CENTRE OF EXCELLENCE IN RESEARCH, DEVELOPMENT AND PILOT PRODUCTION OF NANOFIBRES

CED-Pro-NANO

PROJECT FEASIBILITY STUDY

Editable concept document for STEP / POCIDIF-type funding preparation

SITE **15 m x 110 m**	SELECTED BUILDING **10 m x 90 m + 330 m2 first floor**	TARGET BUDGET **EUR 10,000,000**
PROCESS **0.5-30 kg/h pilot meltblown**	CONTROLLED AREAS **ISO 8 / ISO 7**	DOCUMENT STATUS **Concept feasibility / editable**

Prepared July 2026. All prices exclude VAT unless stated. Final design, eligibility, useful-life treatment, salaries and procurement values require confirmation by licensed designers, the Managing Authority and supplier quotations.

0. Document Control, Purpose and Limitations

Field	Study value
Beneficiary / concept owner	M-TechX EU / CED-Pro-NANO project concept
Project type	New-build nanofiber R&D, testing and pilot-production centre
Site basis	Maximum 15.00 m width x 110.00 m length; 1,650 m2 land area
Selected concept	10.00 m x 90.00 m ground footprint (900 m2) + 330 m2 partial first floor + technical mezzanines
Investment ceiling	EUR 10,000,000, excluding VAT; Class 3/4 planning accuracy
Primary use	Feasibility discussion, funding preparation, employer requirements and procurement planning
Design status	Concept level; not a permit, tender, execution or construction issue
Cost basis	Planning allowances, mix of new/reconditioned non-core equipment; three comparable quotations required

Critical limitations

- The site width is insufficient for a 14-15 m building plus a compliant continuous fire/service lane. The selected concept therefore limits the building to 10 m width and preserves a 4 m service lane plus a 1 m maintenance strip.
- Articulated truck turning is not possible on the plot. The logistics concept assumes scheduled vans or rigid trucks, reverse-in access and off-site bulk storage, subject to a swept-path study.
- Cleanroom, ATEX, fire, environmental, medical-device, food-contact and defence requirements depend on the final product portfolio and must be confirmed before detailed design.
- Financing rates and salary ceilings must be rechecked against the final call, applicant size, region, aid scheme and contracting date.

PROFESSIONAL RELIANCE
This document consolidates the attached architectural concepts, equipment lists, funding guidance and researcher CVs into an editable feasibility study. It does not replace an SF/DALI/PT prepared under Government Decision 907/2016 by licensed Romanian designers.

Contents and Deliverables

Deliverable coverage

DIMENSIONED CONCEPT
External and internal dimensions, area schedule, footprint, clear heights and site logistics.

TECHNICAL CONSTRUCTION
Structure, envelope, floors, fire compartments, accessibility, cleanroom and MEP performance.

EQUIPMENT AND SOFTWARE
Pilot line, preparation, characterization, testing, utility, AI/VR, HPC, LIMS and licensing allowances.

FUNDING READINESS
Eligibility mapping, aid-basis separation, three-quote procurement, TRL/KPI logic and supporting-document checklist.

HUMAN RESOURCES
Six CV-based roles with work packages, laboratory workflows, equipment ownership and 12-month salary costs.

IMPLEMENTATION
24-month programme, commissioning, qualification, training, risks and decision gates.

1. Executive Summary

The proposed CED-Pro-NANO investment establishes an integrated research infrastructure for advanced polymer nanofibres, from molecular and formulation design through pilot meltblown production, finishing, characterization, application testing and prototype release. The centre is planned for a narrow 15 m x 110 m site and is constrained to a maximum EUR 10 million investment envelope.

The recommended solution is a 10.0 m x 90.0 m linear building with a 900 m2 ground floor, a 330 m2 partial first floor for digital and office functions, and technical mezzanines. This geometry leaves a continuous 4.0 m fire/service lane and a protected 1.0 m maintenance strip. Front and rear yards are reserved for access, parking, gas storage, chillers, transformer, generator, waste handling and safe delivery operations.

Key parameter	Selected concept
Gross occupied floor area	Approximately 1,230 m2, excluding technical mezzanines
Pilot capacity	Flexible laboratory module plus modular meltblown line, 0.5-30 kg/h
Controlled environment	ISO 8 transition and ISO 7 critical prototype finishing; hazardous rooms under negative pressure
Electrical basis	Approximately 1 MVA service allowance; N+1 cooling and safe-shutdown generation
Digital basis	10/40 GbE backbone, OT/IT segregation, LIMS/ELN/QMS, HPC and digital twin
Operating team	Six named implementation researchers plus technicians/support recruited during scale-up
Programme	Approximately 24 months to commissioning and initial pilot campaigns
Budget	EUR 10,000,000 including 12-month named-researcher salaries and contingency

Feasibility conclusion

The project is technically feasible within the land and budget limits only if the building remains narrow, the pilot hall is not entirely classified as a cleanroom, inventories are limited to R&D quantities, bulk warehousing is external, and equipment packages are procured through performance-based specifications and competitive quotations. The centre should be positioned as an open, digitally instrumented infrastructure that advances nanofiber technologies from minimum TRL 4 toward pilot validation and Series 0 production.

1.1. Project Necessity, Research Portfolio and Market Logic

Need addressed

- European dependence on non-EU sources for specialist nanofiber materials and pilot-scale production capability.
- Insufficient regional access to integrated meltblown scale-up, advanced characterization and validated application-testing infrastructure.
- High cost and long iteration cycles when molecular design, process simulation, pilot trials and testing are performed in disconnected facilities.
- Need for reliable Series 0 batches, traceable experimental data and industrial partner qualification before full-scale manufacturing investment.

Research and application platforms

Platform	Research objective	Representative KPIs
Filtration	Low pressure drop, high particle capture, chemical and thermal stability	Efficiency, pressure drop, pore distribution, basis weight
Oil and chemical sorption	Selective, reusable hydrophobic nanofiber structures	g/g uptake, retention, reusability, flammability
Thermal and acoustic insulation	Ultra-light layers for buildings, transport and industrial equipment	W/mK, sound absorption, thickness, ageing
EMI / IR protection	Functionalized polymer/graphene or multi-material structures	Shielding effectiveness, IR reflectance/absorbance, mass
Water treatment	High-flux nanofiber supports and functional membranes	Flux, retention, fouling, pressure stability
Biomedical / agronomy prototypes	Non-clinical proof-of-concept materials and controlled release/scaffold concepts	Biocompatibility screening plan, porosity, wettability, degradation

BOUNDARY CONDITION

Biomedical work in this investment is limited to non-clinical prototype development unless separate licensing, biosafety, GMP and medical-device requirements are added. The facility must not claim sterile or pharmaceutical production capability at concept stage.

2. Funding Framework and STEP / POCIDIF Alignment

The financing guidance supplied for CED-Pro-NANO distinguishes industrial research, experimental development and initial investment. The study therefore separates RDI activities from construction and production-scale assets, and treats staff, equipment, software and depreciation according to actual project use.

Funding topic	Planning interpretation for this project
Technology maturity	Provide evidence of at least TRL 4 at submission; define starting and target TRL for each application platform.
Industrial research	Standard co-financing 70%, potentially 80% with wide dissemination, subject to final call conditions.
Experimental development	Standard co-financing 45%, potentially 60% with wide dissemination, subject to final call conditions.
Initial investment / regional aid	Construction, installed utilities, machinery and equipment required to operate the created infrastructure; final intensity depends on applicant and regional-aid conditions.
Human resources	Researchers, technicians and support personnel directly involved in RDI may be eligible by contract, job description and timesheet. Pure management cost is not treated as direct RDI cost.
Tangible assets	Full cost may be eligible where useful life does not exceed project use; otherwise use eligible depreciation corresponding to project duration.
Intangible assets	Software, licences, know-how and directly related digital assets may be eligible; useful-life and depreciation rules must be applied.
Procurement evidence	Prepare technical specifications and obtain three comparable offers/screenshots for each purchase or procurement lot.

Scoring and application-readiness actions

- Target more than 15% of the project budget for research activities performed directly by the applicant where consistent with the final guide and work plan.
- Nominate a project director with at least five years of relevant experience, additional members meeting the operational and EU-project experience thresholds, and submit CVs, job descriptions and availability evidence.
- Attach the SF/DALI/PT package under Government Decision 907/2016, general and itemized estimates, topographic/geotechnical studies, energy documentation, permits and designer quality declarations.
- Prepare a technical report on innovation, technological maturity, technological sovereignty and EU resilience, supported by expert evidence.

3. Site Constraints and Selection of the Buildable Option

The attached architectural reference plans use a 14 m building plus a 4 m east-side vehicle lane on an approximately 18.18 m wide plot. That arrangement cannot be transferred directly to a site with a maximum width of 15 m. A full-width 15 m building would eliminate side access and create unacceptable fire, maintenance, construction and delivery constraints.

Option	Footprint / access	Evaluation
A. Full-width single storey	15 x 95-110 m; no side lane	Rejected: poor fire/service access, difficult maintenance, unsafe utility replacement and no independent material route.
B. 14 m building + nominal strip	14 x 78-90 m; only about 1 m side strip	Rejected unless special authority solution: insufficient continuous fire/service vehicle access.
C. Selected narrow two-level concept	10 x 90 m + 330 m2 first floor; 4 m lane + 1 m strip	Recommended: retains process capacity, emergency access, utility routing and future maintainability within the 15 m width.
D. Split buildings	Narrow production and separate office block	Possible alternative, but increases fire separation, external transfer, envelope and MEP costs; retain only as fallback after survey.

MANDATORY VERIFICATION
Before permitting, commission cadastral/topographic survey, geotechnical study, utility survey, flood and contamination screening, legal-access review, urban-planning certificate and a swept-path / fire-access study.

Selected site allocation

- 12 m front court: gate, security, visitor drop-off, accessible parking, emergency assembly and limited delivery staging.
- 90 m building length: public/admin, material preparation, pilot production, finishing, controlled clean suite, characterization and dispatch.
- 8 m rear utility yard: transformer, generator, chillers, compressed air, nitrogen, gas cages, waste and maintenance access.
- 4 m continuous service lane: rigid-truck and emergency access; no storage, permanent equipment or parking permitted.
- 1 m protected maintenance strip: façade access, inspection and drainage; final setback subject to planning approval.

3.1. Dimensioned Site Plan - Selected 15 m x 110 m Concept

Figure 1. Adapted site plan: 10 m wide building, continuous 4 m service lane, front court and rear utility yard.
Source: M-TechX Nanofiber R&D Center concept package, adapted to the 15 m site constraint

External element	Indicative dimension	Technical requirement
Plot	15.0 x 110.0 m	Confirm cadastral boundaries, easements and legal access.
Building	10.0 x 90.0 m	Ground footprint 900 m2; partial first floor 330 m2.
Service/fire lane	4.0 x 110.0 m	Paved, load-rated, unobstructed, drained and gate-accessible.
Maintenance strip	1.0 x 90.0 m	No permanent plant; protected access and façade drainage.
Front court	15.0 x 12.0 m	Security gate, visitor/accessible parking and emergency assembly.
Rear utility yard	15.0 x 8.0 m	Screened technical plant, gas cages, waste, transformer and generator.

The master plan is a concept allocation and not a cadastral or permitting drawing. Exact setbacks, emergency access, parking count, stormwater retention and external hydrants are to be determined by the licensed design team.

3.2. Ground Floor Plan and Linear Process Spine

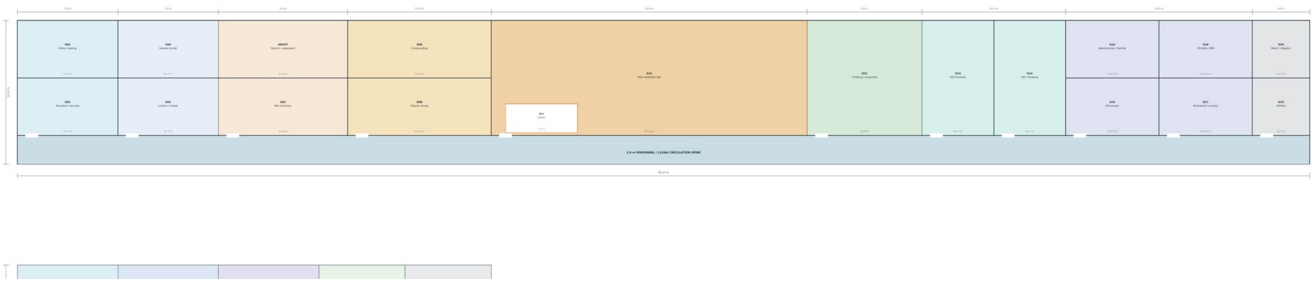

Figure 2. Ground-floor zoning within the 10 m x 90 m building.
Source: True-scale A0 concept master sheet

Internal planning logic

- An 8.0 m laboratory/process bay runs alongside a 2.0 m personnel corridor. Doors are independent and pass-through circulation between hazardous laboratories is avoided.
- Wet chemistry and solvent rooms are maintained negative to the corridor; ISO 8 and ISO 7 rooms are positive with interlocked airlocks and pass boxes.
- The 176 m2 pilot hall receives a 7.5 m clear-height volume, dedicated equipment foundations, lifting access and an adjacent positive-pressure control room.
- Vibration-sensitive microscopy and XRD are located away from the pilot equipment and service-lane vibration sources as far as the site permits.

CONSTRUCTION COORDINATION
Final vendor general-arrangement drawings govern floor pits, foundations, maintenance clearances, roof penetrations, lifting beams, access doors and utility drops. BIM clash detection is required before slab pours.

3.3. Partial First Floor - AI/VR, Data, Quality and Project Functions

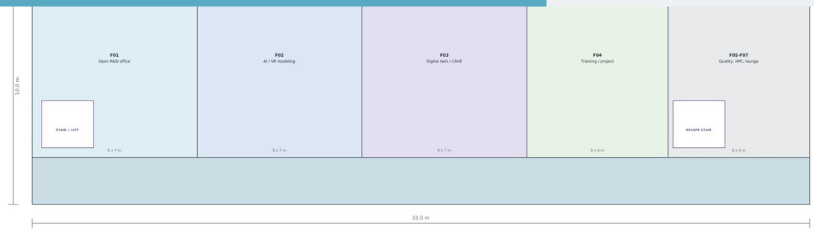

Figure 3. Partial first-floor concept, approximately 330 m2.
Source: True-scale A0 concept master sheet

Room	Area	Primary use
F01 Open R&D office	56 m2	Approximately 24 workpoints and multidisciplinary collaboration.
F02 AI/VR modeling suite	56 m2	GPU workstations, visualization and model review.
F03 Digital twin / CAVE	56 m2	Immersive process twin, training and remote collaboration.
F04 Training / project room	48 m2	Consortium meetings, supplier reviews and technical training.
F05 Quality / regulatory / data	24 m2	LIMS/ELN/QMS review, document control and audit records.
F06 HPC / server / UPS	12 m2	100-200 TB storage, compute, network and dedicated cooling.
F07 Lounge / archive	12 m2	Staff support and controlled records archive.

The partial first floor should be structurally and acoustically separated from the pilot hall. The server room requires dedicated cooling, fire detection, water-leak detection, UPS-backed power and restricted access.

3.4. Functional Area Schedule and Internal Dimensions

ID	Function	Planning dimensions	Area	Environment
G01	Reception and security	4.0 x 7.0	28 m2	Unclassified
G02	Visitor briefing / meeting	4.0 x 7.0	28 m2	Unclassified
G03	Personnel lockers / change	4.0 x 7.0	28 m2	Controlled
G04	Sample receipt / chain of custody	4.0 x 7.0	28 m2	Controlled
G05	Wet chemistry / functionalization	4.0 x 9.0	36 m2	Negative -5 Pa
G06	Solvent / graphene / reagent lab	4.0 x 5.0	20 m2	ATEX review; negative -10 Pa
G07	Glasswash / DI preparation	4.0 x 4.0	16 m2	Controlled
G08	Polymer drying / conditioning	4.0 x 10.0	40 m2	Dry room option
G09	Compounding / masterbatch	4.0 x 10.0	40 m2	Negative -5 Pa
G10	Pilot meltblown hall	8.0 x 22.0	176 m2	Controlled high-bay
G11	Pilot line control room	2.0 x 5.0	10 m2	Positive +5 Pa
G12	Finishing / converting	8.0 x 8.0	64 m2	Controlled
G13	ISO 8 transition / airlocks	8.0 x 5.0	40 m2	ISO 8, +15 Pa
G14	ISO 7 prototype finishing	8.0 x 5.0	40 m2	ISO 7, +30 Pa

Ground floor schedule - part 1. Dimensions are planning dimensions; circulation, wall thicknesses and service risers are coordinated at detailed design.

3.4. Functional Area Schedule - Continued

ID	Function	Planning dimensions	Area	Environment
G15	Microscopy / surface analysis	4.0 x 6.5	26 m2	Stable 22 +/-1 C
G16	Spectroscopy / thermal analysis	4.0 x 6.5	26 m2	Stable 22 +/-1 C
G17	Mechanical / thermal / acoustic	4.0 x 6.5	26 m2	Low vibration/noise
G18	Filtration / environment / EMI	4.0 x 6.5	26 m2	Dedicated exhaust
G19	Utility / electrical room	4.0 x 4.0	16 m2	Technical
G20	Maintenance / waste / dispatch	4.0 x 4.0	16 m2	Separated dirty flow
F01	Open R&D office	8.0 x 7.0	56 m2	Office
F02	AI / VR modeling suite	8.0 x 7.0	56 m2	Office technical
F03	Digital twin / CAVE room	8.0 x 7.0	56 m2	Blackout / acoustic
F04	Training / project room	8.0 x 6.0	48 m2	Office
F05	Quality / regulatory / data	4.0 x 6.0	24 m2	Secure
F06	HPC / server / UPS room	4.0 x 3.0	12 m2	Technical
F07	Staff lounge / archive	4.0 x 3.0	12 m2	Office

Area reconciliation

Component	Area
Ground-floor footprint	900 m2
Partial first floor	330 m2
Total occupied gross floor area	Approximately 1,230 m2
Ground-floor net functional rooms	Approximately 770 m2 before walls/circulation/service risers
First-floor net functional rooms	264 m2 before circulation/walls
Land area	1,650 m2

DESIGN CONTROL
The area schedule is an Employer Requirement. The licensed architect may adjust individual room dimensions while preserving the workflows, environmental classifications, equipment clearances and total site constraints.

4. Civil Construction and Architectural Technical Requirements

Element	Concept specification
Structural system	Steel portal or braced frame with reinforced-concrete cores/frames where required; 5 m transverse planning grid and 6-7 m longitudinal grid; design under applicable Eurocodes and Romanian National Annexes.
Foundations	Geotechnically determined isolated/strip foundations or raft; separate inertia blocks for SEM/XRD and rotating equipment; settlement criteria coordinated with instrument vendors.
Ground slab	Industrial reinforced slab on grade; typical 7.5-10 kN/m2, locally 15-25 kN/m2 or vendor requirement; chemical-resistant topping in labs; joints located outside precision-equipment zones.
Pilot hall	Approximately 7.5 m clear height; high-level services, maintenance platforms, lifting provision and large removable façade/door for equipment replacement.
Laboratory height	Approximately 4.2 m clear where possible, permitting suspended services, exhaust ducts and cleanroom ceiling voids.
Envelope	High-performance insulated sandwich panels or built-up façade; airtightness and vapour control compatible with pressure cascades; impact-resistant plinth and replaceable service panels.
Roof	Insulated low-slope roof, internal drainage with overflow, PV-ready structure, controlled penetrations and screened plant zones.
Internal partitions	Washable laboratory panels, fire-rated systems around hazardous/technical spaces, cleanroom modular panels and acoustic partitions around pilot/CAVE/server zones.
Doors	Interlocked cleanroom doors, fire-rated hazardous-room doors, access-controlled lab doors, 1.2-1.8 m equipment doors and at least one oversized equipment route.
Finishes	Seamless resin floors in wet/chemical/clean zones, conductive floors where required, coved skirtings, washable ceilings/walls, slip-resistant support-area finishes.

A detailed room-data-sheet matrix must be developed during SF/PT design, linking every room to floor loading, fire rating, finishes, temperature, humidity, pressure, air changes, exhaust, gases, drainage, data, access and equipment loads.

4.1. Fire Safety, Accessibility, EHS and Environmental Design

Fire and explosion safety

- Prepare an early fire strategy covering occupancy, fire compartments, evacuation distances, smoke control, hydrants/sprinklers or other suppression, fire-water demand and service-lane access.
- Classify solvent, powder, gas and nanomaterial operations through formal chemical inventory, HAZOP/What-if review and ATEX zoning. Use independent exhaust and no air recirculation from hazardous rooms.
- Provide gas detection, oxygen-deficiency monitoring where nitrogen is used, emergency power-off, machine interlocks, bonded/grounded systems and appropriate explosion-relief or containment based on risk assessment.
- Separate battery energy storage, transformer, generator, gas cages and flammable waste from occupied rooms with code-compliant distances and fire-rated construction.

Occupational safety and environmental controls

Risk	Primary controls
Nanoparticle exposure	Closed transfer where feasible, local exhaust, HEPA-filtered vacuum cleaning, exposure monitoring, PPE and validated cleaning.
Hot polymer / rotating machinery	Guarding, LOTO, insulated surfaces, emergency stops, safe access platforms and operator training.
Solvents / VOCs	Fire-rated store, spill bunds, ATEX equipment, VOC extraction, gas detection, segregated waste and emergency showers/eyewash.
High voltage / lasers / X-ray	Interlocked rooms, warning systems, authorized-user access, radiation shielding and laser-safety programme.
Wastewater / chemical waste	Characterization before discharge, neutralization/collection as required, labelled hazardous-waste staging and licensed disposal.
Noise / vibration	Pilot hall acoustic envelope, resilient mounts, isolated slabs and target below 45 dBA in adjacent offices/labs.

Accessibility

Provide a step-free principal entrance, accessible parking, compliant routes and doors, accessible WC/changing facilities, lift access to the first floor, visual and audible alarms, accessible meeting/training rooms and emergency procedures for persons with disabilities.

5. HVAC, Cleanroom and Environmental Performance

Parameter	Concept target
General laboratories	22 +/-2 C; 40-60% RH; dedicated supply/exhaust according to hazard and heat loads.
Microscopy / XRD	22 +/-1 C; tight vibration, acoustic and temperature stability; low electromagnetic interference.
Polymer conditioning	Optional 20-35% RH dry-room capability for moisture-sensitive polymers.
ISO 8 transition	20-22 C; 40-55% RH; approximately +15 Pa to corridor; HEPA terminal filtration; interlocked personnel/material airlocks.
ISO 7 critical finishing	20-22 C; 40-55% RH; approximately +30 Pa; HEPA filtration and qualification under ISO 14644.
Wet chemistry	Approximately -5 Pa to corridor; dedicated corrosion-resistant exhaust; no recirculation.
Solvent / graphene lab	Approximately -10 Pa; dedicated ATEX-reviewed exhaust and gas/VOC monitoring.
Pilot hall	Temperature controlled for process stability; high heat-load extraction and makeup air; not classified as full cleanroom unless justified.
Resilience	N+1 critical fans/pumps, safe shutdown on power failure, BMS alarms and trend logging.

Qualification strategy

- Design Qualification (DQ) against room requirements and risk assessment.
- Factory and Site Acceptance Tests for AHUs, controls and monitoring.
- Installation and Operational Qualification of cleanroom systems and critical utilities.
- ISO 14644 classification, recovery, pressure, airflow, HEPA integrity and environmental-monitoring baseline.
- Periodic requalification and calibration integrated into the QMS/LIMS maintenance plan.

5.1. Mechanical, Electrical and Process Utilities

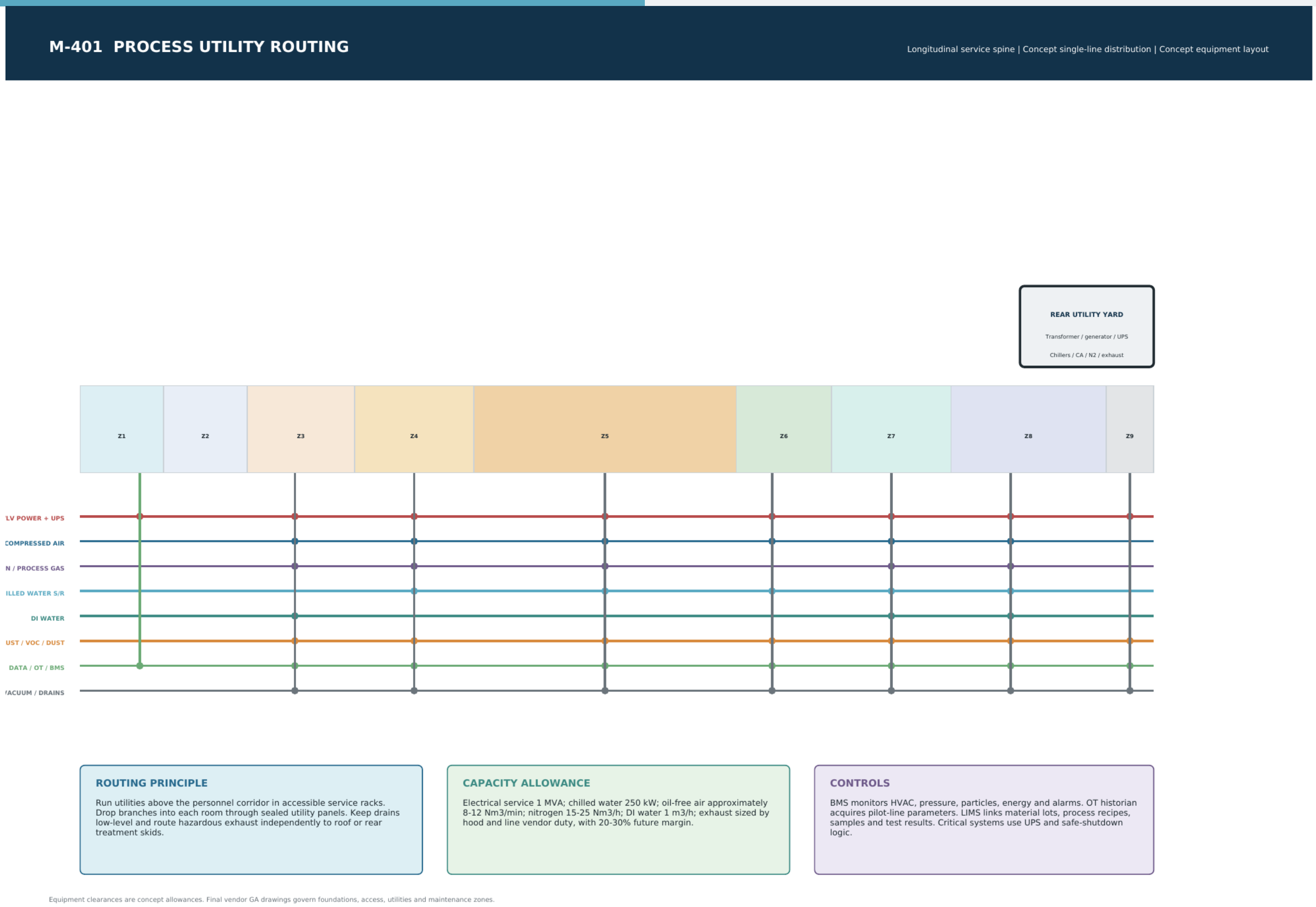

Figure 4. Concept utility routing along the linear service spine.
Source: M-TechX Nanofiber R&D Center concept package

Utility	Concept capacity / routing basis
Electrical	Approximately 1 MVA service allowance; MV/LV transformer, selective distribution, harmonics review, process panels, safe-shutdown generator and UPS for controls/data/instruments.
Compressed air	Oil-free plant, dryers, receiver and ring main; pressure/quality classes defined by equipment URS.
Nitrogen / gases	Generator or manifold, monitored gas cages, oxygen-deficiency alarms, point-of-use regulators and secured cylinder handling.
Chilled water	Approximately 250 kW initial plant with N+1 pumping; process and comfort circuits separated where required.
DI water	Approximately 1 m3/h plant, storage and recirculation loop; points at wet chemistry, glasswash and test skids.
Exhaust	Independent wet, solvent/VOC, dust, thermal and cleanroom systems; HEPA/carbon treatment as risk-assessed.
Drainage	Separated sanitary, process and potentially contaminated drainage; trapped chemical sinks and controlled collection before discharge.
Data/BMS	10/40 GbE backbone; OPC-UA/MQTT gateways; BMS, historian and LIMS synchronization; redundant internet and secure remote support.

6. End-to-End Research and Pilot Production Workflow

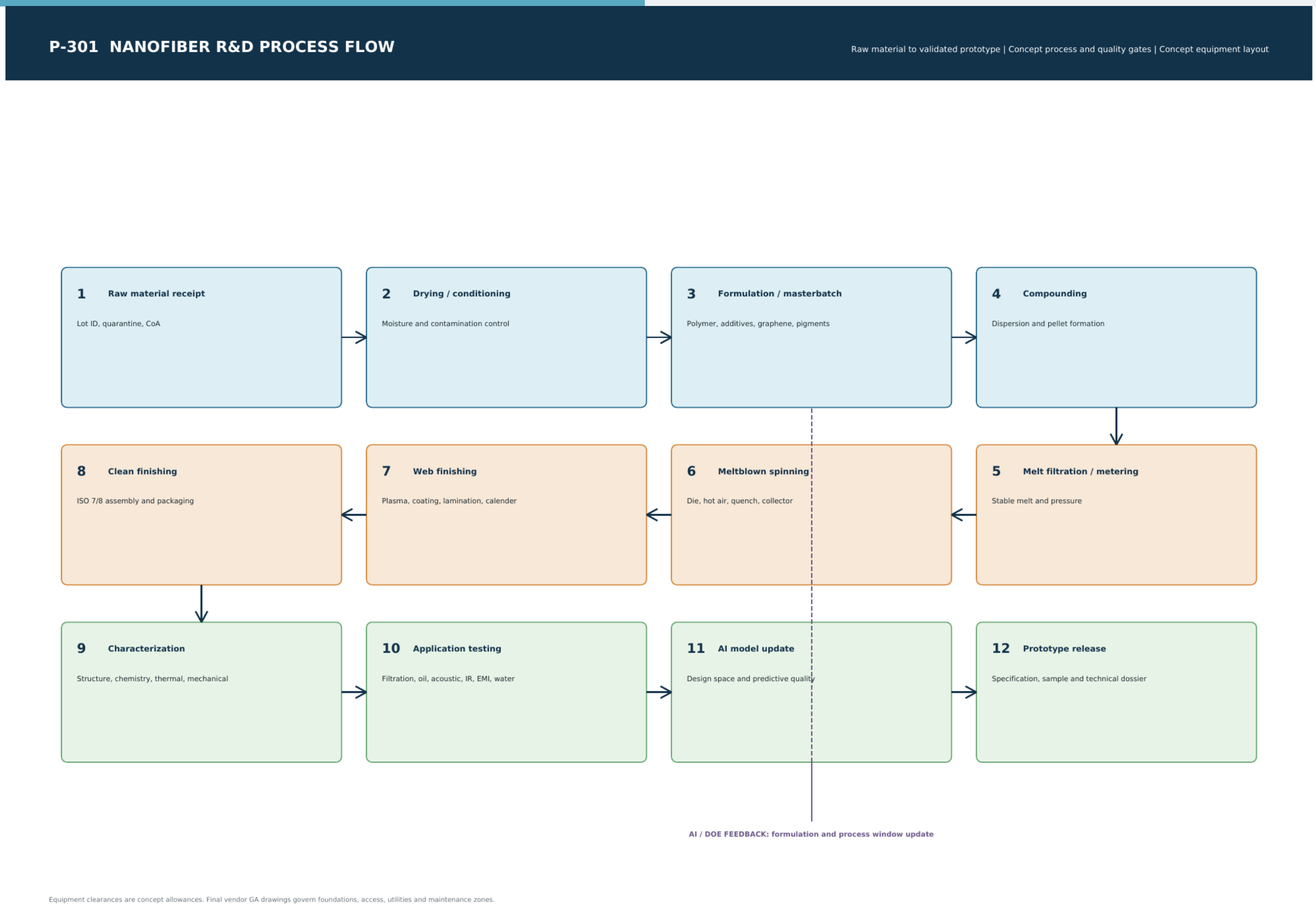

Figure 5. Process flow from polymer receipt to validated prototype and model feedback.
Source: M-TechX Nanofiber R&D Center concept package

Stage	Main activities	Release criterion
1. Receipt	Barcode, quarantine, CoA review, moisture and identity checks	Approved raw-material lot in LIMS.
2. Molecular / formulation design	BIOVIA, AI discovery, literature and experimental design	Candidate formulations and predicted property window.
3. Preparation	Drying, dosing, solution mixing, dispersion and rheology	Controlled feedstock within viscosity/moisture specification.
4. Lab trials	Micro-compounding, electrospinning or lab meltblown	Screening data and safe operating window.
5. Pilot meltblown	Controlled extrusion, air attenuation, collection and inline sensing	Repeatable web at target basis weight/fiber diameter.
6. Finishing	Calendering, coating, plasma, lamination, cutting and sealing	Prototype configuration and traceable genealogy.
7. Testing	Chemical, thermal, structural and application-specific characterization	Results meet platform KPI or drive redesign.
8. Digital feedback	Historian + LIMS data used in physics/AI models and digital twin	Updated design space, recipe and scale-up recommendation.
9. Prototype release	QA review, packaging, retention sample and customer documentation	Approved prototype / Series 0 batch.

6.1. Personnel, Material and Waste Flows

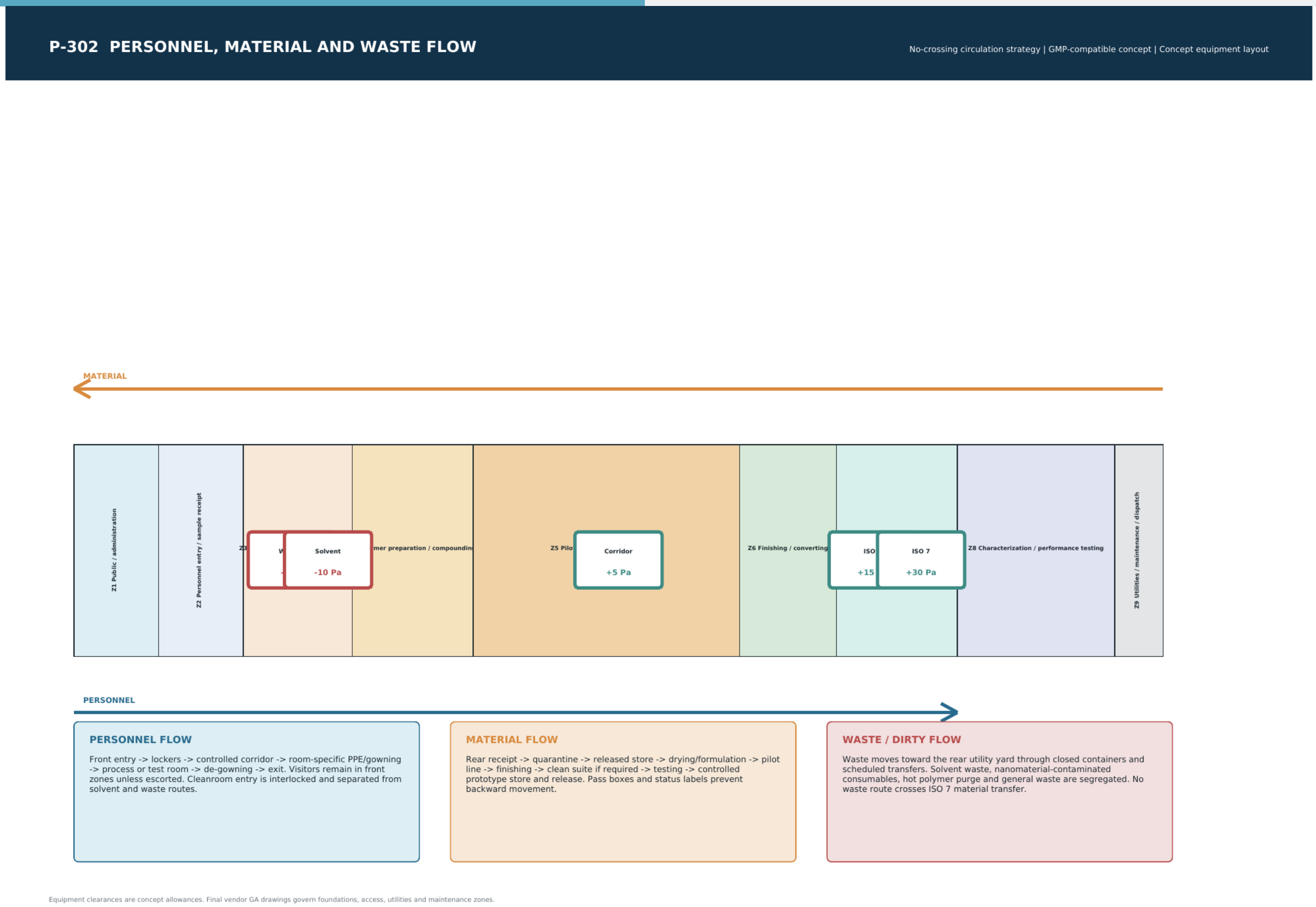

Figure 6. Segregated GMP-compatible flow concept.
Source: M-TechX Nanofiber R&D Center concept package

Flow	Route and controls
Personnel	Front reception -> changing/PPE -> controlled corridor -> assigned laboratory -> de-gowning. Clean-suite entry uses ISO 8 transition and interlocked airlocks.
Raw materials	Scheduled rigid-truck/van delivery -> goods-in quarantine -> sample receipt -> released storage -> drying/formulation/compounding -> pilot hall.
Prototype material	Pilot hall -> finishing -> clean prototype suite where required -> testing -> QA release -> dispatch.
Samples	Pass boxes and sealed labelled containers; chain of custody controlled by LIMS and sample-retention rules.
Waste	Hazardous waste and used filters move through a separated dirty route to G20/rear yard; no reverse flow through clean or public spaces.
Visitors	Restricted to reception, briefing, observation/training and controlled escorted routes; no independent access to active process areas.
Maintenance	Service lane/rear yard and equipment access points; permit-to-work, LOTO and decontamination before intervention.

GMP-COMPATIBLE, NOT GMP-CERTIFIED
The flow concept applies segregation, traceability and contamination-control principles. Formal GMP or medical-device certification would require a product-specific quality system, validation master plan and additional regulatory design.

7. Laboratory Specifications - Materials Receipt, Wet Chemistry and Formulation

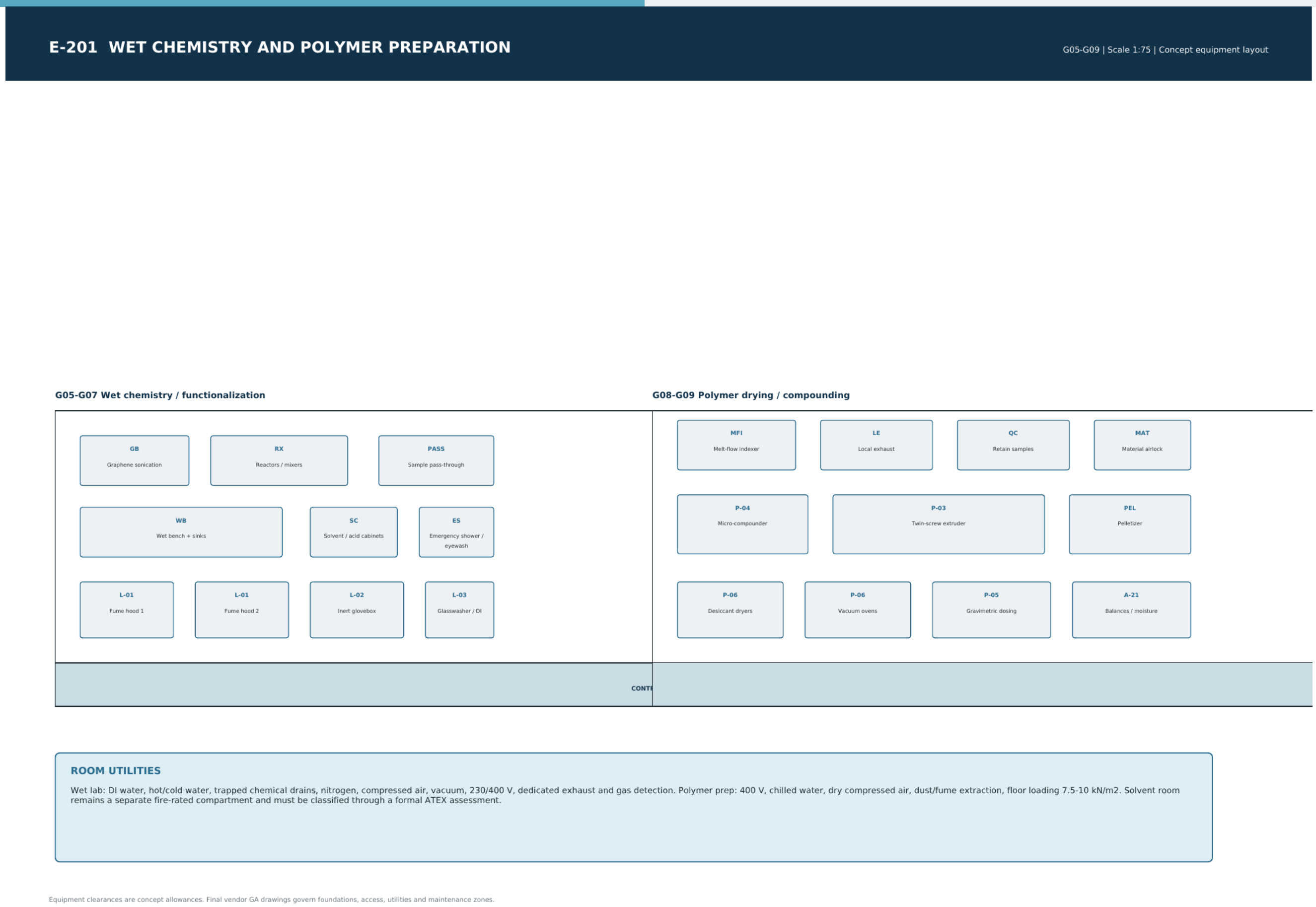

Figure 7. Concept equipment layout for wet chemistry, polymer drying and compounding.
Source: M-TechX Nanofiber R&D Center concept package

Room	Required equipment	Critical utilities / safety
G04 Sample receipt	LIMS terminal, barcode printer/scanner, quarantine cabinets, balances, moisture analyzer, retain-sample storage	230 V, data, controlled access, chain-of-custody SOP.
G05 Wet chemistry / functionalization	ATEX-reviewed fume hoods, wet benches, overhead stirrers, sonication, pH/conductivity, balances, reactors, centrifuge allowance	DI/hot/cold water, trapped drains, N2, compressed air, vacuum, -5 Pa, eyewash/shower.
G06 Solvent / graphene / reagent	ATEX hood, inert glovebox, flammable/corrosive cabinets, explosion-proof refrigerator, dispersion/sonication equipment	Dedicated exhaust, gas/VOC detection, bonding/grounding, -10 Pa, fire-rated compartment.
G07 Glasswash / DI	Glasswasher, ultrasonic baths, drying cabinet, sinks and DI polishing	Hot/cold/DI water, drain, heat extraction and splash-resistant finishes.
G08 Polymer drying / conditioning	Desiccant dryers, vacuum ovens, day bins, humidity control and moisture analysis	400 V, exhaust, dry compressed air, low-RH option, dust control.
G09 Compounding / masterbatch	Twin-screw extruder, micro-compounder, strand pelletizer, gravimetric dosing, melt-flow indexer and local extraction	400 V, chilled water, compressed air, dust/fume extraction, heavy floor loading.

7.1. Pilot Meltblown Hall, Control and Scale-Up Capability

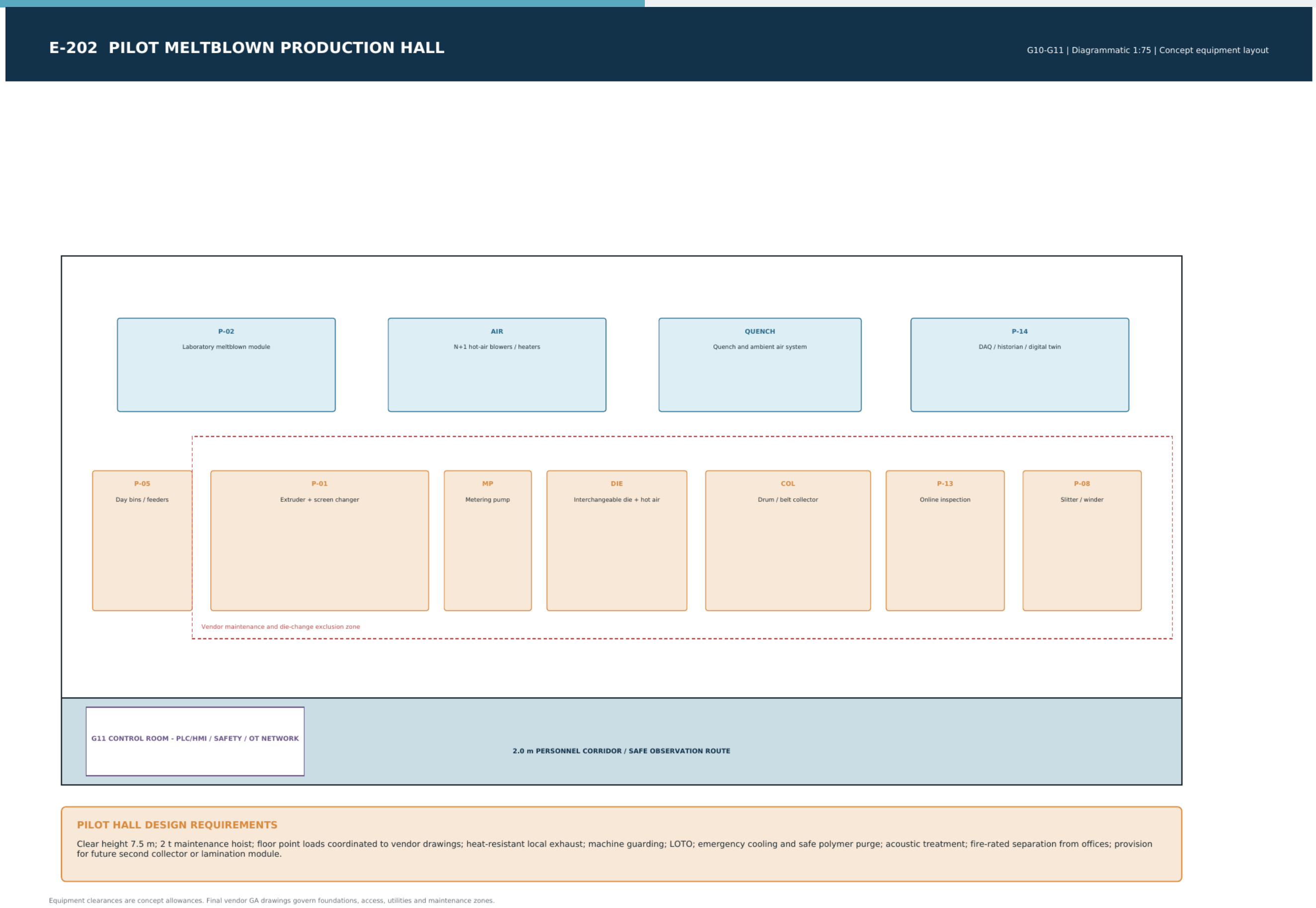

Figure 8. Pilot hall equipment layout and reserved maintenance zones.
Source: M-TechX Nanofiber R&D Center concept package

Package	Functional requirement
Modular pilot line	0.5-30 kg/h range; interchangeable dies, polymer feed, heated air, collectors, web handling and recipe control.
Lab meltblown module	Low-material experiments and rapid screening before pilot-scale trials.
Feed preparation	Drying, day bins, gravimetric feeders and additive/masterbatch dosing linked to lot genealogy.
Inline sensing	Web camera, basis weight, thickness, temperature and other process sensors; time-synchronized with PLC historian.
Control room	Positive-pressure room with PLC/HMI, historian, safety system, process CCTV and secure remote supplier access.
Mechanical design	Dedicated foundations, hot-surface protection, guards, emergency stops, maintenance platforms and lifting access.
Environmental control	High-heat-load makeup/exhaust, dust/fume capture, acoustic treatment and safe shutdown during utility loss.
Data integration	OPC-UA or equivalent interface to LIMS/ELN, digital twin, AI optimization and quality records.

CAPACITY BASIS
The throughput range is a research and pilot target, not a guaranteed vendor specification. Polymer melting temperature, die width, air volume, collector speed and application portfolio must be fixed in the User Requirement Specification.

7.2. Finishing, Converting and ISO 8 / ISO 7 Prototype Suite

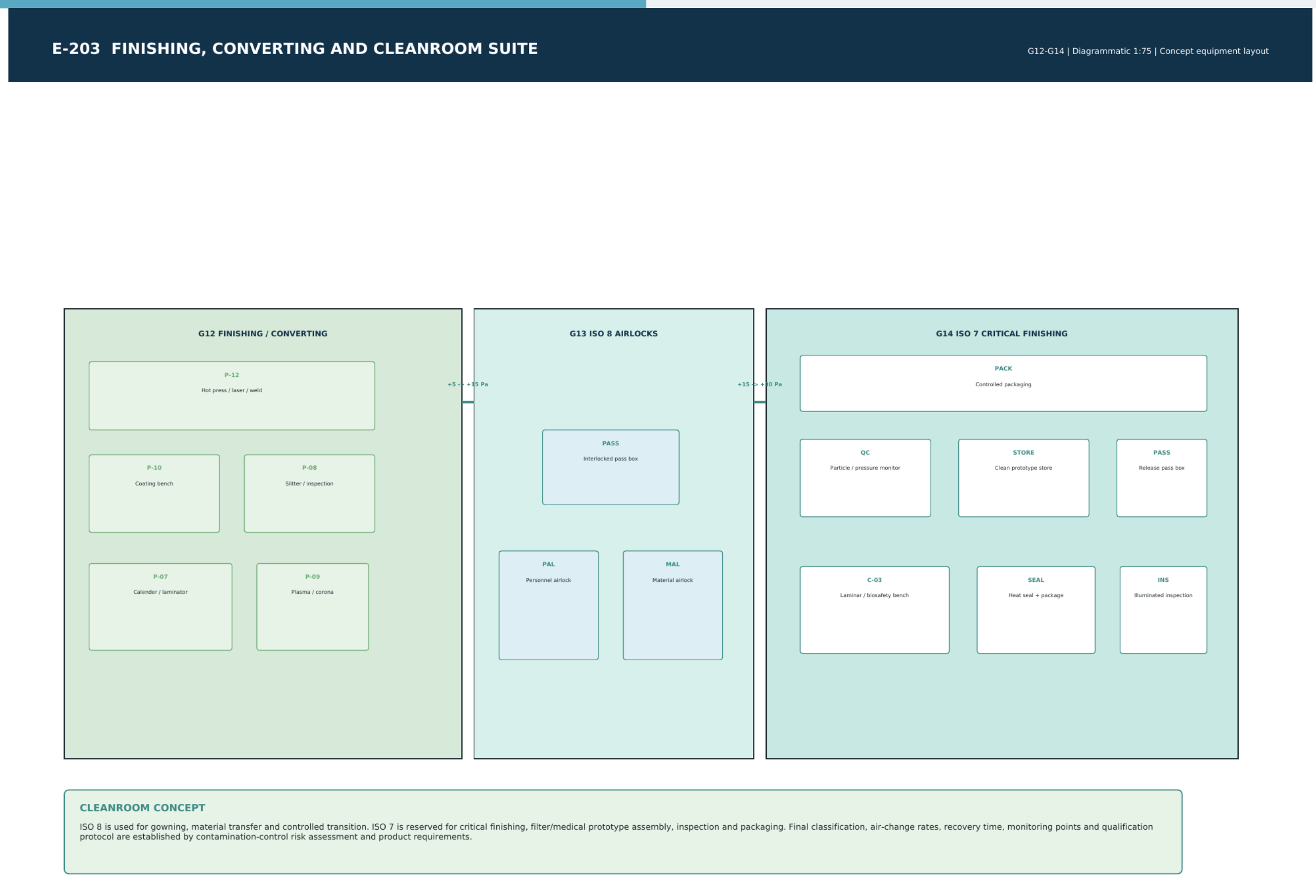

Figure 9. Finishing and clean-suite equipment arrangement.
Source: M-TechX Nanofiber R&D Center concept package

Area	Equipment and tasks	Controls
G12 Finishing / converting	Calender/hot laminator, slitter-rewinder, web inspection, plasma/corona, coating/drying, hot press, ultrasonic welding, heat sealing and laser cutting	Process exhaust, chilled water, compressed air, machine guarding, laser controls and local fire safety.
G13 ISO 8 transition	Personnel and material airlocks, gowning, pass boxes, staging and environmental monitoring	Approximately +15 Pa, HEPA filtration, interlocked doors, cleaning and environmental SOPs.
G14 ISO 7 critical finishing	Clean cutting/sealing/assembly, inspection, packaging and non-clinical prototype handling	Approximately +30 Pa, HEPA filtration, laminar/biosafety bench, particle and pressure monitoring.
Prototype release	Visual inspection, dimensions, basis weight, retention samples, batch documentation and label verification	QA approval in LIMS/QMS; controlled status labels and segregated released/quarantine storage.

Only the critical finishing suite is designed to ISO 7. Keeping the full pilot hall outside formal cleanroom classification materially reduces capital and operating cost while preserving a controlled transfer route into clean prototype finishing.

7.3. Characterization Laboratories - Morphology, Spectroscopy and Thermal Analysis

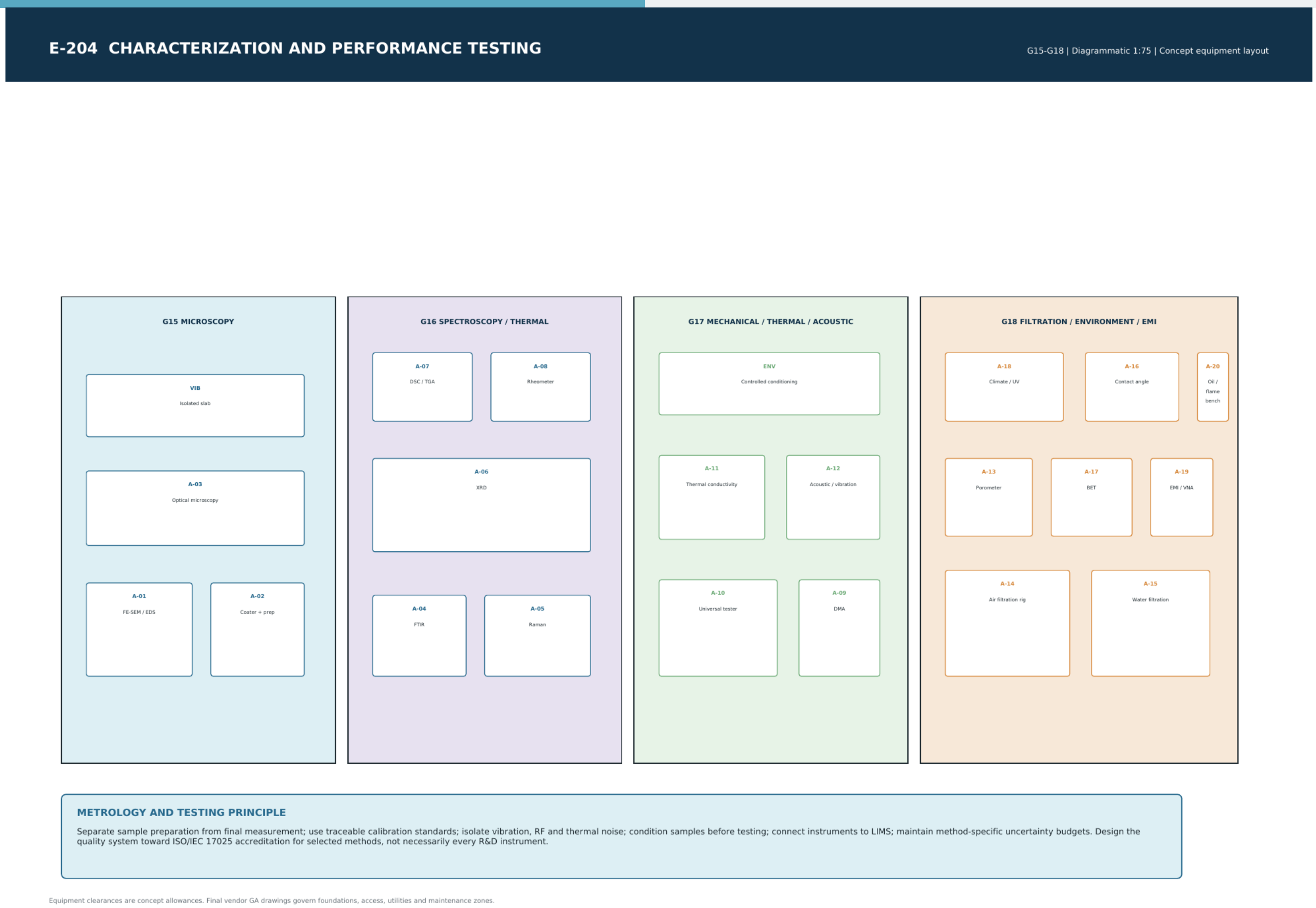

Figure 10. Shared advanced characterization layout.
Source: M-TechX Nanofiber R&D Center concept package

Laboratory	Major instruments	Design requirements
G15 Microscopy / surface	Field-emission SEM with EDS; sputter coater; critical-point dryer; optical, polarized and digital microscopes	Vibration-isolated slab, stable temperature, clean power, N2/vacuum/gases, low acoustic and electromagnetic interference.
G16 Spectroscopy / thermal	ATR-FTIR with microscope, Raman microscope, XRD, DSC/TGA, rheometer and melt-flow indexer	Laser and X-ray controls, N2/dry air, optional chilled water, stable temperature and instrument exhaust.
Sample preparation	Cutting, embedding, polishing, coating, drying, conditioning and reference standards	Separated clean/dirty benches, local exhaust, labelled sample trays and documented preparation methods.
Data handling	Instrument PCs, secure raw-data storage, validated templates and automatic transfer to LIMS/ELN	Role-based access, audit trails, synchronized time stamps and backup.

7.4. Performance and Application Testing Laboratories

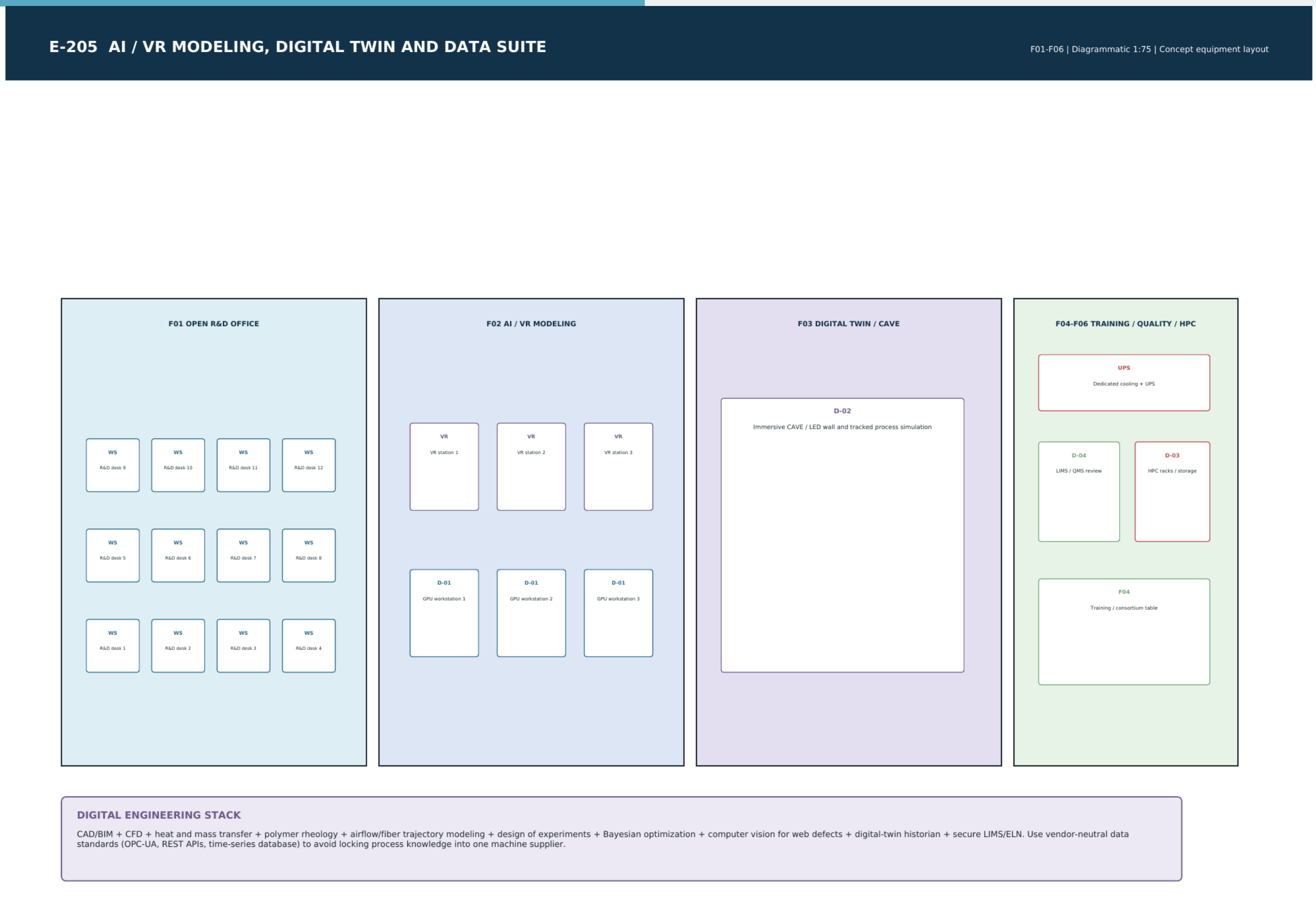

Figure 11. Mechanical, thermal, acoustic, filtration, environmental and EMI testing layout.
Source: M-TechX Nanofiber R&D Center concept package

Testing family	Equipment / methods	Applications
Mechanical / viscoelastic	Universal testing machine, DMA, thickness/basis-weight, environmental grips	Tensile, compression, flexure, creep and dynamic response.
Thermal / acoustic	Thermal conductivity/diffusivity analyzer, impedance tube and vibration shaker	Insulation, sound absorption and vibration damping.
Pore / surface	Capillary flow porometer, permeability tester, BET analyzer, contact-angle goniometer	Filtration, sorption, wetting and surface-area optimization.
Air filtration	Efficiency and pressure-drop rig with controlled aerosol and HEPA exhaust	Face/filter media, industrial filtration and protective materials.
Water filtration	Flux, retention and pressure test skid with DI water and controlled drainage	Membrane supports and water-treatment prototypes.
Environmental durability	UV/weathering and climate chambers, chemical resistance, oil sorption and flammability package	Construction, transport, agriculture and industrial applications.
EMI shielding	Vector network analyzer and shielded test cell with RF grounding	Graphene and functional composite protection structures.

7.5. Quality, Metrology, Support and Laboratory Operation

System	Requirement
Quality management	Integrated QMS with controlled SOPs, deviations, CAPA, change control, training, equipment status, audit trail and document retention.
LIMS / ELN	Sample registration, chain of custody, formulation/recipe links, results, approvals, retention samples, equipment calibration and prototype genealogy.
Method validation	Accuracy, precision, linearity/range, repeatability/reproducibility, robustness, uncertainty and reference-material strategy as applicable.
Calibration / maintenance	Risk-based calibration intervals, preventive maintenance, service contracts, critical spares and equipment-status labels.
Chemical management	Approved inventory, SDS, compatibility segregation, maximum room quantities, expiry control, spill response and waste coding.
Metrology	Traceable balances, temperature, pressure, flow, humidity, particle, electrical and dimensional standards.
Workshop / maintenance	Basic mechanical/electrical tools, HEPA vacuum, LOTO kits, spare storage, decontamination and permit-to-work.
Consumables	Polymer pellets, masterbatches, solvents, gases, filters, substrates, sample holders, PPE, standards and packaging materials.
External testing	Accredited third-party testing retained for methods outside the initial equipment scope and for regulatory/customer validation.

ACCREDITATION ROUTE

The facility should be designed for traceability and method validation from the start. Formal ISO/IEC 17025 accreditation can be phased by method after equipment commissioning and proficiency testing.

8. Digital R&D Architecture and Closed-Loop Materials Development

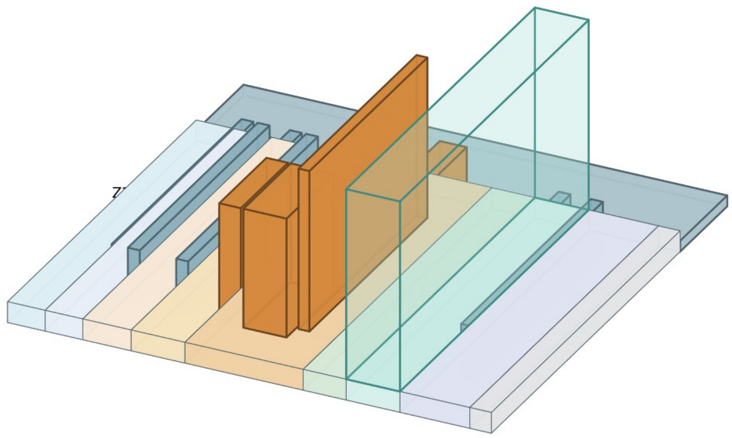

Figure 12. Digital and physical workflow integrated along the process spine.
Source: M-TechX concept massing and process visualization

Layer	Function
Scientific design	Molecular/polymer modelling, multiphysics, CFD/polymer flow, CAD/PLM and AI materials discovery.
Experiment execution	ELN methods, formulation records, instrument acquisition and process historian.
Data integration	Common material IDs, time synchronization, metadata schemas and automated import from instruments/PLC.
Analytics / AI	Design of experiments, surrogate models, sequential learning, property prediction and anomaly detection.
Digital twin	Live and replay process visualization, recipe comparison, virtual commissioning and operator training.
Lifecycle / collaboration	3DEXPERIENCE-based product/process data, requirements, change control, supplier collaboration and IP permissions.
Governance	Role-based access, OT/IT segmentation, backups, cybersecurity monitoring, data retention and FAIR/open-science rules where applicable.

The core data object is a traceable experiment genealogy: raw-material lot -> formulation -> equipment configuration -> process time series -> web/sample ID -> test results -> model version -> released prototype. This structure enables reproducibility and AI model validation.

8.1. Scientific Software Applications and Licence Allowances

Application	Use in CED-Pro-NANO	Primary owner	Planning allowance
BIOVIA Materials Studio	Molecular dynamics, polymer structure, surface interactions, diffusion and property screening.	Daniela Ivanov / Raluca Maier	EUR 45,000
COMSOL Multiphysics + relevant modules	Coupled flow, heat transfer, particle transport, viscoelastic/non-Newtonian behaviour and performance simulation.	Sho Kaneda / Raluca Maier	EUR 50,000
ANSYS Fluent / Polyflow	Extrusion, die flow, air attenuation, thermal-flow analysis and process equipment studies.	Sho Kaneda	EUR 60,000
Citrine Platform OR Microsoft Discovery	AI-driven materials discovery, virtual experiments, formulation optimization and knowledge management. Procure one primary platform after proof of concept.	Daniela Ivanov / Data team	EUR 65,000
NVIDIA Omniverse	Industrial digital-twin integration, USD-based collaborative visualization and physical-AI workflows; allowance focuses on integration/support.	Sho Kaneda / Digital twin engineer	EUR 15,000
Unity Industry + HoloLens	AR-assisted design review, operator training, maintenance instructions and remote support.	Sho Kaneda / Training lead	EUR 30,000
Dassault 3DEXPERIENCE	CAD, requirements, simulation data, experimental records, change control and lifecycle collaboration.	Raluca Maier / QA	EUR 55,000
LIMS / ELN / QMS / cybersecurity	Validated experiment and quality records, interfaces, audit trail, backup and security monitoring.	QA/Data team	EUR 75,000

LICENCE ASSUMPTIONS
Allowances are budget placeholders for approximately 24-36 months of implementation/start-up use and integration. Licensing models, cloud consumption, implementation services and academic/enterprise terms vary; competitive vendor quotations are required.

8.2. Hardware, Visualization, Data and Cybersecurity

Package	Minimum functional specification	Budget
Six GPU engineering workstations	High-core-count CPUs, 128-256 GB RAM, professional GPUs, calibrated 4K displays, VR-ready	EUR 80,000
HPC / storage / backup	GPU compute nodes, 100-200 TB usable storage, immutable backup, 10/40 GbE and UPS	EUR 95,000
CAVE / VR / HoloLens	LED/projection visualization, tracking, VR headsets, four HoloLens devices, acoustic/blackout fit-out	EUR 80,000
Network and OT gateways	Redundant core switches, firewalls, OPC-UA/MQTT gateways, Wi-Fi, time server and secure remote-access jump host	Included in IT/MEP allowances
Server room	Dedicated cooling, UPS, environmental/leak monitoring, inert or clean-agent fire strategy and access control	Included in construction/IT
Cybersecurity	OT/IT segmentation, identity/MFA, endpoint protection, logging/SIEM, backup testing and incident response	Included in LIMS/QMS allowance

Data governance requirements

- Persistent material, batch, sample and experiment identifiers; version-controlled recipes and models.
- Raw data retained in original vendor format plus standardized metadata and derived datasets.
- Role-based IP permissions for confidential partner projects and separate open-science datasets.
- Disaster-recovery objectives, offline/immutable backups and periodic restore tests.
- Cybersecurity requirements included in every equipment URS and supplier remote-access agreement.

9. Detailed Equipment Schedule - Pilot and Processing

ID	Equipment / package	Qty	Location	Critical utilities	Planning EUR
P-01	Modular pilot meltblown line, 0.5-30 kg/h, interchangeable die and collectors	1	G10	400 V, 350-500 kW, CHW, CA, exhaust	900,000
P-02	Laboratory meltblown / micro-spinning research module	1	G10	400 V 80 kW, CA, exhaust	220,000
P-03	Twin-screw compounding extruder with strand pelletizer	1	G09	400 V 80 kW, CHW, exhaust	180,000
P-04	Micro-compounder / micro-injection system	1	G09	400 V 20 kW, CHW	115,000
P-05	Gravimetric feeders, day bins and additive dosing package	1	G08-G10	400 V, CA, dust extraction	100,000
P-06	Desiccant polymer dryers and vacuum drying ovens	4	G08	400 V 45 kW, exhaust	85,000
P-07	Calender / hot-lamination line	1	G12	400 V 60 kW, CHW, exhaust	145,000
P-08	Slitter-rewinder and precision web inspection	1	G12	400 V 25 kW, CA	85,000
P-09	Atmospheric plasma / corona treatment unit	1	G12	400 V 20 kW, exhaust, gases	120,000
P-10	Coating / impregnation and drying bench line	1	G12	400 V 35 kW, exhaust	125,000
P-11	Comparative electrospinning / needleless nanofiber rig	1	G06	400 V, HV interlock, exhaust	95,000
P-12	Hot press, ultrasonic welder, heat sealer and laser cutter package	1	G12/G14	400 V, CA, exhaust	95,000
P-13	Online web camera, basis-weight, thickness and thermal sensors	1	G10	24 VDC, data, laser safety	80,000
P-14	Process data acquisition, PLC historian and digital-twin interface	1	G10/G11	UPS, Ethernet/OPC-UA	55,000

Planning values are order-of-magnitude allowances excluding VAT. Major packages require User Requirement Specifications, budgetary quotations, factory acceptance tests and vendor general-arrangement review.

9.1. Detailed Equipment Schedule - Characterization I

ID	Equipment / package	Qty	Location	Critical utilities	Planning EUR
A-01	Field-emission SEM with EDS	1	G15	400 V, CHW, N2, vibration control	360,000
A-02	SEM sputter coater, critical-point dryer and sample-prep package	1	G15	230 V, vacuum, gases	75,000
A-03	Optical / polarized / digital microscopes	3	G15	230 V, data	55,000
A-04	ATR-FTIR spectrometer with microscope interface	1	G16	230 V, dry air/N2	75,000
A-05	Raman microscope	1	G16	230 V, CHW optional, laser controls	165,000
A-06	X-ray diffractometer (XRD)	1	G16	400 V, CHW, radiation shielding	230,000
A-07	DSC and TGA thermal analysis package	1	G16	230 V, N2, compressed air	150,000
A-08	Rotational rheometer and melt-flow indexer	1	G16/G09	230/400 V, N2	125,000
A-09	Dynamic mechanical analyzer (DMA)	1	G17	230 V, N2	95,000
A-10	Universal testing machine with environmental grips	1	G17	400 V, CA	90,000
A-11	Thermal conductivity / diffusivity analyzer	1	G17	230 V, CHW optional	95,000

9.2. Detailed Equipment Schedule - Characterization II

ID	Equipment / package	Qty	Location	Critical utilities	Planning EUR
A-12	Acoustic impedance tube and vibration shaker	1	G17	230/400 V, acoustic isolation	65,000
A-13	Capillary flow porometer and permeability tester	1	G18	230 V, clean compressed air	120,000
A-14	Air filtration efficiency and pressure-drop test rig	1	G18	400 V, HEPA exhaust, aerosols	155,000
A-15	Water filtration / flux / retention test skid	1	G18	400 V, DI water, drain	85,000
A-16	Contact-angle / surface-energy goniometer	1	G18	230 V, data	45,000
A-17	BET surface-area / pore-size analyzer	1	G18	230 V, N2/He, exhaust	115,000
A-18	Environmental and UV weathering chambers	2	G18	400 V, water, drain, exhaust	90,000
A-19	EMI shielding measurement system with VNA and test cell	1	G18	230 V, RF grounding	115,000
A-20	Oil sorption, flammability and chemical resistance test package	1	G18	230 V, exhaust, fire safety	40,000
A-21	Analytical balances, moisture analyzers, pH/conductivity and lab meters	1	G04-G09	230 V, data	45,000

VALUE ENGINEERING

Protect the core analytical capability (SEM/EDS, FTIR/Raman, thermal analysis, rheology, mechanical, porometry and filtration). Where the budget tightens, phase less frequently used instruments or procure certified reconditioned systems with warranty and service support.

9.3. Detailed Equipment Schedule - Laboratories, Cleanroom and Utilities

ID	Equipment / package	Qty	Location	Critical utilities	Planning EUR
L-01	ATEX-rated fume hoods and wet chemistry benches	3	G05/G06	Exhaust, DI, gases, power	95,000
L-02	Glovebox / inert-atmosphere workstation	1	G06	N2/Ar, vacuum, power	55,000
L-03	Glasswasher, drying cabinet, ultrasonic baths and DI polishing	1	G07	DI water, hot water, drain	45,000
L-04	Flammable, corrosive and gas-cylinder safety storage package	1	G06/external	Ventilation, gas detection	35,000
C-01	ISO 8 / ISO 7 cleanroom envelope, airlocks and pass boxes	1	G13-G14	HVAC, BMS, interlocks	420,000
C-02	Cleanroom monitoring: particle counters, pressure and environmental sensors	1	G13-G14	UPS, BMS, data	55,000
C-03	Biosafety cabinet / laminar flow bench for non-clinical prototypes	1	G14	Exhaust option, power	25,000
U-01	Oil-free compressed-air plant, dryers, receiver and ring main	1	Rear yard/G19	400 V 60 kW, drains	85,000
U-02	Nitrogen generator / manifold and distribution	1	Rear yard	400 V, CA, O2 monitoring	70,000
U-03	250 kW chilled-water plant with N+1 pumping	1	Rear yard	400 V, BMS	140,000
U-04	DI water plant, 1 m3/h, storage and recirculation loop	1	G19/G07	Water, drain, power	55,000
U-05	Process exhaust, dust collection, HEPA and carbon/VOC treatment	1	Roof/rear yard	400 V, BMS, ATEX review	175,000
U-06	Electrical service, 1 MVA transformer, generator and UPS package	1	Rear yard/G19	MV/LV, fuel or gas	260,000
U-07	150 kWp rooftop PV and approximately 300 kWh BESS allowance	1	Roof/rear yard	Grid, EMS, fire safety	250,000
U-08	Fire detection, gas detection, suppression and emergency systems	1	All	UPS, BMS, fire water	135,000

9.4. Digital Equipment and Equipment-Budget Reconciliation

ID	Equipment / package	Qty	Location	Critical utilities	Original concept EUR
D-01	Six GPU engineering workstations and 3D visualization licenses allowance	1	F02	Power, data, cooling	85,000
D-02	Immersive CAVE / LED visualization and VR tracking system	1	F03	Power, data, acoustic	90,000
D-03	HPC server cluster, 100-200 TB storage and backup	1	F06	UPS, dedicated cooling, 10/40 GbE	95,000
D-04	LIMS, ELN, QMS, equipment integration and cybersecurity allowance	1	F05/F06	Server/cloud, validated workflows	80,000

Revised procurement envelope within the EUR 10 million feasibility budget

Equipment grouping	Revised budget	Procurement approach
Pilot and process equipment	EUR 2,030,000	Performance-based lots; preserve pilot line and core compounding/finishing capability.
Characterization and testing	EUR 1,650,000	Core new instruments; selected reconditioned/phase-2 options to be assessed.
Digital, AI/VR, HPC and software	EUR 650,000	Hardware plus 24-36 month licences/integration; select Citrine or Microsoft Discovery, not both initially.
Process utilities / energy / environmental controls	EUR 800,000	Installed utility equipment separated from base-building MEP.
Laboratory furniture, EHS, logistics and waste	EUR 250,000	Benches, cabinets, PPE, handling, workshop and waste packages.

The original concept equipment list is technically comprehensive but exceeds the revised category allocation once salaries, software, qualification and contingency are included. Final reconciliation is achieved through tender competition, specification optimization, phasing and reconditioned non-core equipment, without reducing safety or core pilot capability.

10. Research and Implementation Team - CV-Based Role Allocation

Researcher	Proposed role	Evidence-based contribution
Sho Kaneda	Technical Project Director / Senior Process and Digitalization Lead	Process engineering, PFD/P&ID, HAZOP, pilot line, AI/IoT and vendor integration.
Lucia Raluca Maier	Scientific Director / Advanced Materials and Characterization Lead	Composite materials, SEM/XRD/DSC, mechanical testing, numerical assessment and EU project coordination.
Daniela Ivanov	Polymer Chemistry and Biomaterials Lead	Macromolecular chemistry, rheology, computational chemistry, biomaterials, formulation and FTIR/SEM.
Cristina Lucretia Dima	Construction Materials, Standards and Compliance Lead	Technical approvals, construction materials, conformity, standards, quality systems and EU-fund expertise.
Marinela Ghita	Testing Laboratory and Validation Lead	Thermal-insulation/composite testing, ISO/IEC 17025, method validation, uncertainty and technical audit.
Laurentiu Constantin Ceatra	Chemical Process and Environmental Testing Engineer	FTIR, viscosity/flash point, emissions, chemical process operations, GMP production and process kinetics.

Team governance

- Sho Kaneda owns process design, equipment integration, technical schedule, commissioning and digital-twin connection.
- Raluca Maier owns the scientific portfolio, experimental design, characterization strategy and multidisciplinary research quality.
- Daniela Ivanov owns polymer/formulation science and molecular-to-experiment correlation.
- Cristina Dima and Marinela Ghita jointly own conformity, testing validity, technical documentation and laboratory-quality readiness.
- Laurentiu Ceatra owns chemical-process monitoring, emissions/environmental testing and operating procedures.

ELIGIBILITY DISCIPLINE
Management titles do not by themselves make salaries eligible as direct RDI costs. Every named person must have explicit scientific/technical tasks, effort percentages and timesheets corresponding to industrial research or experimental development.

10.1. Sho Kaneda - Technical Project Director / Senior Process and Digitalization Lead

CV basis: Master of Chemical Engineering; carbon-fibre, plasma, solar-cell and nanotechnology research; chief process-engineering experience on a USD 100 million plant; PFD/P&ID for more than 200 equipment units with SIL 2 compliance; management of large multidisciplinary teams; AI, IoT, RPA, ERP and current nanofiber R&D experience.

Responsibility	Implementation workflow	Primary equipment / software
Process basis and URS	Define polymers, throughput, temperatures, air flow, die/collector architecture, utilities, alarms and acceptance tests.	Pilot line, lab meltblown, extruders, feeders, dryers, sensors.
Engineering integration	Develop/review PFD, P&ID, equipment layouts, line lists, utility loads and vendor interfaces.	3DEXPERIENCE, ANSYS Polyflow/Fluent, COMSOL, BIM coordination.
Process safety	Lead HAZOP/What-if, safeguard review, ATEX interface, LOTO and safe-shutdown philosophy.	Gas detection, exhaust, interlocks, PLC/SIS interfaces.
Commissioning	FAT/SAT, installation checks, dry/wet commissioning, capability trials and operator qualification.	All pilot and utility packages; historian and LIMS.
Digital twin	Map sensors and tags, validate historian data, create virtual commissioning/training workflows.	NVIDIA Omniverse, Unity/HoloLens, PLC historian, HPC.
Optimization	DOE and AI-assisted operating-window optimization; energy and material efficiency.	Citrine or Microsoft Discovery, COMSOL/ANSYS, inline sensors.

12-month output	Acceptance evidence
Approved process design basis and equipment URS	Signed URS, PFD/P&ID register, load list and design-review records.
Pilot line installed and safely commissioned	FAT/SAT, punch-list closure, interlock tests and baseline capability run.
Digital data path established	Tag dictionary, historian-LIMS interface and reproducible process dataset.
Training and handover	Operator/maintenance training records and approved SOPs.

10.2. Lucia Raluca Maier - Scientific Director / Advanced Materials and Characterization Lead

CV basis: Senior Scientific Researcher CS I and head of a composite-materials laboratory; coordination of approximately 20 national and European projects; polymeric, metallic and carbon composites; prototype manufacturing; SEM-EDX, X-ray, DSC, mechanical testing, CAD and FEM; project and risk-management training.

Responsibility	Implementation workflow	Primary equipment / software
Scientific portfolio	Define application work packages, baselines, KPIs, TRL progression and partner validation.	All characterization/testing platforms, LIMS/ELN.
Experimental design	Approve material architecture, DOE, sample plan, replication and statistical interpretation.	Citrine/MS Discovery, COMSOL, 3DEXPERIENCE.
Structural characterization	Establish microscopy, XRD and image-analysis methods; correlate structure with performance.	SEM/EDS, optical microscopy, XRD, sample prep.
Mechanical/thermal performance	Define tensile, DMA, thermal and acoustic protocols for nanofiber composites.	UTM, DMA, thermal conductivity, acoustic tube, climate chambers.
Prototype development	Coordinate lamination, coating, composite integration and application demonstrations.	Finishing line, hot press, plasma/corona, laser cutter.
Research quality and risk	Chair scientific reviews, risk register, external validation and publication/IP decisions.	QMS, ELN, 3DEXPERIENCE, risk tools.

12-month output	Acceptance evidence
Six application-platform research plans	KPI/TRL sheets, test methods and validation-partner commitments.
Characterization method library	Approved methods, control samples, uncertainty plans and instrument qualification.
Prototype design reviews	Traceable design decisions and correlation reports.
Research dissemination / IP plan	Publication, repository and foreground-IP decision matrix.

10.3. Daniela Ivanov - Polymer Chemistry and Biomaterials Lead

CV basis: Long-term researcher in polymer biomaterials for biomedical and agronomic applications; postdoctoral work on injectable photopolymerizable hydrogels; PhD in chemistry; macromolecular chemistry, polymer physicochemistry, rheology, computational chemistry and molecular-dynamics publications; practical use of FTIR, NMR and SEM/EDAX.

Responsibility	Implementation workflow	Primary equipment / software
Polymer selection	Screen polymers, additives, solvents and compatibilities against target applications and process windows.	BIOVIA Materials Studio, literature/ELN, balances and thermal analysis.
Formulation	Prepare solutions/masterbatches, define mixing order, solids, viscosity, ageing and safety limits.	Fume hoods, glovebox, mixers, sonication, rheometer, dryers.
Molecular-to-process correlation	Model polymer/additive interactions and compare predictions with rheology, FTIR and thermal data.	BIOVIA, Citrine/MS Discovery, FTIR/Raman, DSC/TGA.
Lab-scale fibre trials	Define screening matrix for electrospinning/lab meltblown and transfer recipes to pilot engineering.	Electrospinning rig, lab meltblown, micro-compounder.
Biomaterial / agronomy concepts	Develop non-clinical prototypes, degradation/wettability plans and external biocompatibility testing strategy.	ISO 7 bench, porometer, contact angle, SEM, external accredited labs.
Scientific documentation	Maintain formulation genealogy, deviations, reports and invention disclosures.	ELN/LIMS/QMS, 3DEXPERIENCE data links.

12-month output	Acceptance evidence
Prioritized polymer/formulation library	Approved formulation records, safety assessment and material IDs.
Predictive model baseline	Documented molecular/AI model, training data and validation error.
Lab-to-pilot transfer packages	Recipe, operating window, sampling plan and transfer report.
Two non-clinical prototype families	Characterization and external-testing plans.

10.4. Cristina Lucretia Dima - Construction Materials, Standards and Compliance Lead

CV basis: Senior scientific researcher and manager of research/development/technical approvals activities in construction; leader of testing groups; technical expert and conformity assessor for construction products and factory production control; PhD in Applied Chemistry, oxide materials and ceramics; standards-committee, quality-audit and European-funds expertise.

Responsibility	Implementation workflow	Primary equipment / documents
Civil material specification	Review concrete, resin floors, panels, insulation, fire-rated systems and chemical resistance.	Construction test data, technical approvals, supplier declarations.
Performance requirements	Translate nanofiber application targets into construction-product test plans and acceptance criteria.	Thermal, flammability, adhesion, climate and mechanical equipment.
Standards matrix	Map ISO/EN/SR standards, CE/conformity routes, cleanroom requirements and regulatory deliverables.	QMS, standards database, compliance matrix.
Technical documentation	Review SF/PT specifications, room data, finishes, fire compartments and quality declarations.	BIM/3DEXPERIENCE documents, inspection and test plans.
Funding compliance	Support eligible-cost classification, technical evidence, audit trail and expert report inputs.	Funding guide, procurement files, document control.
Supplier quality	Review submittals, material certificates, factory control and site inspection records.	QMS/LIMS, inspection checklists, nonconformance system.

12-month output	Acceptance evidence
Construction-material performance specification	Approved technical clauses and testing/inspection plan.
Standards and conformity matrix	Applicable standards, evidence owner and verification record.
Technical-document quality reviews	Signed review comments and closure register.
Funding audit trail	Cost-to-activity-to-evidence compliance matrix.

10.5. Marinela Ghita - Testing Laboratory and Validation Lead

CV basis: Chemical engineer and testing engineer; technical auditor; responsible for testing and conformity evaluation of thermal-insulation systems, sandwich panels, composites, polyurethane foams and adhesives; experience with laboratory accreditation, proficiency testing, ISO/IEC 17025, method validation and measurement uncertainty.

Responsibility	Implementation workflow	Primary equipment / systems
Test-method design	Convert product KPIs into controlled procedures, sampling, conditioning and acceptance limits.	Thermal conductivity, UTM, climate/UV, flammability and adhesion systems.
Validation and uncertainty	Plan repeatability, reproducibility, calibration, uncertainty budgets and control charts.	Reference standards, calibrated sensors, balances and LIMS.
Laboratory qualification	Support IQ/OQ/PQ, environmental checks, staff competence and method authorization.	All testing equipment, QMS/LIMS and training records.
Quality assurance	Manage proficiency testing, interlaboratory comparisons, deviations and CAPA for test results.	QMS, statistical tools and external comparison providers.
Construction applications	Lead performance validation of nanofiber insulation/composite prototypes against harmonized methods.	Thermal, acoustic, mechanical, environmental and fire packages.
Reporting	Issue technically reviewed, traceable test reports and data packages for partners/funding evidence.	LIMS report templates and controlled electronic signatures.

12-month output	Acceptance evidence
Validated method portfolio	Protocols, validation reports and uncertainty budgets.
Laboratory competence matrix	Training, authorization and proficiency records.
Baseline equipment qualification	IQ/OQ/PQ and calibration status register.
Partner-ready test reports	Controlled templates and first validated reports.

10.6. Laurentiu Constantin Ceatra - Chemical Process and Environmental Testing Engineer

CV basis: Technological-development engineer with FTIR analysis of compressor oils, flash-point and kinematic-viscosity testing, ambient-emission analysis for CO, CO2, NOx, SOx, CH4 and particulate matter; former pharmaceutical production director/chemical engineer with GMP responsibilities; research in pyrolysis, reaction kinetics and sustainable fuels.

Responsibility	Implementation workflow	Primary equipment / systems
Incoming and process QC	Define identity, moisture, viscosity, thermal and contamination checks for polymers, additives and oils.	FTIR, balances, moisture, rheometer/MFI, viscosity/flash-point tools.
Pilot operating procedures	Draft start-up, steady-state, sampling, shutdown, cleaning and deviation procedures.	Pilot line, extruders, historian and LIMS.
Emissions and workplace monitoring	Baseline and periodic monitoring of VOCs, gases, dust and exhaust performance.	Portable/fixed gas and particulate analyzers, scrubbers, exhaust.
Utility/process media control	Check compressed-air, nitrogen, cooling and process-water parameters affecting quality.	Utility meters, O2 monitors, water/pressure/flow instruments.
Maintenance coordination	Support preventive-maintenance schedules, critical spares and safe intervention procedures.	CMMS/QMS, LOTO, maintenance workshop.
Scale-up data	Analyse mass/energy balances, process kinetics and efficiency opportunities.	Historian, COMSOL/ANSYS outputs, spreadsheets and AI models.

12-month output	Acceptance evidence
Approved pilot SOP set	Controlled operating, cleaning and sampling procedures.
Environmental baseline	Monitoring plan, baseline data and alarm/action limits.
Process QC plan	Incoming/in-process tests and sampling frequencies.
Maintenance readiness	Asset register, PM plan and critical-spares list.

11. Twelve-Month Named-Researcher Salary Budget and RACI

Researcher	Monthly project cost	12-month cost	Main RDI allocation
Sho Kaneda	EUR 8,500	EUR 102,000	Process design, commissioning and digital twin
Lucia Raluca Maier	EUR 7,500	EUR 90,000	Scientific direction and characterization
Daniela Ivanov	EUR 6,500	EUR 78,000	Polymer/formulation and biomaterials
Cristina Lucretia Dima	EUR 5,500	EUR 66,000	Construction materials, standards and compliance
Marinela Ghita	EUR 4,500	EUR 54,000	Testing validation and ISO/IEC 17025 readiness
Laurentiu Constantin Ceatra	EUR 4,500	EUR 54,000	Chemical process, environment and operating procedures
TOTAL	-	EUR 444,000	12-month gross employer/project-cost allowance

The amounts are indicative gross employer/project-cost allowances, not net salaries or contractual commitments. Eligibility depends on employment/collaboration form, actual effort, timesheets, job descriptions and the salary ceilings applicable at contracting. Travel, accommodation and external-consultancy costs are not included in these salary lines.

High-level RACI

Activity	Sho	Raluca	Daniela	Cristina	Marinela	Laurentiu
Process URS / PFD / P&ID	A/R	C	C	C	C	R
Scientific work packages	C	A/R	R	C	C	C
Formulation and molecular models	C	C	A/R	I	C	C
Construction / standards	C	C	C	A/R	R	C
Test validation / uncertainty	C	C	C	C	A/R	R
Commissioning / pilot SOP	A/R	C	C	I	C	R
Digital twin / data integration	A/R	C	R	I	C	C
Funding evidence / audit trail	C	C	C	A/R	R	C

Legend: A = accountable, R = responsible, C = consulted, I = informed.

12. Implementation Work Packages and 24-Month Programme

WP	Work package	Period	Milestone / output
WP1	Feasibility, surveys, permitting and funding documentation	M1-M6	Validated site, SF/DALI basis, permits roadmap and funding evidence.
WP2	Detailed architectural, process, MEP, cleanroom and BIM design	M3-M10	LOD 300 coordinated design, URS, PFD/P&ID and tender packages.
WP3	Long-lead procurement	M4-M16	Pilot line, SEM/XRD, AHUs, transformer, chillers and software contracts.
WP4	Site, civil works, structure and envelope	M7-M16	Weather-tight building and equipment access routes.
WP5	MEP, process utilities and cleanroom installation	M12-M19	Energized utilities, qualified clean envelope and BMS.
WP6	Equipment installation and software/data integration	M16-M21	Installed pilot/lab systems, historian, LIMS and digital environment.
WP7	Commissioning, IQ/OQ, cleanroom qualification and method validation	M20-M23	Accepted systems, calibrated equipment and approved methods.
WP8	Training, pilot campaigns and operational handover	M22-M24	Competent team, baseline recipes, prototypes and handover dossier.

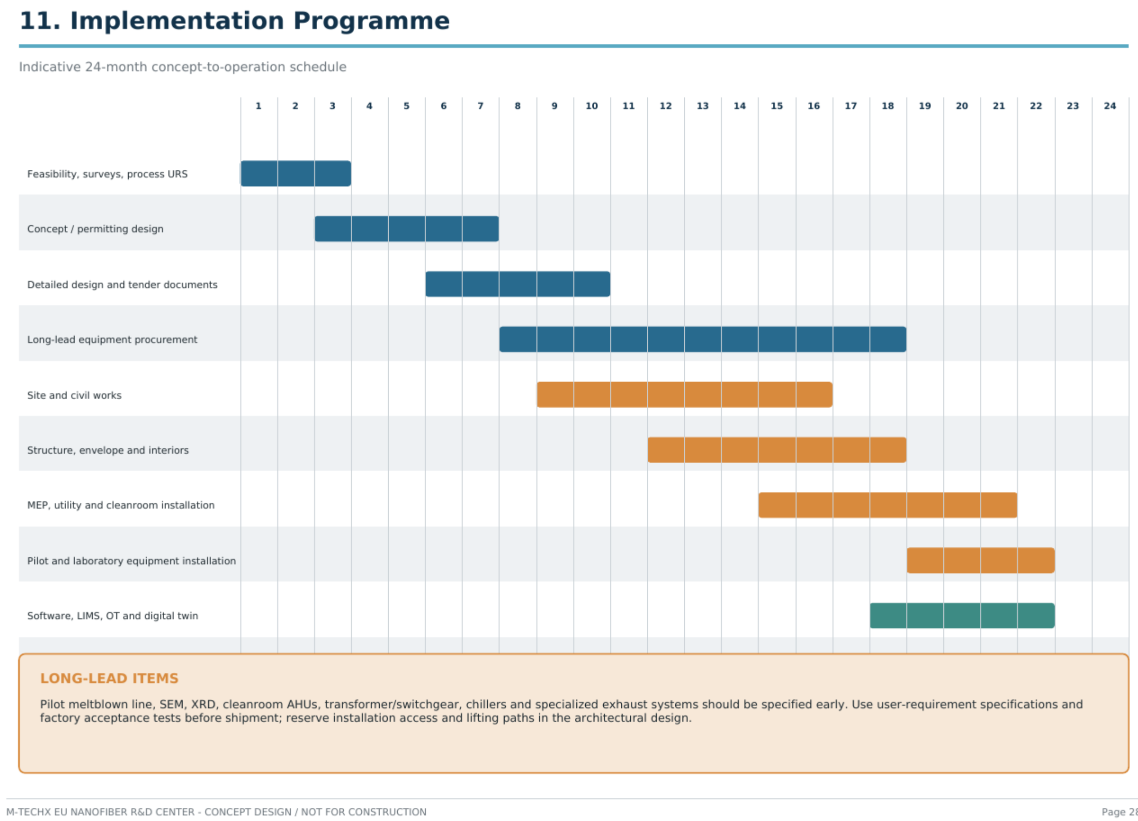

Figure 13. Indicative 24-month implementation sequence.
Source: M-TechX Nanofiber R&D Center concept package

Long-lead decisions

Freeze the priority product portfolio, polymer temperature range, solvent inventory, pilot die width/throughput, utility availability, cleanroom need and external-user model during WP1. These decisions control most of the technical risk and capital exposure.

12.1. Procurement, Cost Justification and Eligibility Control

Procurement lot	Strategy	Required evidence
Design and surveys	Competitive professional-services procurement by scope and competence	Terms of reference, offers, evaluation, contracts and deliverables.
Construction / MEP / cleanroom	Coordinated bills of quantities and performance specifications	GD 907 estimates, tender comparison, permits, site records and acceptance.
Pilot line and process packages	URS-based competitive procurement; early vendor engineering	Three comparable offers, compliance matrix, FAT/SAT and training.
Analytical instruments	Technical equivalence matrix and lifecycle-cost evaluation	Specifications, offers, warranties, service, calibration and acceptance.
Software / cloud / integration	Proof of concept before multi-year commitment	Licence metrics, implementation scope, data rights, cybersecurity and exit plan.
Research consumables	Framework or lot procurement with batch traceability	Price evidence, receiving records and project-use allocation.
Salaries	Employment/collaboration documents and effort records	Job description, contract, availability, timesheet, payroll and RDI task evidence.

Cost and compliance matrix

- Assign every budget line to an activity, aid basis, work package, room/equipment ID, responsible person and verification document.
- Separate eligible and ineligible portions, VAT treatment, depreciation, operating costs and financing costs.
- For each equipment or intangible asset, document project use, useful life, depreciation method, installation, training and maintenance.
- Keep supplier technical data, offers and evaluation criteria comparable; avoid brand-locking unless objectively justified.
- Recheck current funding rules before submission and again before contracting or any budget amendment.

RESEARCH SHARE

The supplied scoring guide awards maximum points when research activities performed directly by the applicant exceed 15% of the project budget. The final work plan should preserve a credible RDI share rather than reclassifying investment costs without technical basis.

13. Total Project Budget - EUR 10,000,000

No.	Budget category	EUR	Share
1	Design, surveys, permitting and project management	400,000	4.0%
2	Civil shell, envelope and external site works	1,550,000	15.5%
3	HVAC, base MEP and cleanroom construction	1,450,000	14.5%
4	Process utilities, energy and environmental controls	800,000	8.0%
5	Pilot and process equipment	2,030,000	20.3%
6	Characterization and testing equipment	1,650,000	16.5%
7	AI/VR, HPC, software, data and cybersecurity	650,000	6.5%
8	Laboratory furniture, EHS, logistics and waste	250,000	2.5%
9	Installation, commissioning, training and qualification	250,000	2.5%
10	Named-researcher salaries - 12 months	444,000	4.44%
11	Initial consumables and method validation	126,000	1.26%
12	Contingency and escalation	400,000	4.0%
	TOTAL	10,000,000	100.0%

Construction subtotal

Construction / installed systems	EUR
Civil shell, envelope and external works	1,550,000
HVAC, base MEP and cleanroom construction	1,450,000
Installed process utilities / energy / environmental controls	800,000
Construction-related design, surveys and permitting allocation within category 1	Approx. 300,000
Indicative construction and installed-systems envelope	Approx. 4,100,000

Equipment and digital subtotal

Equipment / digital category	EUR
Pilot and process equipment	2,030,000
Characterization and testing equipment	1,650,000
AI/VR, HPC, software, data and cybersecurity	650,000
Laboratory furniture, EHS, logistics and waste	250,000
Indicative equipment/digital envelope	4,580,000

13.1. Indicative Financing Classification and Own-Contribution Logic

The table below is a planning classification, not a grant calculation. The final eligible amount and aid intensity must be determined from the active call, applicant size, location, incentive effect, cumulation rules and whether assets are used for industrial research, experimental development or initial investment.

Aid basis	Illustrative CED-Pro-NANO costs	Planning rate / treatment
Industrial research	Researcher time, molecular/physics models, formulation screening, characterization method development, open dissemination	70% standard / up to 80% with qualifying dissemination, per supplied guide.
Experimental development	Pilot recipes, prototypes, scale-up trials, Series 0, validation and customer qualification	45% standard / up to 60% with qualifying dissemination, per supplied guide.
Regional aid / initial investment	Building, installed utilities, pilot/production machinery and equipment required for the created infrastructure	Intensity to be confirmed from final regional-aid conditions.
Depreciation-based costs	Assets whose useful life extends beyond project use, when required by the aid scheme	Eligible depreciation corresponding to documented project use.
Potentially ineligible / own funds	VAT where recoverable, financing costs, land, non-project operating cost, unsupported contingencies and expenditure outside the call	Finance from own contribution / bank loan / other non-aid sources.

Recommended financial model tabs

- Budget by GD 907 chapter and subchapter.
- Budget by work package, research type and aid basis.
- Eligible / ineligible / VAT / own contribution / loan requirement.
- Procurement cash flow, pre-financing, reimbursement lag and bridge-finance need.
- Depreciation schedule and project-use allocation for each asset.
- Five-year operating statement including utilities, service contracts, consumables, staff, external users and pilot revenue.

DO NOT OVERSTATE FUNDING
A feasibility study may model scenarios, but the application budget must use the exact active guide. No fixed grant percentage is assigned here to construction because the required regional-aid parameters are not established in the supplied documents.

14. Operating Feasibility and Sustainability Model

Operating parameter	Concept basis
Initial shift model	One daytime R&D shift with controlled extended pilot trials and scheduled maintenance.
Mature staffing	Approximately 28-34 FTE including scientists, process engineers, laboratory technicians, QA/regulatory, maintenance, IT/data, administration and EHS.
Named implementation team	Six senior specialists budgeted for 12 months; additional technicians/operators recruited and trained before commissioning.
External access	Structured access for universities, SMEs, industrial partners and consortia under IP, pricing, safety and data-access rules.
Revenue / cost recovery	Contract R&D, pilot batches, testing services, training, licensing and consortium projects; pricing must include service contracts, utilities, staff and consumables.
Maintenance	Multi-year service contracts for pilot line and core instruments, internal preventive maintenance, calibration and critical spares.
Energy	Metered process loads, heat recovery, 150 kWp PV and approximately 300 kWh BESS subject to fire/financial assessment.
Inventory	Development quantities on site; bulk polymers/solvents and finished-goods warehousing off site due to narrow logistics.
Data / IP	Project-specific access controls, protected foreground IP, reproducible research records and open data only where contractually permitted.

Indicative steady-state annual operating-cost drivers

Cost driver	Planning treatment
Personnel	Largest recurring cost; mature staffing model to be developed by role and shift.
Electricity / cooling / gases	Submeter every major line and laboratory; model pilot utilization scenarios.
Service and calibration	Typically material for SEM/XRD/thermal/rheology/filtration and pilot equipment; obtain vendor service quotations.
Consumables and waste	Polymer, additives, solvents, gases, filters, standards, PPE, sample prep and licensed disposal.
Software / cloud	Annual licences, cloud/HPC consumption, support and cybersecurity.
Insurance / compliance	Property, equipment, liability, environmental, periodic qualifications and accreditation.

14.1. Principal Risks and Mitigation Measures

Risk	Level	Mitigation
Narrow-site logistics	High	Swept-path study, rigid-truck scheduling, removable gates, off-site bulk storage and installation lifting plan.
Power / heat load underestimated	High	Vendor load list, diversity model, 1 MVA allowance, N+1 cooling and safe shutdown.
ATEX / solvent scope growth	High	Early chemical inventory, formal zoning, separate compartment/exhaust and room-quantity limits.
Cross-contamination / exposure	High	Closed transfer, local extraction, HEPA vacuum, PPE, cleaning validation and exposure monitoring.
Equipment dimensions change	High	URS tender, vendor GA review, reserved clearances, BIM clash detection before foundations/slabs.
Funding eligibility mismatch	Medium-High	Cost/activity/evidence matrix, aid-basis separation and Managing Authority clarification.
Cleanroom over-specification	Medium	Limit ISO 7 to critical finishing; qualify only rooms justified by product needs.
Vibration / electromagnetic interference	Medium	Isolated slabs, distance, RF grounding, pre-installation site survey and vendor acceptance tests.
Software integration / data silos	Medium	Common IDs/schema, proof of concept, open interfaces, data ownership and phased deployment.
Operating-cost burden	Medium-High	Submetering, utilization model, service quotations, phased procurement and external-user pricing.
Key-person dependency	Medium	Document methods, cross-train team, succession matrix and recruit technicians early.
Regulatory product creep	Medium	Define industrial vs medical/pharma boundary and use formal change control before expanding claims.

DECISION GATE
Do not commit to detailed design until the priority applications, polymer temperature range, solvent inventory, cleanroom need, utility availability, pilot throughput, external-user model and staffing plan are approved.

14.2. KPIs, TRL Roadmap and Expected Impact

Indicator	Year-1 / commissioning target	Mature annual target
Research platforms operational	4 priority platforms	6 platforms
TRL progression	Documented TRL 4 baselines	At least 3 technologies validated at TRL 6-7
Pilot campaigns	Initial 10-15 commissioning/development campaigns	40-60 partner/internal campaigns
Prototype families	Minimum 4	8-12
Validated methods	Minimum 15	25-35, selected ISO/IEC 17025 scope
Digital genealogy	100% of pilot batches after commissioning	100% of experiments and released prototypes
Material / energy reduction	Baseline established	20-30% reduction in trial material/time for selected platforms
IP results	IP landscape and invention process	Patents/licences/trade secrets as technically justified
Researchers / technicians trained	Named team + initial operators	30-50 trainees/year including external users
External users	Access policy and first pilots	Universities, SMEs and industrial partners under transparent access rules

Strategic impact

- Creates a European pilot and testing alternative for advanced nanofiber materials and reduces dependence on non-EU supply and development capability.
- Links physics-based simulation, AI discovery, experimental data and pilot production in a reproducible closed loop.
- Enables industrial partners to de-risk scale-up before committing to full manufacturing lines.
- Builds regional high-skill employment, research collaboration and an open-access infrastructure for SMEs and universities.
- Supports lower-material, lower-energy and circular product concepts through process optimization and life-cycle assessment.

15. Conclusions, Required Decisions and Source Documents

Conclusion

CED-Pro-NANO is technically feasible on the 15 m x 110 m plot within the EUR 10 million ceiling using the selected 10 m x 90 m, partially two-level concept. The facility can support integrated polymer design, lab screening, pilot meltblown scale-up, controlled finishing, advanced characterization, AI/VR digital twins and application validation, provided the scope is disciplined and procurement is value-engineered.

Decisions required before SF/PT and tender

- Confirm cadastral geometry, setbacks, fire access and utilities.
- Approve the initial four to six application platforms and regulatory boundary.
- Freeze pilot-line URS: polymers, maximum temperature, throughput, die width, collectors and finishing interfaces.
- Approve solvent/graphene inventory and ATEX design basis.
- Approve the research/experimental-development work plan and eligible-cost classification.
- Obtain budgetary quotations for pilot line, SEM/XRD, cleanroom AHUs, transformer, chillers and scientific software.
- Nominate the final management/implementation team and confirm contracts, effort and salary-ceiling compliance.

Source documents reviewed

- M-TechX Nanofiber R&D Center Concept Package, 32 pages, July 2026.
- Nanofiber R&D Center Concept Design & Feasibility Package, 30 pages.
- Architectural site plan and floor plans; Florin ground-floor and first-floor drawings; Romanian translated drawing set; building renderings and site photographs.
- Categorii cheltuieli / CED-Pro-NANO expenditure categories and financing guidance.
- List of documents and information for submitting the STEP project, draft April 2026.
- Proposed Nanofiber R&D Center Layout concept.
- Curricula vitae: Sho Kaneda; Cristina Lucretia Dima; Daniela Ivanov; Laurentiu Constantin Ceatra; Marinela Ghita; Lucia Raluca Maier (former Voicu).
- Official vendor capability information reviewed for BIOVIA Materials Studio, COMSOL Multiphysics, ANSYS Fluent/Polyflow, Citrine Platform or Microsoft Discovery, NVIDIA Omniverse, Unity Industry/HoloLens and Dassault 3DEXPERIENCE.

FINAL STATUS
Editable feasibility study. Concept and budget assumptions must be validated by licensed Romanian architecture, structure, fire, MEP, cleanroom, process, EHS, regulatory and cost specialists, together with the Managing Authority and equipment suppliers.