

CNF Export - De Rossi Consulting Ltd

Question	Answer
Business Name	De Rossi Consulting Ltd
Technical lead's full name	Stefano Marco Maria De Rossi
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Technical lead's job title	Director
Can HMRC use this email to send communications to you?	Yes
Number of R&D Projects	4
Overview of R&D projects	<p>Note: Two major new R&D projects started within the company in FY2024:</p> <ul style="list-style-type: none">- Development of a suite of low-level development tools (libraries, frameworks) for the porting of MFC C++ applications for Windows to the Browser- AlphaMax: a tool for the global optimisation of petrochemical processes <p>These projects, which we have yet to disclose to GrantTree as the FY2024 claim is still pending, will see their continuation into FY2025.</p> <p>Project 1: Continued development of the VPI real-time engine</p> <p>Industry baseline: Advanced real-time control systems require evaluating large sets of complex mathematical expressions under strict performance and correctness constraints. At the time, existing open-source and proprietary tools could not reliably evaluate hundreds of expressions with up to 100 input variables within the time and correctness constraints required</p>

	<p>for real-time deployment (sub-10-second latency for complex systems).</p> <p>New knowledge or capability sought: We aimed to create a highly performant, multi-threaded evaluation engine by reworking a single-threaded parsing and execution library to support safe, batched computation of inferentials in parallel. This resulted in performance improvements of 80–95%.</p> <p>Technological uncertainties: Designing concurrency strategies in a library not originally intended for multithreading, while preserving deterministic output. Optimizing opaque and undocumented parsing internals without introducing instability or regression.</p> <p>Project 2: Development of a suite of low-level development tools (libraries, frameworks) for the porting of MFC C++ applications for Windows to the Browser (continued from FY24)</p> <p>2.1 Development of a WebAssembly port of the MFC C++ library to aid the porting of Windows Desktop applications to the Web (continued from FY2024) Industry baseline: ATL/MFC has never been ported to WebAssembly, and no tools or precedent existed. Our earlier work in this area (in FY2024) revealed that an unmanaged memory model for string data (as exists in C++ standard library) does not scale well for porting ATL/MFC applications, because they originally have a managed memory model. A naive implementation leads to excessive memory bloat in WebAssembly environments. New knowledge or capability sought: We aimed to develop a new custom CString implementation with copy-on-write semantics, optimised for WebAssembly. Technological uncertainties:</p>
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	<p>Preserving correct behaviour and memory safety across both native and Wasm builds. Emulating CString's semantics without a reference implementation.</p> <p>2.2 Continued development of a framework for porting synchronous code to an asynchronous execution model (continued from FY2024)</p> <p>Industry baseline: There is no general-purpose, automated method for transforming synchronous MFC C++ network operations into asynchronous logic compatible with the browser. While in FY24 we developed a manual wrapper framework for "asyncifying" blocking operations, it still required developers to refactor their code explicitly.</p> <p>New knowledge or capability sought: In FY2025, we expanded on our earlier work by investigating whether such transformations could be automated using C++20 coroutines to automatically convert synchronous control flow into resumable async tasks, minimising the changes required to port legacy networking code to WebAssembly.</p> <p>Technological uncertainties: Preserving control flow and memory state during transformation. Ensuring safe yielding and resumption in legacy code not designed for async.</p> <p>Project 3. Development of a Browser-compatible version of the Logisim Java application</p> <p>Industry baseline: Logisim is a widely-used Java-based desktop application for digital circuit simulation. There was no robust, browser-native version usable in modern educational environments.</p> <p>New knowledge or capability sought: We developed a WebAssembly-powered port of Logisim that runs in the browser with full</p>
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	<p>simulation features, usable in classrooms with no installation.</p> <p>Technological uncertainties: Creating a stable and portable JS bridge to expose low-level Java I/O and system operations to the browser, including file save/load and workspace persistence, without modifying the original Logisim source code.</p> <p>Working around circular references and nested dependencies in Logisim's library and project format, which complicated runtime symbol resolution and state restoration.</p> <p>Project 4. Continued development of AlphaMax, a tool for the global optimisation of petrochemical processes</p> <p>Industry baseline: Most advanced process control systems are designed to optimise individual plant units independently, each working toward local performance objectives. While some plant-wide coordination tools exist, these are typically bespoke implementations, typically limited to steady-state optimisation and lacking the ability to incorporate future boundary condition changes, such as scheduled maintenance, shifts in product demand, or supply disruptions.</p> <p>New knowledge or capability sought: Building on work done in FY2024, we aimed to develop a set of graphical offline tools for modelling a process plant, defining constraints and boundary conditions, and formulating the optimization problem. We also investigated methods for multi-period optimisation (i.e. solving over future horizons using forecasted inputs).</p> <p>Technological uncertainties: Designing an intuitive graphical modelling system capable of expressing complex</p>
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	<p>inter-unit process logic while remaining usable for engineers.</p> <p>Ensuring model consistency and mathematical feasibility when connecting predictive components with real-time plant data.</p> <p>Creating a solver that could efficiently compute optimal decisions across multiple future time periods under real-time constraints.</p>
Company UTR	7539711040
End Date of the Relevant Financial Period	31/05/2025