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Overschie Consulting

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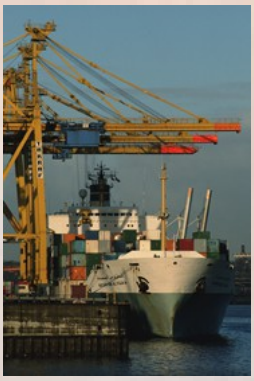
Overschie Consulting

Overschie Consulting (OC) provides consulting and solutions in mathematical modelling, algorithm development, control systems design, simulation, and estimation processes. This in an environment which emphasises on Model Based Design to achieve fast results from initial design to final integration on customer's computing platform or embedded hardware.
One method used, is rapid prototyping through an Integrated Development Environment with automated code generation for fast deployment on software or hardware targets such as existing software applications or embedded hardware platforms for real time control in a mechatronic environment.

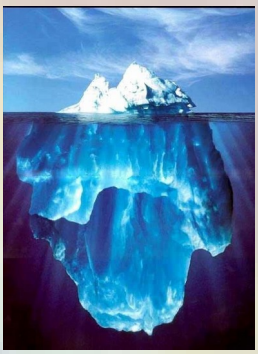


Dynamics of systems

OC's angle of attack is from a systems, dynamics and mechanical engineering point of view whilst being very capable in the electrical and electronics field. The mechanical orientation is a niche within controls and allows for a true systems approach in the fusion of mechanical, electrical, electronic and control system designs. Mechatronics engineering is only one of **OC's** competencies. Other dynamic systems will include finance, thermodynamics, energy systems and stochastic behaviour.
OC has merged its core system dynamics knowledge with an Integrated Development Environment and automated code generation to embedded platforms through the use and ownership of The Mathworks tools. Rapid prototyping, compliance driven, risk reduction and achievable complexity are the drivers for this.

Unique in commercial services

OC has a full suite and multiple licences from The Mathworks and is one of a few companies offering this capability on a commercial basis.
OC also provides modelling, support, training, start up and backbone implementations to facilitate a running start when a client adopts the design process.
Next to the Mathworks' model formats, applications can be made available through automated code generation as generic or customised C/C++ source, .NET, .COM, libraries or pre-compiled code. The end user requires no licence for The Mathworks products in order to use and implement the application on the platform and operating system of choice.



Feedback Thinking®

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Code generation, rapid prototyping and Software Life Cycle

It is important to emphasise that all the work and developments done in high level tools can be migrated onto the customers platform or into its existing software application through the use of an automated code generation facility. This is the crux that transforms an advanced design into an advanced application on the customers platform. This finally bridges the gap from academic thinking to true field applications.

Technology companies

Adopters of this technology and design process are mostly larger compliance driven organisations such as DoD and automotive. Yet it is our strong belief that particularly small specialised technology companies can greatly benefit from rapid prototyping and rapid product development. For them there is much less margin for error from an engineering and a financial point of view. This technology and design process reduces technical risk, tackles over design, feature creep and prevents re-invention. Moreover it delivers facilities for automated testing, code verification and a traceable design effort including all Software Life Cycle monitoring from start to final commissioning.

Despite the accepted advantages, such an environment is no silver bullet. Adoption creates its own challenges especially with corporate introduction and integration of legacy development. It is especially here where **OC** also provides an important part of its services.

Compliance driven

For moving into compliance driven development such as for mining, Oil / Gas and safety critical applications, a full overview of a systems development life cycle will sooner or later be inevitable. An integrated development environment provides full traceability and reporting.

Building eternal knowledge

The Mathworks environment provides a wealth of stable numerical libraries which allows for a rapid application of the knowledge under consideration. Hence the time available can be spend on developing eternal knowledge for building the core business competence. This allows to stay focussed and to spend the time where it is truly needed. Time spent is once again in balance with product performance.

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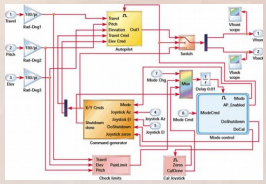
OC's Capabilities

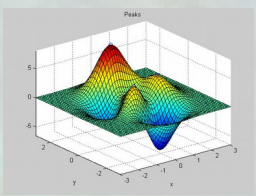
- Closed loop system analysis, design and simulation.
- Dynamic modelling for control system design and simulation.
- Dynamic modelling and simulation for mechanical and electrical system design and component sizing.
- Automated design optimisation.
- Signal processing, large scale data analysis.
- State machine design.
- Optimisation, filtering, estimation and prediction techniques for open and closed loop systems.

- 2D and 3D scientific visualisation GUI and VRML interaction and display.
- Geodetic and Geophysical data processing and visualisation.
- Computational geometry.
- Dead reckoning calculations, navigation engineering.
- GPS mathematics and coordinate mappings
- Inertial Sensor modelling, calibration techniques and data processing.
- State machine development and simulation for HMI and complex decision trees.



- Automated code generation for stand alone or embedded systems.
- Automated module testing and code verification.
- Compliance driven design using Software Life Cycle tools.
- Software Life Cycle engineering.
- Generation of numerically stable libraries for integration in existing systems.

- Import of legacy developments into an Integrated Development Environment e.g. for compliance driven design.
- Hard real time testing and simulation of a combination of real hardware and virtual hardware (running as software components).
- Co-simulation, Parallel and distributed simulation and processing, in hard real time, with Hardware In the Loop (HIL) and Software In the Loop (SIL).



- Technology and methods for compliance driven design e.g. for DoD, automotive, mining and offshore.
- Training, teaching and knowledge transfer.

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OC's Operational Envelope

Applications	Design Disciplines	Operating areas
Dynamic Positioning of semi submersibles.	Mechanical	Mining
Sea keeping performance analysis.	Electrical	Agriculture
Vehicle dynamics simulation.	Electronics	Automotive
ABS and ESP system design.	Embedded systems	Geoscience
Drying of materials.	Real Time software	Defence
Electric motor drives.	Real Time algorithms	Finance
4 quadrant power stage control.	Dynamics of Systems	Off Shore / On Shore
Load control and regeneration.	Feedback systems	Oil / Gas
Tractor guidance and control.	Control systems	Process control
Hydraulic servo control.	Multivariable Control	HVAC
Pneumatic systems.	Parameter Estimation	Sensor technology
Instruments.	Optimisation	Instrumentation
Vehicle stability control.	Geomatics	Navigation
Cut and fill optimisation.	Signal processing	
Inertial Sensor modelling and processing.	Sensor fusion	
Calibration, alignment and sensor stability.	Navigation engineering	
Signal processing, filtering and prediction.	Software Life Cycle	
Geophysical data processing.	Systems engineering	
2D and 3D scientific presentation	Workflow engineering	
Volume visualisation, virtual reality and fly through.		
Human Machine Interface.		
Dead reckoning calculations, coordinate mappings.		
Algorithm development for embedded systems.		
Parallel and distributed real time simulation.		
GPS/INS, GPS/vision, Inertial/vision integration.		
Sensor Fusion for high fidelity estimation.		
Mechanical and dynamic modelling, simulation of systems.		

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Drivers to use an Integrated Design Method

Compliance

- Systems engineering will be the driving factor. Tools are required for Systems Development Life Cycle (SDLC or SLC) capture such as
  - Requirements capture and trace
  - Change management
  - Integrated Development Environment
  - Testing and reporting

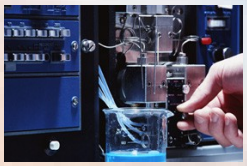
  Most of the development will be based on proper definition, modelling, simulation, testing and migration to operational conditions.
  Compliance driven design demands a lot of emphasis on how things are done, which requires a considerable overhead but is in many instances unavoidable (oil/gas, automotive, aerospace,..)

Systems

- Rapid prototyping, flexibility and solid delivery will be the driving factor.
- Flexible and scalable design
- Tools focus towards the design effort, testing and delivery.

Technology

- Building specific knowledge such as
  - Process control
  - Actuator design and control
  - Sensory systems and signal processing
  - Dynamics of systems, such as mechanical and electrical in a closed loop setting
  - Practical field implementations



Complexity

- System is too complex, can't be done otherwise
- In an Integrated Design Method complexity is no longer a factor.
  - A single module or a thousand modules has no impact on the environment's functionality
  - Allows for order and management of complex systems.

Platform independence

- The algorithms and applications developed are platform independent and can target and be migrated to a range of platforms.
  - Micro controller, CPU, DSP, FPGA
  - Floating point, fixed point
  - Without OS, OS, RTOS, Time Triggered Architecture

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Keywords

Adaptive Control
Analogue Filter Design
Application Lifecycle Management
Bilateral Coupled Energy Systems
Bond Graphs
Change Management
Code Generation
Compliance Driven Development
Control Systems Design
Digital Filter Design
Digital Signal Processing
Discrete Control
DSP
Dynamics of Systems
Electronic Designs
Embedded Systems
Energy Systems
Estimation Theory
Fixed Point implementation
Floating Point implementation
Fluid Flow
FPGA
Frequency Domain Design
Frequency Domain Identification
Hardware In the Loop
Hybrid Control
Instrumentation
Kalman Filtering
Loop Shaping
Mathematical Control Theory
Mathematical modelling
Matlab
Mechanical Designs
Mechatronics
Model Based Design
Model Predictive Control
Modelling of Dynamic systems
Monte Carlo Simulation
Motor Control
Multi-variable control
Multi-variable Frequency Domain
Non-Linear Control
Observers
Optimal Control
Optimisation Techniques
Parameter Estimation
Perturbation Signal Generation
PID
PLC
Process Control
Professional Engineer
Programming Languages
Quantitative Feedback Theory
Rapid Prototyping
Real Time Embedded
Real Time Simulation
Real Time Target
Real Time Workshop embedded
Requirements Driven Design
Robust Control
SCADA
Sensitivity Analysis
Sensor Fusion
Sensor modelling
Sensor Selection
Servo Control
Simulink
Simultaneous Mass and Heat Transfer
Software In the Loop
Spectral Analysis
Spiral Design Method
Stateflow
Stochastic modelling
System Identification
Systems Engineering
Test Harness
Test Vector Generation
Thermodynamics
Time Triggered Architecture
Uncertainty modelling
XPC Target

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can be found on the web

www.apices.de

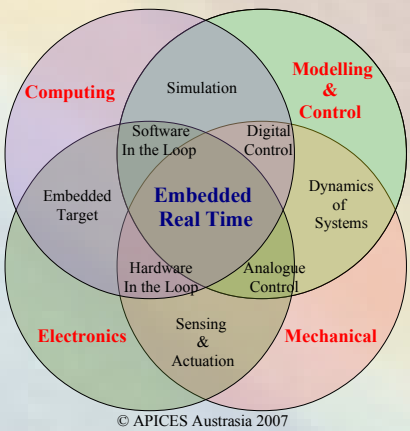
also referenced as:

www.modelbaseddesign.net

www.feedbackthinking.net

Mechatronics

according to OC



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