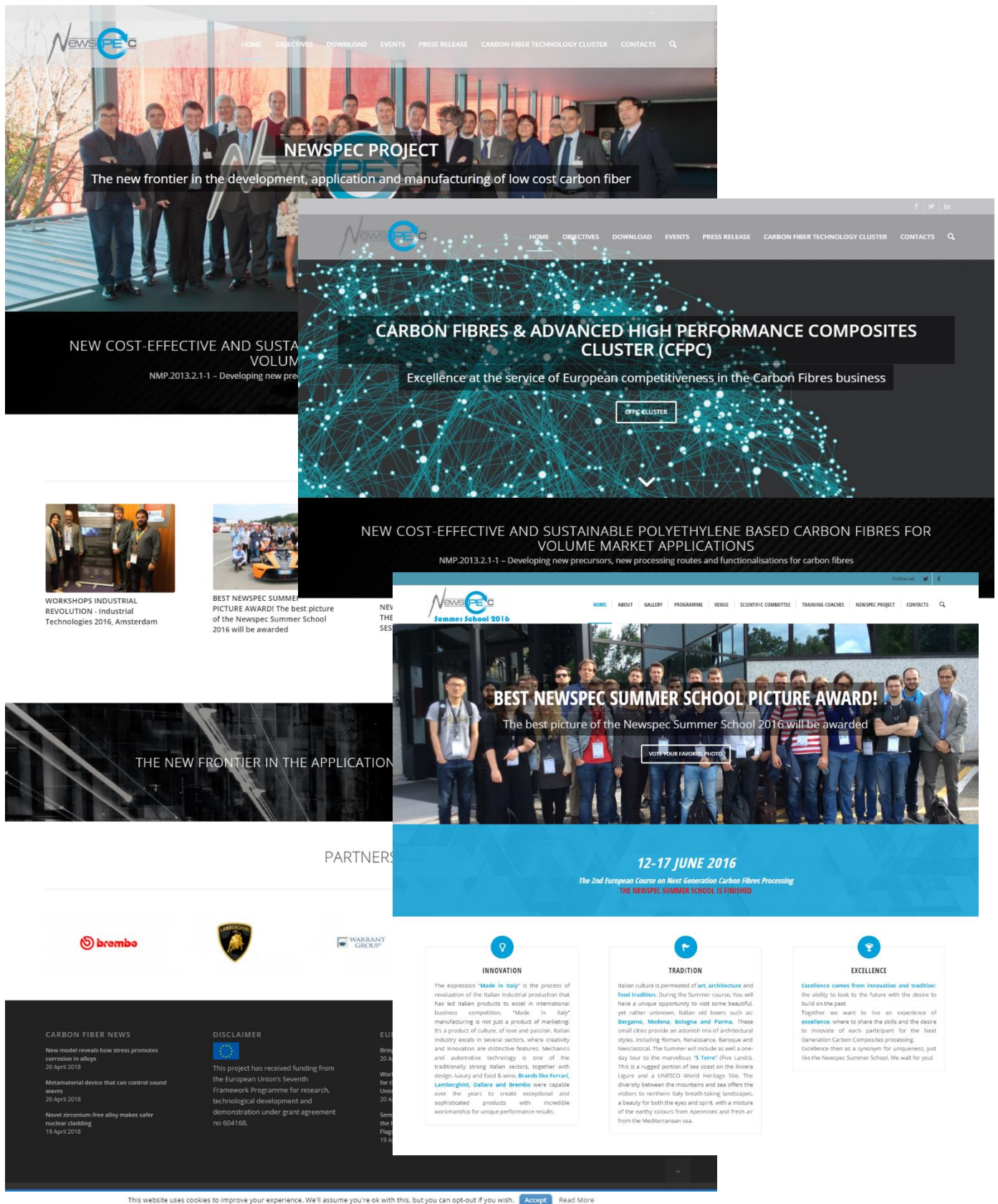


Figure 29 NEWSPEC website

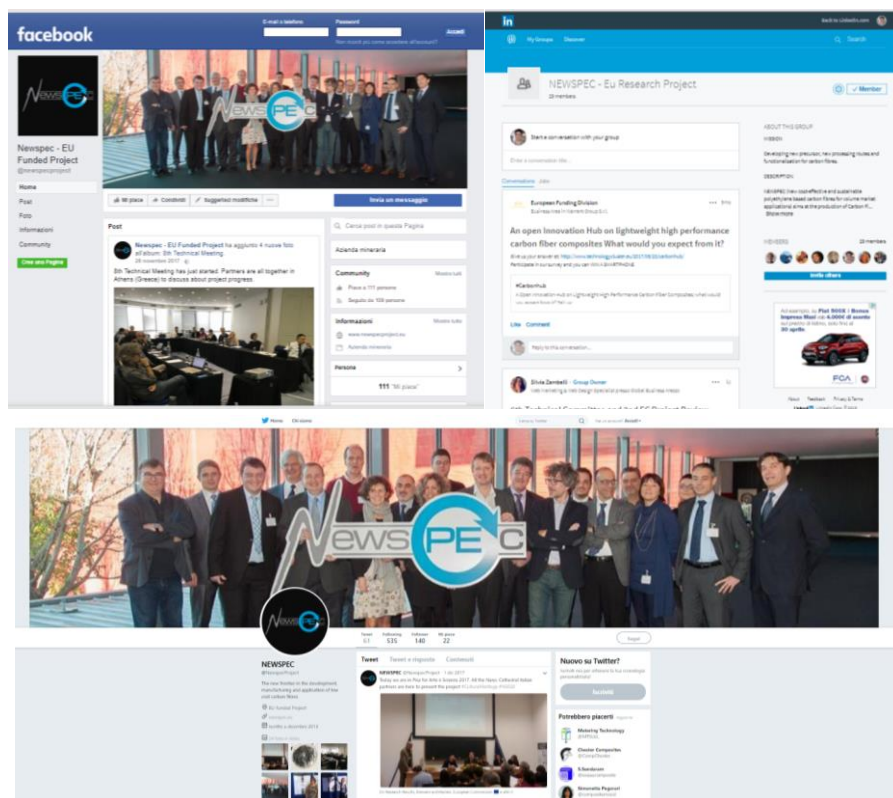


Figure 30 NEWSPEC Social Media



Figure 31 NEWSPEC 2nd SummerSchool



Figure 32 NEWSPEC Final Meeting