# FINAL REPORT

**Grant Agreement number: 314345**

**Project acronym: PLAST4FUTURE**

**Project title: Injection Moulding Production Technology for Multi-functional Nano-structured Plastic Components enables by Nanoimprint Lithography**

**Funding Scheme: FP7-2012-NMP-ICT-FoF**

**Date of latest version of Annex I against which the assessment will be made: 5 May 2015**

**Period covered: 36 months, 1 January 2013 – 31 December 2015**

**Name, title and organisation of the scientific representative of the project's coordinator[1]:**

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement.

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

# Final publishable summary report - Figures

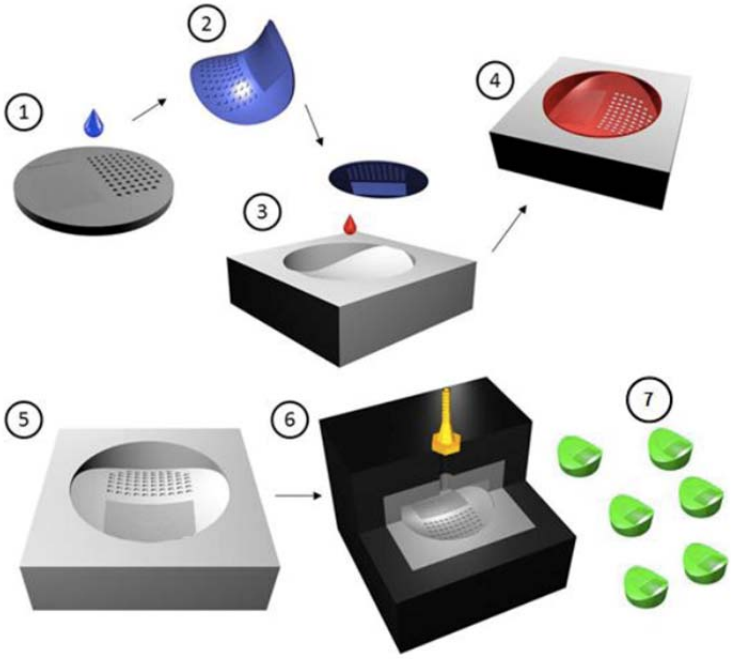


**Figure 1: Manufacturing chain of Plast4Future**

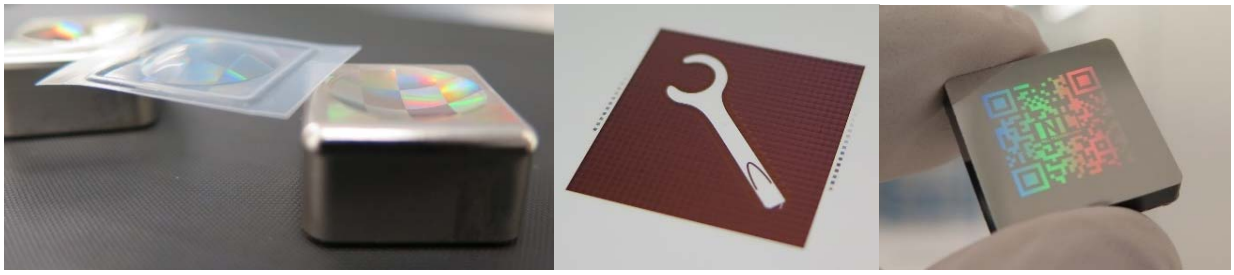

**Figure 2: Free form steel insert with diffraction grating pattern (left). Angle independent color effect from plasmonic colors (middle) Plastic part with QR-code in an angle dependant color made from diffraction gratings (left).**

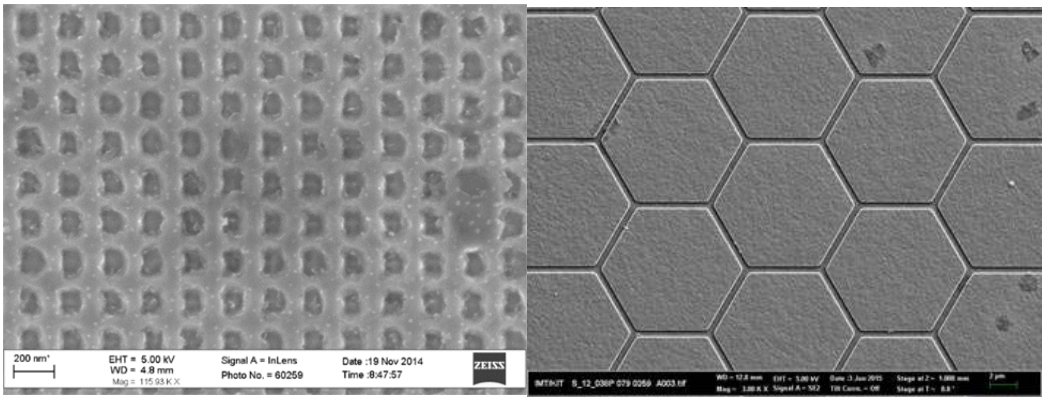


**Figure 3: Ø100 nm nanostructures etched directly into steel (left) and up-plated Ni nanostructures on Ni(P) coated steel inserts (right).**

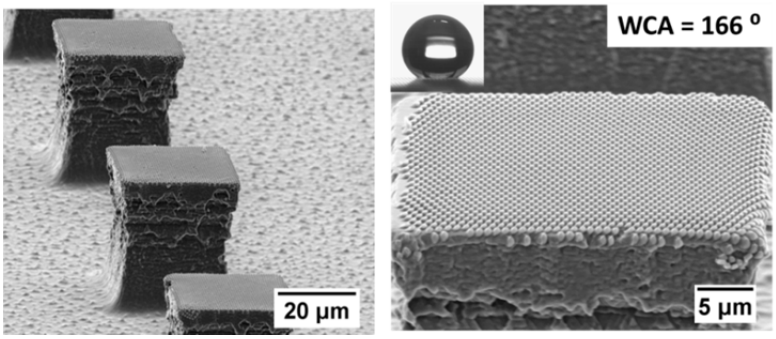


**Figure 4: Hierarchal micro and nanostructures by reverse nanoimprint. A super-hydrophobic effect is seen by the high water contact angle value.**

**Figure 5: Sample with milled surface**

**Table 1: Milled samples compared to polished samples.**

Results obtained

| | Ref | Ra | Rq | Rz | Aq |
|---|---|---|---|---|---|
| Milled sample | 47 | 0,2 | 0,24 | 1 | 12,63 |
| Milled sample | 50 | 0,1 | 0,12 | 0,5 | 6,69 |
| Milled sample | 76 | 0,08 | 0,1 | 0,48 | 2,5 |
| Milled sample | 117 | 0,08 | 0,09 | 0,44 | 2,1 |
| Polished 6 mikrons | 240 | 0,04 | 0,06 | 0,4 | 1,95 |
| Polished 3 mikrons | 241 | 0,01 | 0,01 | 0,05 | 1,6 |

Milled sample can be compared to polished sample

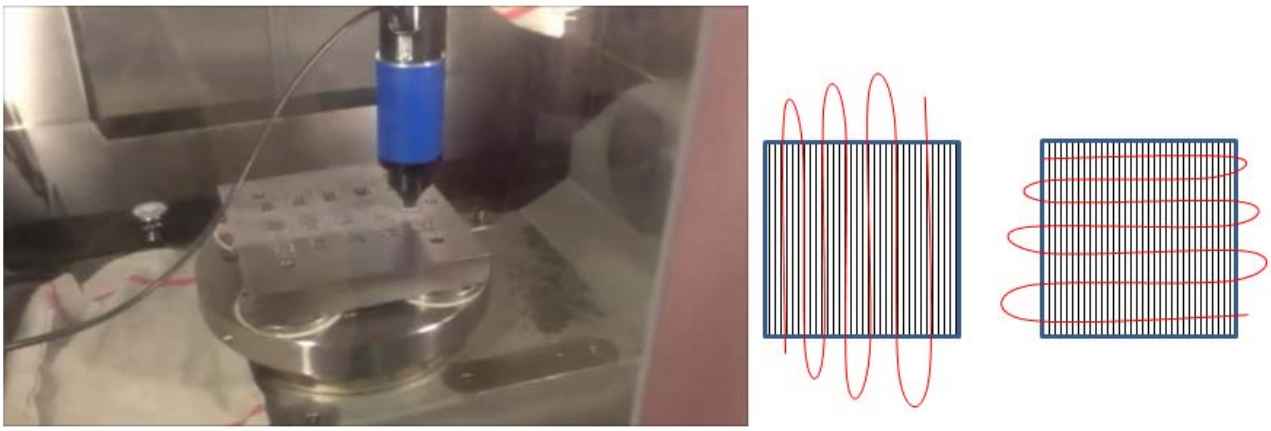

**Figure 6: Surface roughness measurement with Optosurf device**

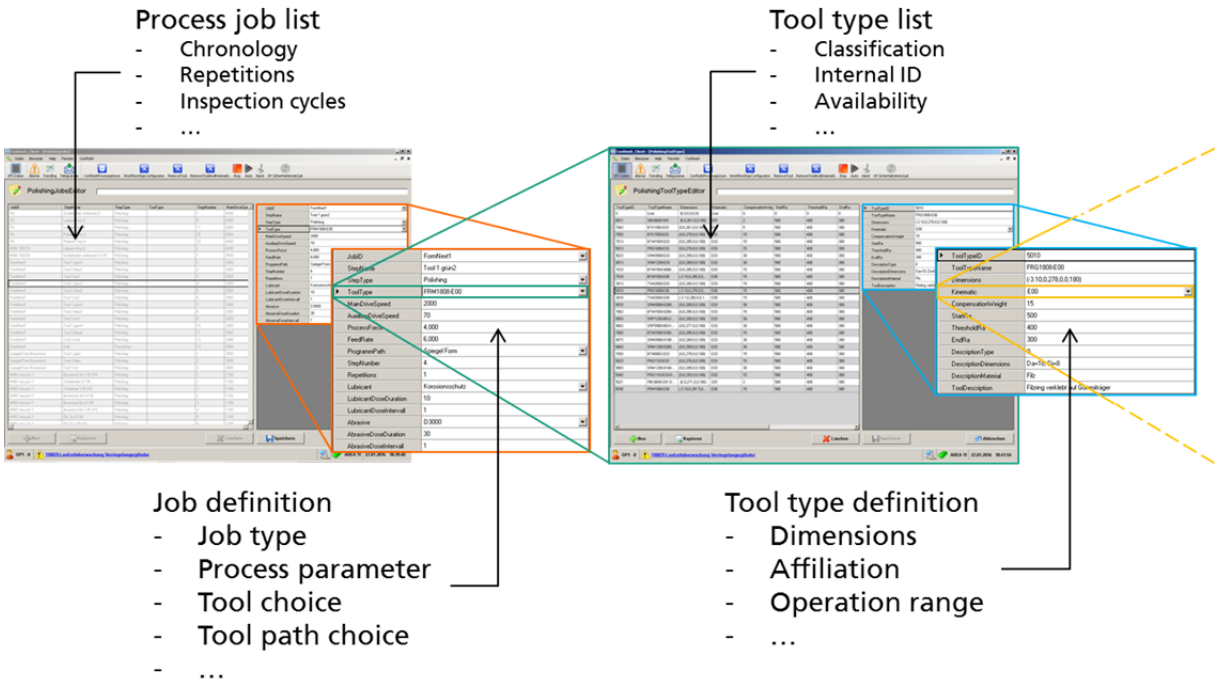


**Figure 7: GUI structure of the control system developed for automatic fine machining**

**Table 2: Three final demonstrators (Technological Milestone TM) as targets of P4F**

| Demonstrator | Insert size (mm) | Curved | Resist coating | Application | Functionality | Pattern transfer | Injection moulding material |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| TM5 | 100x50 | Y | Spray-coating | Automobile | Easy-to-paint | Up-plating | PP |
| TM6 | 160x150x90 | Y | Spray-coating | Automobile | Anti-fog | Up-plating | PMMA |
| TM7 | 20x20 | N | Spin-coating | Toy | Color | Etch | ABS |

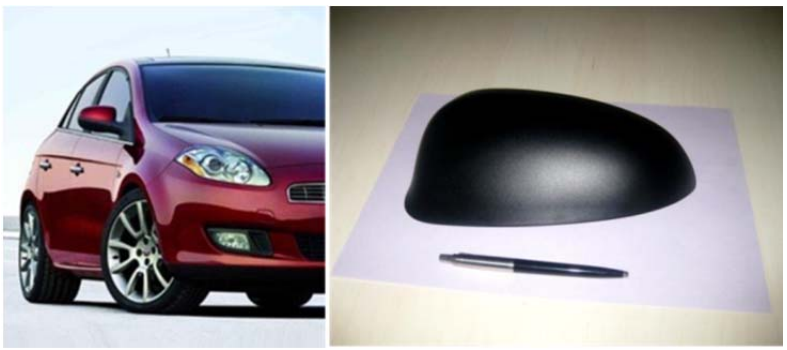

**Figure 8: Mirror cup and CAD technical-drawing**

The nanostructured large area insert is not the overall mould but it is a part within the 3D curvature area. After a cleaning phase, the enclosure in to the mirror cup mould have been carried out.

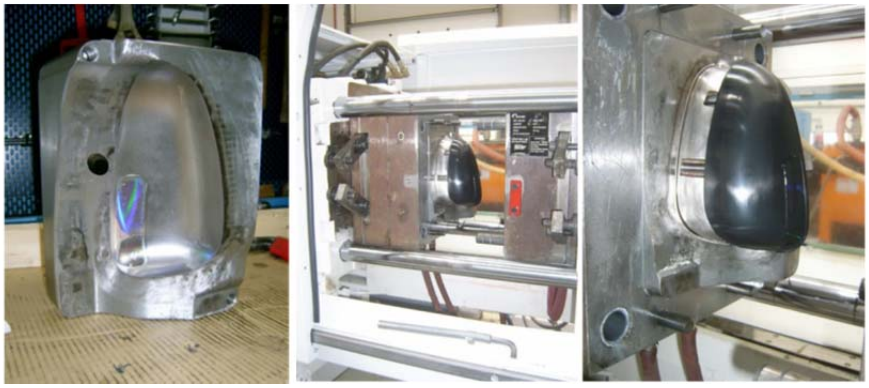

**Figure 9: Plastic components after ejection**


**Figure 10: Final plastic mirror cup after painting process**

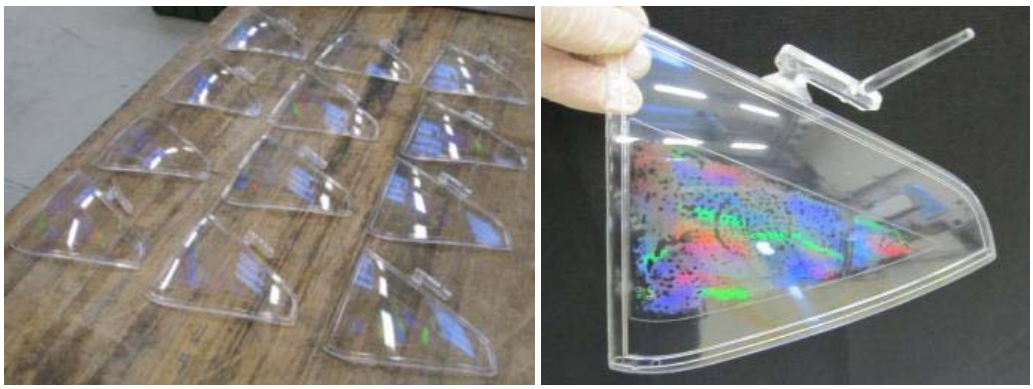

**Figure 11: Moulded outer lens (CRP)**

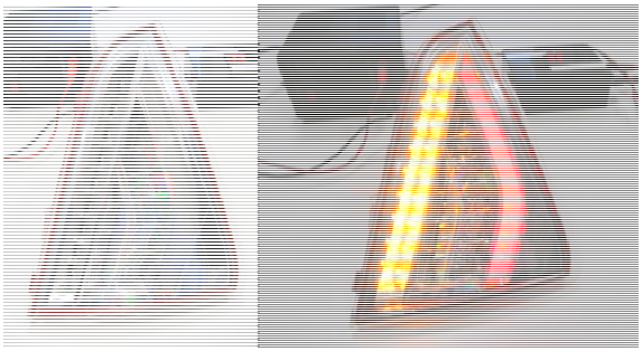

**Figure 12: Rear lamp prototype**

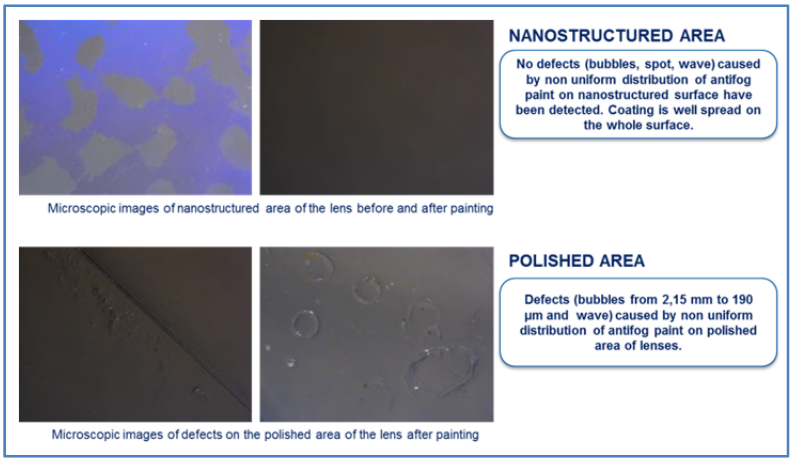


**Figure 13: Evaluation of surfaces after painting**

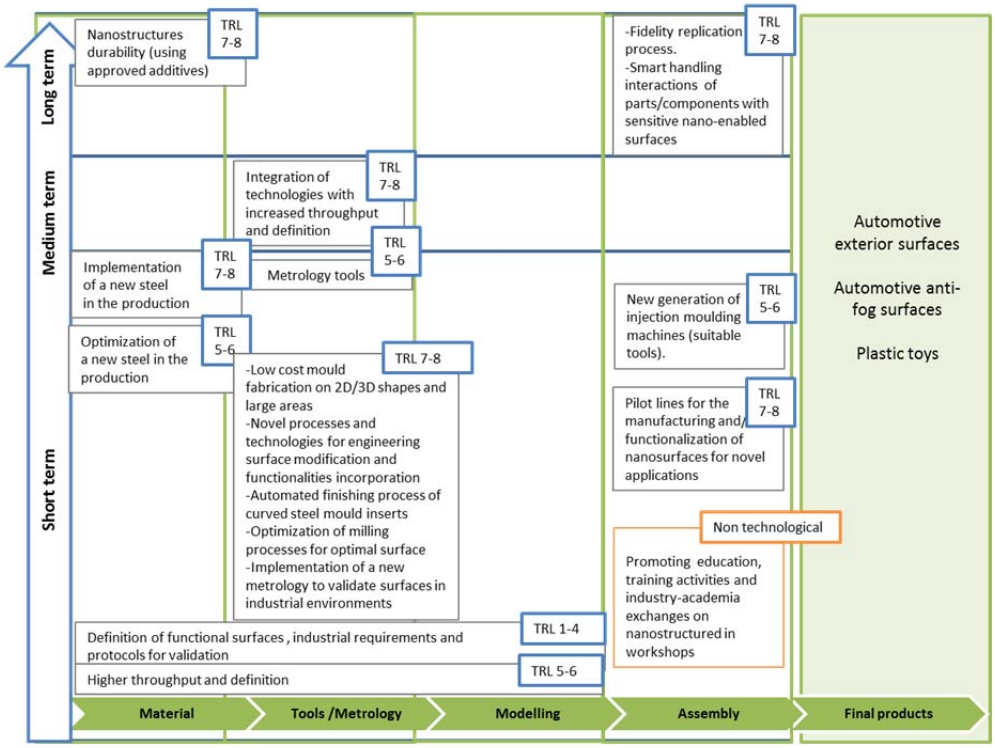


**Figure 14: Plast4Future Road map (2014-2024)**