



Applied Research - Technologies - Solutions

Smart Sustainability Optimization

Sustainable Production

- PARAGON IS A MULTI-DISCIPLINARY RESEARCH, TECHNOLOGY & DEVELOPMENT SME
 - ESTABLISHED: 1995 , ATHENS (GR) , SIZE: 1-10 PERSONS , < 500 KEURO
- MULTI - LEVEL OPTIMIZATION FOR FLEXIBLE & CONFIGURABLE TRIPLE-BOTTOM-LINE SUSTAINABLE PRODUCTION OPERATIONS (SHOP-FLOOR - LEVEL) :
 - + ENERGY
 - + EMISSIONS
 - + SOCIAL (WORKFORCE)
- FOR 'ON-LINE' PRODUCTION OPTIMIZATION & (RE)-CONFIGURATION , ACCORDING TO ENERGY , EMISSIONS , SOCIAL , AND COMBINED TARGETS OR SCENARIOS
- APPLICATION(S) - FRAMEWORK ENABLING INVESTMENT – PROLIFERATION OF SUSTAINABLE MANUFACTURING , AS PRODUCT AND/OR SERVICE

Research, Technology and Development activities & services

- In-house R&T , R&T solutions, guidance, and services
- Participation to European / International RTD initiatives - consortia as an SME Research partner
- Participation and contribution as an SME Research partner to 29 EC research projects
- Areas – Industries: Aeronautics & Surface Transport , Information and Communication Technologies (ICT) , Public-Private Partnerships (PPPs), e.g., Factories of the Future , Energy & Environment , Security

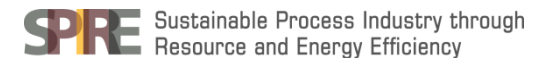
Commercial activities & services

- Engineering and Measurements (experimental , industrial , occupational safety & health) applications and support , Technology and applications development
- Commercial representation of Industrial & Scientific instrumentation manufacturers from Europe and the U.S.A. to markets in Greece and S.E. Europe

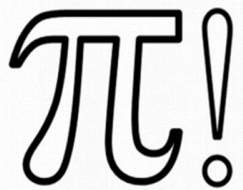
About PARAGON: Research experience



European Technology Platforms (ETP) memberships



- SUSTAINABLE MANUFACTURING IS BECOMING A TO BE NECESSARY PARADIGM FOR MANUFACTURING OPERATIONS
- FURTHER TO TRADITIONAL ECONOMICAL PRODUCTION OBJECTIVES , ENVIRONMENTAL DRIVEN OBJECTIVES (E.G. LOW CO2 EMISSIONS , ETC) ARE INCREASINGLY MORE OR ARE BECOMING STRATEGICALLY RELEVANT FOR PROCESS / MANUFACTURING ENTERPRISES
- TRIPLE-BOTTOM-LINE SUSTAINABLE MANUFACTURING PARADIGM : INTEGRATION OF ECONOMIC + ENVIRONMENTAL + SOCIAL PERSPECTIVES & TARGETS
- 'ON-LINE' OPTIMIZATION & (RE)-CONFIGURATION OF PRODUCTION (VIA , E.G. , IOT INFRASTRUCTURE) , E.G. , DEFAULT FULL RATE (THEORETICAL MAX) , OPTIMAL TBL SUSTAINABILITY , VARIABLE PRODUCTION , FAILURES AND/OR SOCIAL FACTORS

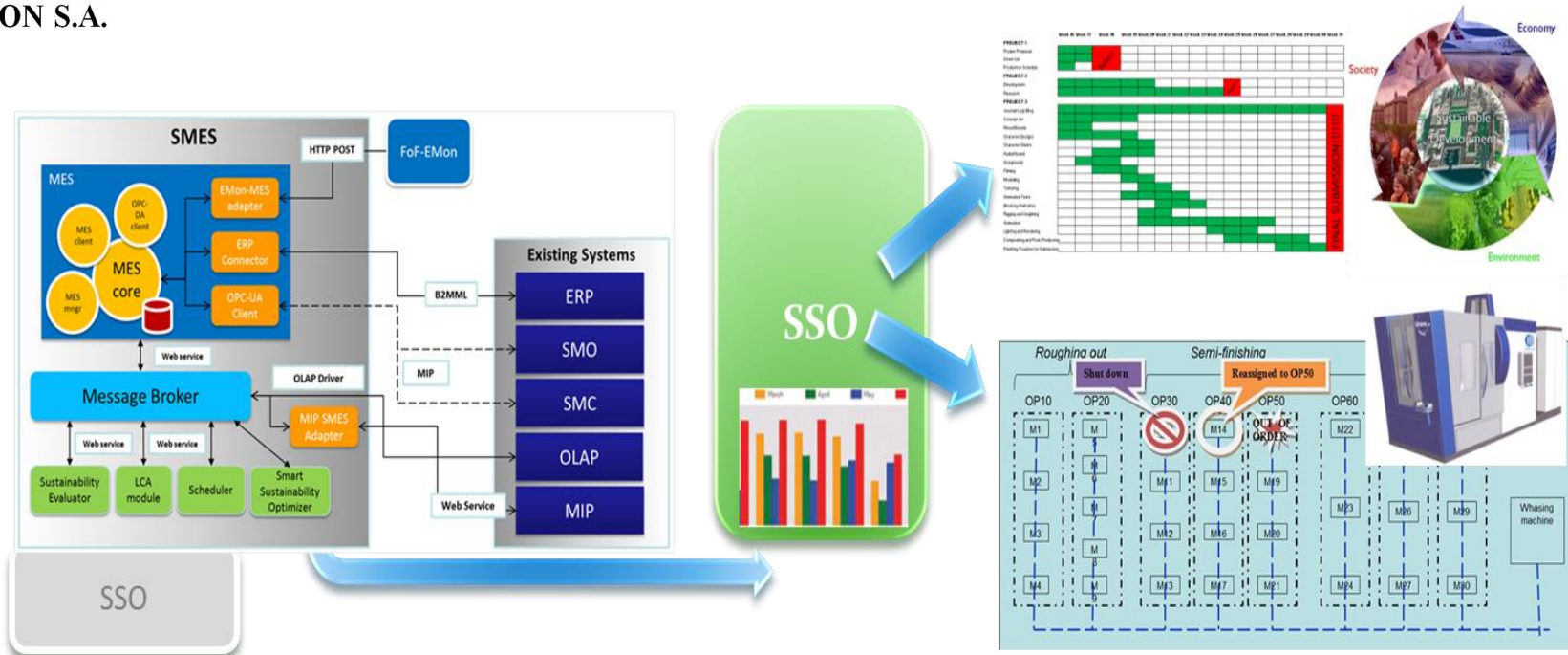


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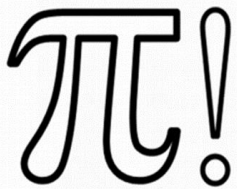
PROPTIM : PProduction schedule OPTIMisation



- FOF PROJECT - FOF-DATION : EXTENSION OF MANUFACTURING EXECUTION SYSTEMS (MES) TO 'SMART' MANUFACTURING EXECUTION SYSTEMS (SMES) – THRU SUPPORTING RESOURCE EFFICIENCY , SUSTAINABILITY GOALS , AND COMMUNICATION
- DEVELOPED AND VALIDATED FOR AUTOMOTIVE OEM (FIAT CHRYSLER, IT) FOR SHOP-FLOOR LEVEL SUSTAINABLE MANUFACTURING & OPTIMIZATION USE CASE SCENARIO

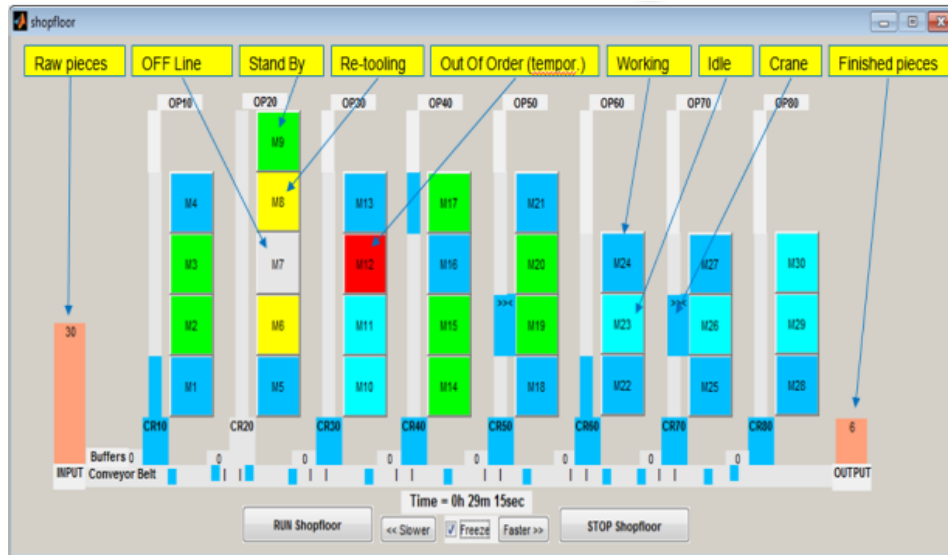


- MULTI-LEVEL OPTIMIZATION :
 - OPTIMIZED SCHEDULING BASED ON TOTAL SUSTAINABILITY (ENERGY, SOCIAL, ETC..)
 - OPTIMIZED MACHINE / OPERATION DEFINITION (ADAPTABILITY AND FLEXIBILITY OF THE TRADITIONALLY RIGID PRODUCTION PROCESS)
 - PROPOSITION OF ALTERNATIVE PROCESS LAYOUTS AND ACCOMPANYING SUSTAINABLE SCHEDULES



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PROPTIM : PProduction schedule OPTIMisation

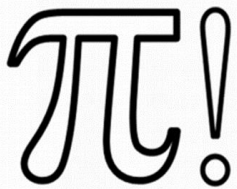


Production Orders:	Quantities:
No.55859 - CH Diesel (096005251):	60
No.55862 - CH Petrol (096062445):	60
No.55864 - CH Diesel (096005251):	0

FIAT UC Shopfloor & Product

FEATURES :

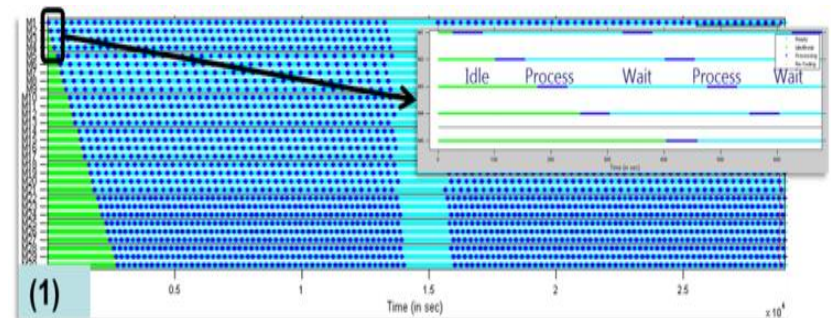
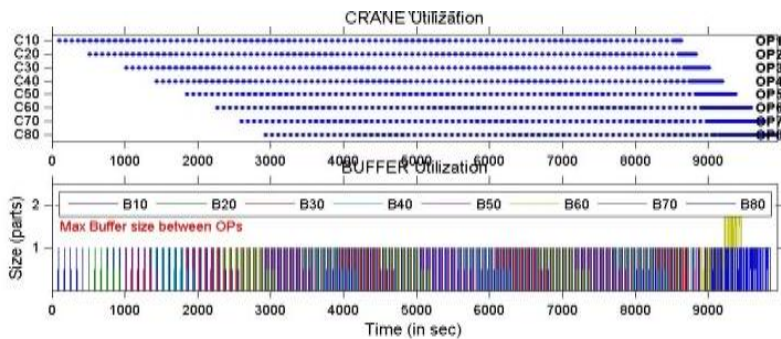
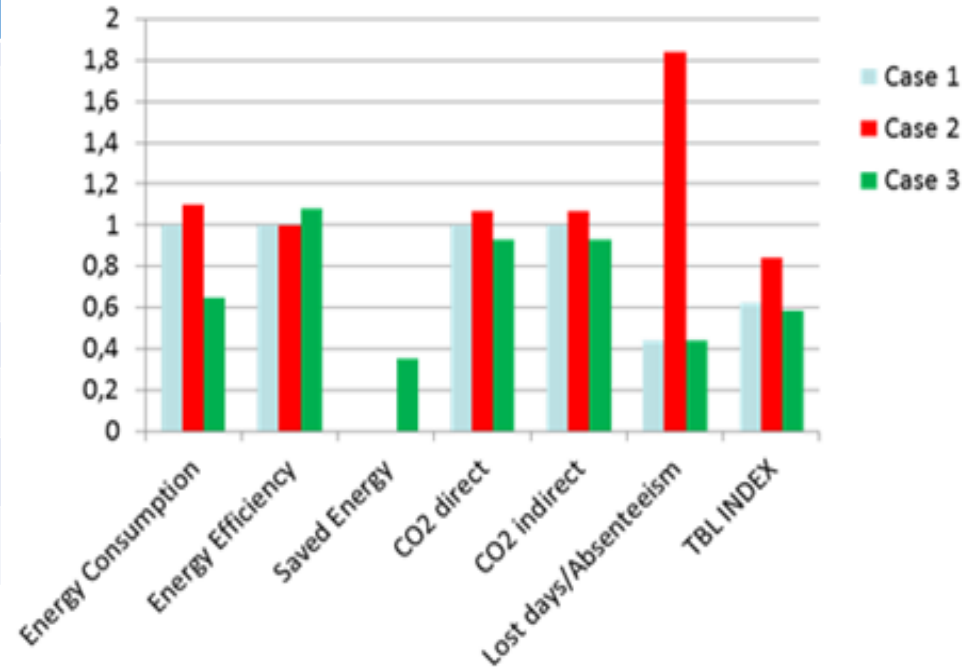
- MULTI-CRITERIA OPTIMIZATION
- OPEN MES CONNECTIVITY (WEB SERVICE)
- ADJUSTABLE TO ANY KPI SET AND/OR PRODUCTION LINE
- FULL PRODUCTION SIMULATION DOWN TO 1S
- OPTIMAL TBL SUSTAINABILITY PRODUCTION SCHEDULE
- IDENTIFY IDLE TIMES FOR SMC
- RE-SCHEDULING IN CASE OF FAILURES AND/OR OTHER CASES



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CASE	Default	Theoretical max	Optimal TBL	Opt. reduced	Opt. increased
Availability	93.7%	93.7%	93.7%	93.3%	93.3%
Performance Efficiency	32%	68%	32%	24%	48%
Scrap ratio			5%		
Quality			95%		
Energy consumption	100%	107% of case 3.1	61% of case 3.1	60% of case 3.1	68% of case 3.1
Energy efficiency	1	1	1.08	1.1	1.07
Saved energy	0%	0%	39%	40%	32%
CO ₂ direct	100%	107% of case 3.1	92% of case 3.1	90% of case 3.1	81% of case 3.1
CO ₂ indirect	100%	107% of case 3.1	92% of case 3.1	90% of case 3.1	81% of case 3.1
Injury rates vs work patterns	0.49 / year / 100 employees	0.97 / year / 100 employees	0.49 / year / 100 employees	0.31 / year / 100 employees	0.6 / year / 100 employees
Lost days / absenteeism	0.44 / year / 100 employees	1.84 / year / 100 employees	0.44 / year / 100 employees	0.19 / year / 100 employees	0.75 / year / 100 employees
TBL SUSTAINABILITY INDEX	0.619	0.843	0.587	0.513	0.591

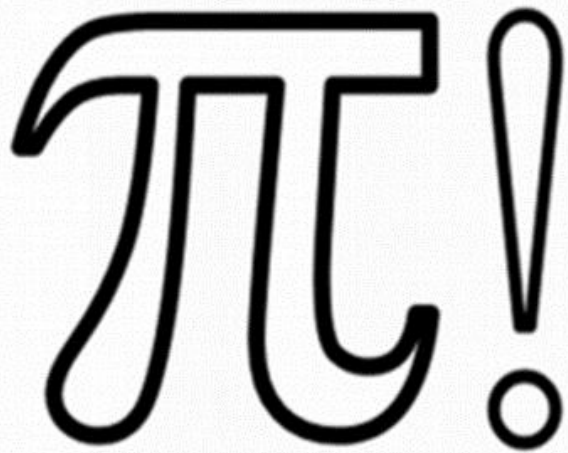


Business Case – Partnership(s) Sought

- THE MAIN EXPECTED COST OF INVESTMENT :
TO BE DETERMINED IN COOP WITH INDUSTRY , SERVICES , IOT EXPERTS.

- THE EXPECTED RETURN ON INVESTMENTS ON MEDIUM AND LONG TERMS
 - SAVINGS IN ENERGY CONSUMPTIONS – ENERGY WASTE , EMISSIONS OUTPUTS
 - SAVINGS RELATED TO SOCIAL FACTORS (ABSENTEEISM, INJURIES, OVER-STAFFING)
 - SAVINGS IN NON-RECOVERABLE AND/OR TRADE-OFF COSTS IN PRODUCTION RAMP-UPS AND/OR IN FULL TBL PRODUCTION IMPLEMENTATIONS

- THE EXPECTED TIME FOR BREAK EVEN :
CONSERVATIVE: < 2Y (SIZE OF SCALE) , ESTIMATE: < 1Y PER SAVINGS TO BE ACHIEVED



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CONTACT:

Harry Tsahalis

Head of Research & Development

Tel: +30 210 2220 008

Email: htsahalis@paragon.gr

LinkedIn: <https://gr.linkedin.com/in/htsahalis>