

High throughPut lasER-based processing of Dlamond And Silicon (HIPERDIAS)

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Overall presentation of the project

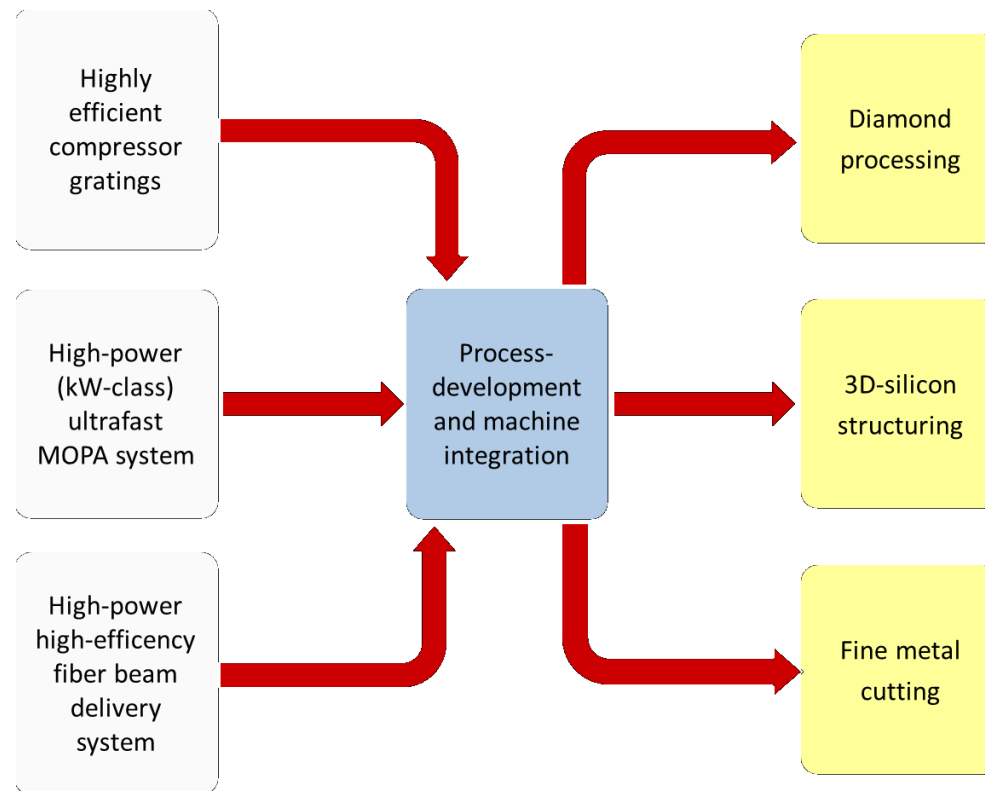


- Call H2020-ICT-27-2015:
 - High-throughput laser-based manufacturing: High-power, high-efficiency laser sources (both continuous wave and pulsed); novel technologies and devices for beam delivery and for processing of multiple beams from laser source arrays; high-performance optical devices and systems; fast synchronisation of laser source and high-speed scanning devices.
 - All RTD actions should address also the related materials, manufacturability, validation of results for the target applications, and standardisation activities, as appropriate. They should demonstrate strong industrial commitment, be driven by user needs and concrete business cases supported by strong exploitation strategies, and cover the value/supply chains appropriate.



- Brief project overview

- Project duration: 42 Months
- Project budget: ~4.4 Mio€ (~3.6 Mio€ from EC + ~0.8 Mio€ from SNF)



- Objectives: Applications
 - **HIPERDIAS** will demonstrate USP laser-based material processing at unprecedented (high-throughput) levels of productivity and precision
 - Three attractive applications shall be investigated to demonstrate the high-throughput laser-based manufacturing:
 - 3D silicon structuring at high-speed: $>1\text{mm}^3/\text{s}$ ($\sim \text{X}10$ vs SoA)
 - Precision processing of diamond material : $>0.15\text{mm}^3/\text{s}$ ($\sim \text{X}5\text{-}6$ vs SoA)
 - Fine cutting of metal for the watch and the medical industry: $500\text{mm}/\text{min}$ ($\sim \text{X}2\text{-}4$ vs SoA)



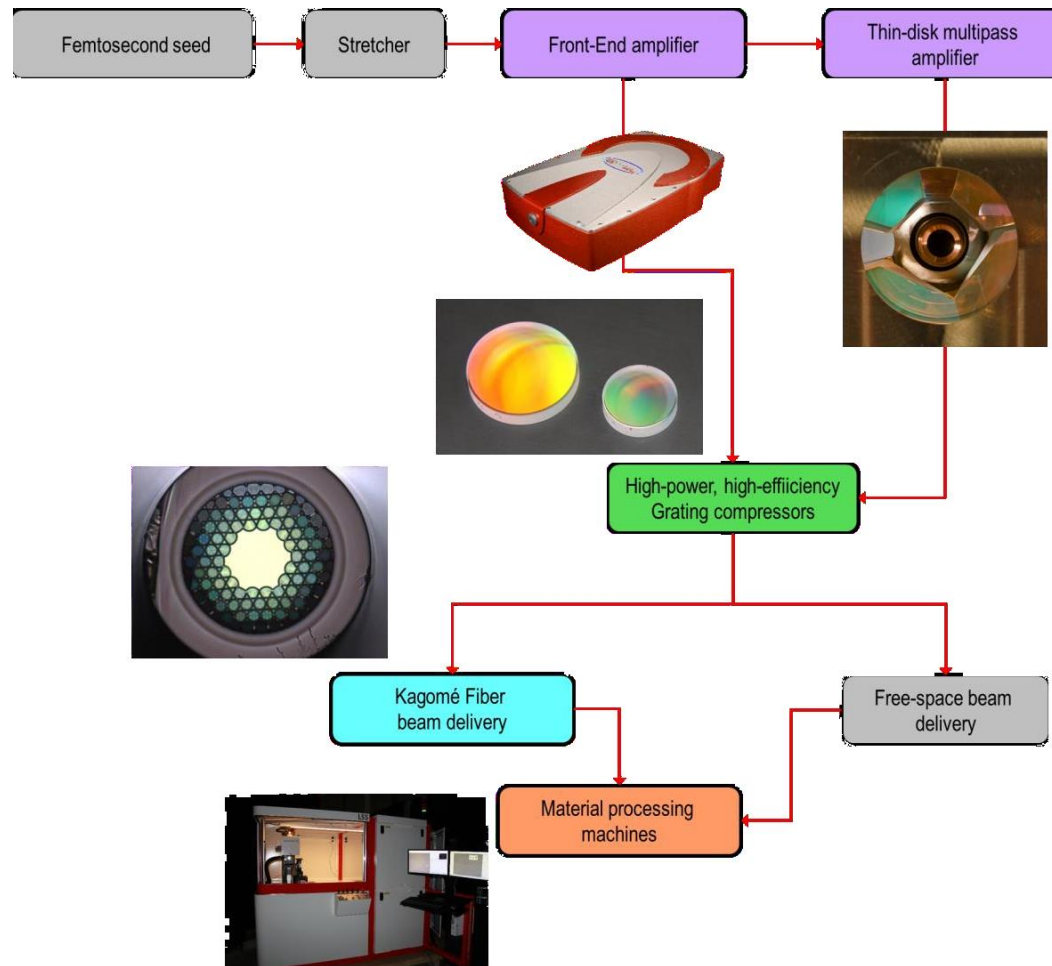
- Objectives: laser sources and components
 - Flexible high-power CPA-based femtosecond laser sources
 - 50W, 300fs, at 1-2 MHz (system 1: hybrid fiber-bulk amplifier)
 - 200W, 600fs, at 1-2 MHz (system 2: hybrid fiber-bulk amplifier)
 - 500W, 500 fs, 1-2 MHz (system 3: system 1 boosted using a thin-disk multipass amplifier)
 - 1000W, sub-1ps, 1-2 MHz (system 4: system 2 boosted using a thin-disk multipass amplifier)
 - High-power suitable fiber beam delivery (Kagomé fibers)
 - Delivery of >500W (up to 1kW) , sub-1ps pulses
 - High-power capable pulse compression gratings
 - >99% diffraction efficiency (per pass) over >5-10 nm spectral bandwidth



- Objectives: material processing and machine integration
 - Fundamental process development
 - Upscaling for high-throughput
 - Demonstration of productivity increase
 - Integration of system and high-power suitable machines for:
 - 3D silicon ablation
 - Diamond processing and fine-cutting of metal



- Overall of the HIPERDIAS project



- Work packages
 - WP1: Definition of User Requirements
 - WP2: Process Development
 - WP3: Ultrafast Laser Front-end development
 - WP4: Photonic components for pre- and post-pulse conditioning
 - WP5: Thin-disk multi-pass Booster
 - WP6: System Development
 - WP7: Demonstrators
 - WP8: Exploitation Planning & Dissemination
 - WP9: Project Management



- Deliverables & Milestones
 - 46 Deliverables
 - 45 Milestones

