

Nanofilm

Intangibles Disclosure Framework Example Report

This is a brief analysis of Nanofilm Technologies International Limited (Nanofilm)'s Intangible Assets (IA) using the Intangibles Disclosure Framework (IDF).

The IDF outlines principles for businesses to disclose and communicate their IA such as brand value, patents or registered designs in a systematic and comprehensive way.

The disclosure principles in the IDF are anchored in four pillars: Strategy, Identification, Measurement, and Management (SIMM).

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An Overview of Nanofilm

Nanofilm Technologies International Limited (Nanofilm) is a leading provider of nanotechnology solutions.

There are four business units within the Nanofilm Group:

The **Advanced Materials Business Unit** provides advanced materials through surface solution services based on Nanofilm's proprietary vacuum coating technologies and processes. Their surface solution services involve the use of Filtered Cathodic Vacuum Arc ("FCVA") and FCVA hybrid technology with physical vapour deposition ("PVD") coating equipment to deposit their proprietary advanced materials on key components and parts of the global supply chain, thereby enabling their customers to achieve the desired functional and/or decorative requirements for their end-products.



The **Industrial Equipment Business Unit** manufactures and supplies turnkey equipment systems, ranging from coating equipment to auxiliary equipment (such as cleaning lines) to automation systems, which are installed at customers' production lines. They provide customers with not just the physical equipment, but also customised operating software for their systems and training, as well as spare-parts, customer service and other forms of after-sales support.

The **Nanofabrication Business Unit** manufactures and supplies nanoproducts which, due to their nanoscale and/or nanofeatures, are used by customers as components for the smooth functioning and performance of their end-products. They utilise their nanofabrication technology and software to fabricate nanoproducts which are designed to meet the dimensional specifications of customers as well as provide the required functional properties of their end-products.

The **Sydrigen Business Unit** offers advanced materials solutions to the emerging hydrogen energy market. Their corrosion resistant carbon coating solution enhances the lifespan and conductivity of metallic bipolar plates in PEM hydrogen fuel cells and significantly reduces ion leaching. They also offer turnkey systems to integrate or retrofit hydrogen power generation into customers' systems to help to reduce carbon footprint. Use cases include maritime, EV charging station and commercial vehicles.



STRATEGY

Creating Sustainable Value

As a deep tech spin-off from NTU, Nanofilm started with no market positioning and limited capital. Nevertheless, the company defied market expectations by successfully competing against tech giants from America, Europe and Japan in gaining market share from customers who are accustomed to their proven conventional technologies.

The pursuit for continuous self-improvement and persistent research and development (R&D) in their products and services led Nanofilm to achieve new boundaries in material science technologies, surmount numerous challenges, and exceed expectations over the years.

Alignment of IA and Business Strategies for Value Creation

Today, Nanofilm's technology-based solutions are utilised in a wide range of industries such as 3C (computer, communication and consumer electronics), automotive, precision engineering, printing and imaging, and new energy. Their products and services are integral to the smooth functioning of many technologies and tools that are essential to modern daily lives.

Nanofilm's business model is constantly evolving in tandem with their strategy and is designed and crafted for business excellence. They have grown and developed alongside their customers through their continuous focus on R&D and innovation, often undertaken in collaboration with their customers and leveraging their strong in-house engineering and solid production capabilities.



Key Competitive Advantage

Innovation is at the core of Nanofilm and embedded in the company's corporate DNA. The company is committed to maintain more than 7% of its revenue in R&D and engineering initiatives.

At the group level, Nanofilm has set up the Advanced Technology Research Centre (ATRC). ATRC is a multi-site organisation with core locations in Singapore and Shanghai. The Singapore site is located at Nanofilm's headquarter at Tai Seng, while the Shanghai site is located at Shanghai Plant 2 in Qingpu district, China.

ATRC's mandate is to validate and improve maturity of new technologies and products for eventual mass production by business units. This organisation will also be the primary unit addressing the integration of new technologies into product development for Nanofilm's customers and business development teams, creating innovative nanotechnology solutions to address the needs of their stakeholders.

The R&D projects undertaken at ATRC are at the mid-Technology Readiness Levels (TRLs). At each Business Unit, there is also a Research and Engineering Development (RED) team to focus on R&D work at higher Technology Readiness Levels (TRLs).

In late 2023, Nanofilm established the \$66 million NTI-NTU Corporate Laboratory in collaboration with NTU, supported by the Singapore government under Research, Innovation and Enterprise 2025 (RIE2025) Plan. Leveraging the facilities and expertise of NTU, Nanofilm is able to augment their innovation strategy, consolidating and strengthening the deep technological R&D. The NTI-NTU Corporate Laboratory will also be a common platform for public and private collaborators to access NTI's deep tech, contributing to a more vibrant and robust RIE ecosystem. The NTI-NTU Corporate Laboratory will focus on projects of earlier Technology Readiness Levels (TRLs).



IDENTIFICATION	MEASUREMENT
<p>Key Intangibles</p> <p>Technology – Patents: Nanofilm Group owns a portfolio of granted patents and pending patent applications on products and processes related to the vacuum coating technology.</p> <p>Notable features of the portfolio include the proprietary filtered cathodic vacuum arc (FCVA) technology and the various functional and decorative coatings incorporating tetrahedral amorphous carbon (ta-C).</p> <p>In recent years, they also expanded their patent portfolio by filing more product related patent applications, such as piston rings and fuel cell bipolar plates. The patent applications are filed in Singapore, China, Japan, Europe and USA, to offer protection in territories of main business interest.</p>	<p>Metrics and Drivers</p> <p>R&D expense (Nanofilm Group):</p> <p>2021 - S\$17.4 million</p> <p>2022 - S\$18.4 million</p> <p>2023 - S\$15.9 million</p> <p>Granted patents: > 60</p> <p>Pending patent applications: > 40</p> <p>Granted utility models in China: > 60</p>
<p>Technology – Nanofabrication: The Nanofabrication Business Unit has core technologies in 5-axis Single Point Diamond Turning and proprietary CAM software. By optimising the tooling and production process, they are able to produce fine structures and accuracy, with lens thickness <0.1 mm and microstructure accuracy <0.1 µm.</p> <p>Combining their proprietary synergistic nanofabrication and FCVA coating technology, they are able to achieve very smooth surface on the lens products by reducing surface roughness values to 5 nm. The integrated technologies in tooling, process engineering and thin-film coating further cement Nanofilm’s market position as a provider of nanofeatured and nanoscale sensors and optical products.</p>	<p>Nanofabricated product features:</p> <p>Lens thickness <0.1 mm</p> <p>Microstructure accuracy <0.1 µm</p> <p>Profile accuracy <0.5 µm</p> <p>Surface roughness (Ra) <10 nm</p>



Key Intangibles	Metrics and Drivers
<p>Technology – Computer software: In addition, they have developed automation and digital management systems in-house to improve the mass production capability in the manufacturing plants. These software and systems have been officially registered with software copyrights in China.</p>	<p>Computer software copyright registrations: 15</p>
<p>Marketing – Trade marks have been registered for the main functional coating products including TAC-ON® coating, i-TAC® coating, MiCC® coating, and recently STAR-TAC® coating and SydroDIAMOND® coating. The main jurisdictions covered include Singapore, China, Japan, Europe and USA.</p>	<p>Trade mark registrations: > 60 (Multiple pending trade mark applications)</p> <p>Number of awards won in 2023: 4</p>
<p>Contract – Nanofilm Group has formed lasting relationships with customers in the glass lens industry, piston ring manufacturing industry and leading companies in the 3C industry, with some over 10 years and counting.</p> <p>Their Sydrogen Business Unit has established strategic collaborations with Shanghai Hydrogen Propulsion Technology Co., Ltd. (SHPT) and Pyxis Maritime Pte. Ltd.</p>	<p>Years of relationships with key customers: 10-20 years</p>



MANAGEMENT

At Nanofilm Group, the **CTO Council** has the overarching responsibility to provide the appropriate leadership of Nanofilm's research and technical development work, including the NTI-NTU Corporate Laboratory, Advanced Technology Research Centre and BU-level product and process development work. The CTO Council comprises the Executive Chairman and the CTOs of the various technological domains, including coating technology, nanofabrication and hydrogen renewable energy.

Given the diverse nature of the group's business and the deep technology that they specialise in, the composition of the CTO Council members, who have in-depth knowledge and expertise in their respective areas, will facilitate the effective leadership of the Group's R&D endeavours and technology commercialisation efforts, including exploring new business opportunities.

Under the guidance of the CTO Council, the **IP Management Office** manages filing and prosecution of patent applications. Patent search is performed at the beginning of R&D project proposal stage and at milestones, to identify potential risks and possible IP protection.

The **corporate legal department** manages the risks of the intangibles by reviewing contracts and Non-Disclosure Agreements (NDAs), as well as providing legal advice to other departments and business units.

Looking ahead, the establishment of the **NTI-NTU Corporate Laboratory** marks a significant milestone, enabling Nanofilm to leverage combined resources and expertise to drive deep-tech innovation.

The four research pillars of the Corporate Laboratory are structured in alignment with the four business units of Nanofilm Group. This arrangement will ensure a smooth pathway to commercialisation. The collaborative initiative is poised to yield mutual benefits, enhancing their competitiveness, and positioning them as pioneers in the field of advanced technology.



Find out more about the Intangibles Disclosure Framework [here](#).

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