

## PERSONAL INFORMATION Domenico Corapi

## WORK EXPERIENCE

## (2020-on) Senior Additive Manufacturing Engineer

Ad-hoc coding for the parametric drawing of conformal lattice structures and, more generally, of very complex geometries for additive manufacturing.

## (2017-2020) Additive Manufacturing Process Technologist Engineer

Definition of user requirements (User Requirements Specification) for a new additive manufacturing plant (Laser Beam Powder Bed Fusion), plant and utilities design, project compliance verification during construction, use, cleaning and maintenance of the EOS M290 system with comfort module, Ruwac wet scrubber, dust transport system, sieve shaker, electric and manual lifters. Creation of a system for the determination of the transformation cost and economic offers. New mechanical components and assemblies design, and existing ones reengineering, topological optimization to improve mechanical strength and stiffness, for weight reduction, for system's own vibration frequencies tuning. CFD and fluid dynamic optimization of hydraulic or cooling systems channels for pressure drop reduction by discretization grid morphing. Data preparation for additive manufacturing including support design. AM process simulation, analysis of the parts optimized for AM by means of finite element method (FEM) or Precise Solid Method (PSM). Manipulation of medical images and conversion to 3D model. Technological process parameters optimization to permit the production of mechanical parts using new metal powders. Management of European KET4CP and ELIIT projects.

## (2015-2017) Mechanical Engineer Technologist

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Design and construction of a technical system, and related process, for the reproduction of very specific historical violins manufacturing in carbon fibers (Plowden, B.G.Guarneri del Gesù, 1735; Willemotte 1734 and Tiziano 1715, A.Stradivari); construction of a 2.5-axis computerized numerical control (CNC) milling machine for aluminum and wood, 1m x 1m table, 0.75 kW power (mechanics, electronics, electric drives, BASH programming, Linux systems, safety systems, technological parameters determination of milling process through Taguchi experimental plan).

## (2009-2015) Support for a Man with disabilities

Home

Architectural barriers elimination; civil installations safety update (gas / electric / water / TV / electric automatisms / hydraulic automatisms); building renovation (screed, crawl space, tiling, plaster, painting, civil systems, construction of safety grates, iron and concrete fences, artistic terrace reconstruction for infiltration and insulation, stone laying, snoezelen sensorial chamber, design and construction of a mechanical lifter for bedridden, management of: documentation / administrative procedures / hygiene / health / correct nutrition of the patient (RIP).

## (2008-2009) QA/Engineering services officer (Quality assurance)

Abbott S.R.L., Strada Statale 148 Pontina Km 52, CAP 04011, Campoverde di Aprilia (LT), <https://www.abbvie.it/in-italia/polo-produttivo-campoverde.html>

VCR (Validation Change Request) documents administrator relating to facility, equipment, validated processes and safety VCRs in the two chemical plants (seven production lines); drafting of Cleaning Validation / Verification protocols; Periodic Product Review; Tracking & Trending; coordination activities in the API (Active Principle Ingredient, two chemical plants) area, data processing for the Area Management Review activities; participation in safety, calibration and maintenance committees; participation in housekeeping tours; application of the communication and reporting methods related to the key performance indicators (KPI) used in the API area; collaboration with the supervisor and the training department representatives in order to ensure the correct application of the site training procedures; execution of support activities for the Quality Control IP / FP and Raw Materials laboratories.

## (2008) Documentation support clerk (Technological innovation team)

Abbott S.R.L., Strada Statale 148 Pontina Km 52, CAP 04011, Campoverde di Aprilia (LT), <https://www.abbvie.it/in-italia/polo-produttivo-campoverde.html>

Automation of a pharmaceutical production line present in the liquids department for the elimination of manual loads and signal testing, feasibility study of a PAT-FBRM Mettler-Toledo system (Process Analytical Technology - Focused

Beam Reflectance Measurement) for in-line particle size analysis during the crystallization of chemical active ingredient (API) with the integration of an optical microscopy system (PVM) and the interface with a multivariate data analysis and storage system (ABB), introduction of a new statistical control system for weighing in pharmaceutical packaging department and stick filling process control, introduction of optical pyrometry on the Site for products development purposes and electrical panels maintenance.

**(2005-2008) Documentation support clerk (Research and development)**

Abbott S.R.L., Strada Statale 148 Pontina Km 52, CAP 04011, Campoverde di Aprilia (LT), <https://www.abbvie.it/in-italia/polo-produttivo-campoverde.html>

Pharmaceutical products formulation and processes optimization, products cost reduction maintaining the same quality; physical / chemical analysis in the laboratory (length measurements with Mitutoyo Digimatic caliper and DP-7 microprocessor; mass with technical balance and Mettler-Toledo microbalance with LV11-SQC14 automatic system for statistical analysis; volume with class A graduated glassware; density with Mettler-Toledo pycnometer and densimeter; particle size distribution with Octagon 2000 sieves vibrator and Hosokawa Alpine 200LS-N; smoothness and rest angle with Pharma Test PTG1; hardness with Pharma Test PTB 311E; friability with Pharma Test PTF2E crusher; structure with TA-XT2 Texture Analyzer; temperature with PT100 Testo and Testo optical pyrometer; melting temperature; viscosity with Brookfield DV-III viscometer; speed; electrical measurements with digital tester, pH with Mettler MP230 pH meter; dissolved oxygen with Mettler-Toledo M0128 oximeter; Loss on Drying with Mettler-Toledo HG63-P; dissolution with Pharma Test PTWS 310; others); responsible respect to the regulatory and control bodies of the laboratory personal notebook, traceability, analysis, protocols and test reports; production of business presentations of proposed changes, improvements and data analysis through the use of statistical techniques such as the  $\chi^2$  test, Student's t, statistical process control with variable and attributes charts (Shewhart, EWMA and CUSUM); SCADA Intellution iFix system for supervision update, data control and recording in the pilot production laboratory; process equipment maintenance, modification and revamping (Patterson Kelly and Zanchetta RotoJ granulators, Pellegrini and GSE pans, Fitz and Quadro Comil 197 milling machines, Manesty B3B tablet press, Glatt fluid bed, Calmic oven, Preci B DR / 2 dosing machine, agitators with compressed air, Silverson L4R micronizer, Erweka mixer / blender / homogenizer, liquid tanks, others); Munters rotating disk conditioning system sizing; design of a custom new 150 liter multipurpose pilot reactor; transformation of a 24 liter liquid reactor into a vacuum oven for tablets; safety and calibration of measuring instruments management in the Process Unit; critical to quality (CTQ) products characteristics Tracking & Trending; Capability Analysis of liquid and granules packaging lines and analysis for the determination of corrective actions in case of non-conformities; introduction of the 5S method in the R&D department; introduction of the Monte Carlo method for projects duration estimation; writing of standard operating procedures (SOP), validated systems change request documents creation (VCR), participation in safety and calibration committees, firefighting and emergency officer in accordance with Legislative Decree 626/94.

**(2005) Six Sigma program clerk (Research and development)**

Abbott S.R.L., Strada Statale 148 Pontina Km 52, CAP 04011, Campoverde di Aprilia (LT), <https://www.abbvie.it/in-italia/polo-produttivo-campoverde.html>

Six Sigma pilot project "Lopinavir Drug Substance: N-Acetyl-Core-Wing-A failure" (elimination of impurities from a chemical active ingredient for the treatment of AIDS);

Six Sigma pilot project "Reduce the high variability of the drying step cycle time observed in the Brufen process" (standardization of the drying time of a non-steroidal anti-inflammatory).

**(2005) Intern (Research and Development)**

Abbott S.R.L., Strada Statale 148 Pontina Km 52, CAP 04011, Campoverde di Aprilia (LT), <https://www.abbvie.it/in-italia/polo-produttivo-campoverde.html>

480-hour company internship related to the IFTS (Higher Technical Education and Training) 1200 hours course for the achievement of the title: "Quality Assurance and Systems Management Officer in the Chemical and Pharmaceutical Industry". Participation in the first two experimental Six Sigma projects ever conducted in the company.

**(2004) Civil service**

Social Services Office of the Municipality of Colleferro (RM).

## EDUCATION AND TRAINING

### PhD in "Industrial and information engineering"

University of Perugia, Department of Electronic and Information Engineering

### Professional qualification (Industrial Engineer)

Sapienza University of Rome and Order of Engineers of Rome

### Master Degree in Mechanical Engineering, five years long, pre D.M. 509/99

Sapienza University of Rome

### Bureau Veritas - Additive Manufacturing Trainer

Additive Manufacturing train the trainer qualification N°TTAM0002-21

### Operation of System EOS M290 + Safety Instruction

EOS certified training (32 hours), basic design rules, data preparation, system operation, regular system care, safety rules and material handling

### EOS Parameter Editor Training

EOS certified training (16 hours), EOS exposure strategies, process troubleshooting, parameter editor, design and development of new parameters

### Simufact Forming SFC101

Courses taught by Almatec Srl (MSC Software Corporation) on 10-17-24-31 May 2021

### MSC Apex Modeler APX101 / MSC Apex Structures APX102

Courses taught by Almatec Srl (MSC Software Corporation) on 3-5-24 August 2021

### General training and specific part (safety on the workplace)

Courses taught by CDS Services SIC-LAV Srl (4 + 4 hours)

### Firefighter

Technical suitability for the position of "firefighter" (16-hour course at the Latina Fire Brigade, high risk), updated with the 8-hour course (medium risk)

### First aid and emergency management for type B - C companies

Courses taught by CDS Services SIC-LAV Srl, 12 hours

### Training course for fire prevention, fire fighting, and emergency management (medium risk)

Courses taught by CDS Services SIC-LAV Srl, 8 hours

### Safety manager on mobile and temporary building sites (CSP, CSE)

120-hour professional qualification course held by the Department of Engineering of Sapienza University of Rome and by the Order of Engineers of Rome pursuant to art. 10 of Legislative Decree 494/96, updated with the 40-hour course pursuant to Legislative Decree 81/08.

### Health and Safety Representative (RLS)

Courses taught by CDS Services SIC-LAV Srl, 32 hours

### Multivariate Data Analysis Basic Course

Business course "Multivariate Data Analysis Basic Course" (Umetrics)

### User Requirements for Middle Management

Business course provided by CTP tecnologie di processo S.P.A.

### Quality assurance and systems manager in the chemical and pharmaceutical industry

Professional post diploma I.F.T.S. (Higher Technical Education and Training) 1200 hours qualification course (480 hours company internship at Abbott S.R.L.) provided by: Sapienza University of Rome; Bioprogress S.P.A.; Labor and education ministries; Lazio region,

### CTD and variations, prepare the documentation for API and medicinal specialties registration

Business course provided by Pharma D&S

## PERSONAL SKILLS

Mother tongue	Italian
Other Languages	English, C1 level (Cambridge Assessment English, self-assessment online test: comprehension / speaking / written production)
Communication skills	I have good communication skills and I properly use "assertive language" in the contexts of work groups, even highly heterogeneous
Organizational	I managed projects worth up to € 1.5M using project management techniques and organized the department work

and management skills	within a chemical / pharmaceutical R&D pilot plant (time, resources, activities coordination, safety, maintenance, revamping, cleaning, documentation) with authoritative and non-authoritarian leadership in a team of 6 people
Digital skills	<p><b>Office</b> S.O. Windows and Linux, Microsoft Office including Visio and Project, Pertmaster Primavera (project duration estimation with Monte Carlo method)</p> <p><b>Drawing</b> Rhinoceros with Grasshopper and other CAD instruments</p> <p><b>Additive manufacturing</b> Materialize Magics, EOSPRINT, EOSTATE, RP-Tools, EOSACCESS, Ansys Workbench + Additive + Print, MSC Simufact Additive, Altair Amphyon, Autodesk Netfabb + simulation utility, Topology Optimization SW, Cura</p> <p><b>Statistical calculation</b> Minitab, Simca, others</p> <p><b>Design (simulation)</b> Ansys (FEM), Fluent (FVM), DEM, Simsolid (PSM)</p> <p><b>Business systems</b> AS400, Intellution iFix (now General Electrics Proficy), Foxboro DCS, custom document systems based on Documentum</p>
Other skills	Bricklayer, electrician, plumber, carpenter, tiler, I synthesize simple electronic circuits based on the Arduino controller and the Raspberry Pi microcalculator (Linux distribution personally modified for the Real Time management for CNC systems), brewer, electric guitarist and fretless bass player, I can manage operating machine tools, with regard to the maintenance plan, and workshop equipment, I am able to draw up worksheets and to instruct a manufacturing process starting from a mechanical drawing
Driving license	B (cars)

## ADDITIONAL INFORMATION

Contests	<b>Contests</b>
Posters	<ul style="list-style-type: none"> <li>Eligible for the public competition, for qualifications and exams, at "No. 1 position in category D, economic position D1, technical, scientific and data processing area, for the needs of the Department of Mechanical and Aeronautical Engineering of Sapienza University of Rome".</li> <li>Ongoing application for European Space Agency astronaut selection (2021).</li> </ul>
Publications	<b>Poster</b>
Presentations and conferences	<ul style="list-style-type: none"> <li>Titanium alloys by anodic oxidation: effect of experimental parameters on surface coloring</li> </ul>
Teaching	<b>Papers</b>
Honors and awards	<ul style="list-style-type: none"> <li>G. Napoli, C. Zitelli, D. Corapi, A. Di Schino, Materials Science Forum Online: 2018-12-26 ISSN: 1662-9752, Vol. 941, pp 730-734 doi:10.4028/www.scientific.net/MSF.941.730: Titanium Alloys Anodic Oxidation: Effect of Experimental Parameters on Surface Colouring</li> <li>M. R. Ridolfi, V. Battaglia, T. Vela, D. Corapi, A. Di Schino, Structural Integrity Procedia: : Development and calibration of a CFD-based model of the bed fusion SLM additive manufacturing process aimed at optimizing laser parameters. AIAS 2019 International Conference on Stress Analysis, Procedia Structural Integrity. 2019 24:370-380 Language: English. DOI: 10.1016/j.prostr.2020.02.034</li> <li>D. Corapi, G. Morettini, G. Pascoletti, C. Zitelli, Structural Integrity Procedia: Characterization of a Polylactic acid (PLA) produced by Fused Deposition Modeling (FDM) technology. AIAS 2019 International Conference on Stress Analysis, Procedia Structural Integrity. 2019 24:289-295 Language: English. DOI: 10.1016/j.prostr.2020.02.026</li> <li>A. Di Schino, D. Corapi, C. Zitelli, Structural Integrity Procedia: 3D printing of austenitic stainless steels by laser powder bed fusion technique</li> <li>P. Burrascano, D. Corapi, A. Di Schino, L. Gentilesch, i S. Mengaroni, G Napoli, S. Neri. "Applicazione di tecniche ultrasonore alla valutazione della microstruttura in acciai al carbonio per componenti forgiati". Atti del 37° Congresso Nazionale AIM, Bologna, 2018, Paper n. 37035</li> <li>A. Di Schino, D. Corapi, O. Di Pietro, Chiara Zitelli "Laser powder bed fusion of austenitic stainless steels". Journal of Chemical Technology &amp; Metallurgy; 2021, Vol. 56 Issue 1, p221-226, 6p</li> <li>A. Di Schino, D. Corapi, O. Di Pietro "Austenitic stainless steels manufacturing by laser powder bed fusion technique". Acta Metallurgica Slovaca 26(1):24-26 DOI:</li> </ul>

10.36547/ams.26.1.329

- Stomelli, G.; Ridolfi, M.; De Nisi, J.; Corapi, D.; Repitsch, C.; Di Schino, A. "Feasibility assessment of magnetic cores through additive manufacturing techniques". Met. Ital. 2021, 113, 50–61.

#### Presentations and conferences

- TERMECH 2018 - Materials Science Forum - Vol. 941, pp 730-734 - MSF.941.730 - Titanium Alloys Anodic Oxidation Effect of Experimental Parameters on Surface Colouring - Giuseppe Napoli, Chiara Zitelli, Domenico Corapi, Andrea Di Schino
- AIAS 2019 - Leghe di acciaio inossidabile e Laser Powder Bed Fusion: stato dell'arte attuale e possibili sviluppi futuri
- AIAS 219 - Effetti della direzione di accrescimento sul comportamento meccanico del PLA prodotto tramite tecnologia additiva Fused Deposition Modeling (FDM)
- Presentazione Atti del 37° Congresso Nazionale AIM: Applicazione di tecniche ultrasonore alla valutazione della microstruttura in acciai al carbonio per componenti forgiati
- Linee di sviluppo della modellistica applicata ai processi di gas atomizzazione e manifattura additiva di materiali per il settore aerospazio. Conference: Materiali metallici e processi produttivi innovativi per l'aerospazio, Napoli Università Federico II, 19-20/07/2018
- Materiali metallici funzionali per l'industria l'energia e la mobilità - Giornate di Studio - 28-29 settembre 2021 - Politecnico di Milano - Campus Bovisa. "Studio di fabbricazione e proprietà di nuclei ferromagnetici da manifattura additiva (A. Di Schino, A. Faba, E. Cardelli - Università di Perugia, Terni; G. Stomelli, R. Montanari - Università di Roma2 Tor Vergata; M. Ridolfi, D. Corapi)

#### Magazine articles

- Plast Design, XXIV agosto/settembre 2021, pagg.78-81, "La leggerezza degli ingranaggi"

#### Teaching (Additive Manufacturing)

- Sapienza Università di Roma, seminar for the Additive Manufacturing and production systems course of the master's degree in mechanical engineering (Additive manufacturing process simulation)
- Sapienza Università di Roma, seminar for the additive manufacturing technologies course of the master's degree in management engineering (Additive manufacturing Topology optimization overview)
- UniPG (Terni), metallurgy course module
- TUCEP (Perugia and Terni)
- AQM (Provaglio d'Iseo), training in technical offices of: B.O.A. Brunetti Officina Armi; Brembo S.p.A., CAM85 Coop; COBO S.p.A.; Davide Pedersoli & C.; Fabbrica d'Armi Pietro Beretta S.p.A.; F.A.P. Fabbrica Armi F.lli Pietta; F.A.I.R S.r.l.; Industrie Saleri Italo S.p.A.; Lonati S.p.A., Metra S.p.A.; Luniletronik Cooperativa S.p.a.; S.E.F.A. Acciai S.r.l.; Tamburini S.r.l.; UTIL Industries S.p.a.

#### Company awards and prizes

- Michelangelo award (two Six Sigma projects)
- Premier plant of the year
- Michelangelo award (Levopraid project)
- Letter of praise from the Division for the project "European Modernization and Marketing Authorization Access"
- Alessandro Volta prize (new liquid pilot plant)

#### Personal data

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