rakon

2014 REVIEW

Enabling Next Generation Technologies

rakon

Performance at a Glance

Revenue
NZ$**150.0m**
▼ 15%

Net Debt Reduction
81%
Reduction from NZ$**33.1m** to NZ$**6.4m**

R&D Spend
NZ$**13.6m**
9% of Revenue

Operating Cash Flow
NZ$**12.5m**
▲>100%

Total Assets
NZ$**128.4m**
▼ 47%

Underlying **EBITDA***
NZ$**(7.5m)**
▼>100%

Financial Key Points FY2014

Operational Key Points FY2014

Equity Sale of Rakon Crystal Chengdu
Completed October 2013. Transfer of internal resources away from Smart Wireless Devices (SWDs) toward other markets.

French Operations Restructured
France restructure implemented with Oven Controlled Crystal Oscillator (OCXO) manufacturing now fully shifted to Centum Rakon in India.

Transfer of Lincoln, United Kingdom (UK) Manufacturing to New Zealand
Plans to transfer Lincoln, UK manufacturing to New Zealand with transfer programme underway.

New Zealand Reorganisation
Following on from plans to exit SWDs and the transfer of Lincoln manufacturing, the New Zealand business reorganised to align with future business needs.

Financial Snapshot Financial Year (FY)2014

NZD Millions	FY14	FY13
Revenue	150.0	176.3
Underlying EBITDA*	(7.5)	5.1
Loss from discontinued operations	33.3	7.6
Impairment	19.9	17.3
Profit/(loss) after tax	(83.8)	(32.8)
Earnings (cents per share)	(41.7)	(16.7)
Operating cash flow	12.5	(2.7)
Capital expenditure	5.9	12.3
Bank borrowings	10.9	36.1
Net debt	6.4	33.1
Shares on issue at balance date (millions)	191.0	191.0

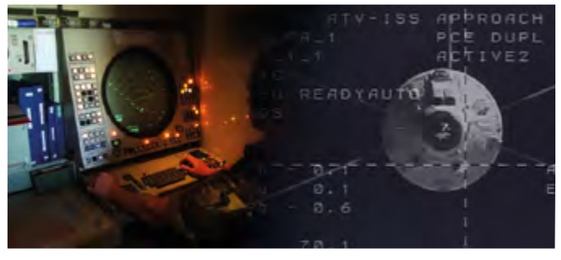
*Disclosure of Non-GAAP Financial Information.
Rakon has used 'Underlying EBITDA' as a measure of non-GAAP financial information in this announcement and it is defined as: "earnings before interest, tax, depreciation, amortisation, impairment, loss on disposal of assets, employee share schemes, non-controlling interests, adjustments for associates and joint ventures share of interest, tax and depreciation, and other non-cash items."
'Underlying EBITDA' is a non-GAAP measure, with its presentation not being in accordance with GAAP. The Directors present 'Underlying EBITDA' as a useful non-GAAP measure to investors, in order to understand the underlying operating performance of the Group and each operating segment, before the adjustment of specific non-cash charges and before cash impacts relating to the capital structure and tax position. 'Underlying EBITDA' is considered by the Directors to be the closest measure of how each operating segment within the Group is performing. Management uses the non-GAAP measure of 'Underlying EBITDA' internally, to assess the underlying operating performance of the Group and each operating segment. The use of 'Underlying EBITDA' in this document has been extracted from the audited financial statements for 2014. This document should be read in conjunction with the Rakon Limited Annual Report 2014. A detailed reconciliation of 'Underlying EBITDA' is contained at Note 4 (Segment information) of the Financial Statements.

Advanced Timing for High Speed Connectivity

Rakon is a global high technology company and world leader in its field. It designs and manufactures advanced frequency control and timing solutions.

Primarily based around quartz crystal and utilising its unique and natural piezoelectric properties, Rakon's products create extremely accurate electrical signals. These signals are used to generate radio waves or synchronise time in the most demanding communication applications.

Today we live in a connected society of wired, wireless and optical networks. Data is being transferred everywhere, any time and at high speeds. Rakon's products are found at the forefront of communication where speed and reliability are paramount.



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Strategic Position

Rakon has built a world class design and manufacturing platform. It has a customer portfolio of global leaders through its ability to offer disruptive technologies coupled with comprehensive application knowledge. Rakon's focus is on enabling next generation technologies as well as retaining or securing 'preferred supplier' status with leading Tier One companies. Business targets are centred on growth and profitability in the core markets of telecommunications, global positioning and space & defence. The focus is on delivering high value, high performance products to these markets – driven from the operational excellence of its worldwide facilities.

Chairman's Report

Dear Shareholders,

Welcome to this, the 9th Annual Report of your company Rakon Limited.

The team at Rakon has undertaken a number of important structural changes during the past year, rebuilding our business platform and creating a base from which we are confident that future profits will be generated.

The major structural changes that have been made, are the following:

1. The successful sale of 80% of the equity in Rakon Crystal (Chengdu) Company Limited (RCC) to ZheJiang East Crystal Electronic Company Limited (ECEC), on 17 October 2013;
2. The restructure of Rakon France and the completion in the transfer of Oven Controlled Crystal Oscillator (OCXO) component manufacturing from France, to Rakon's joint venture in India (Centum Rakon);
3. The initial actions to close Rakon's manufacturing plant at Lincoln in the United Kingdom (UK) and shift all operations to New Zealand in 2014, allowing us to create future operating efficiencies.

These three activities are consistent with our stated goals of exiting the Smart Wireless Device (SWD) market and concentrating our manufacturing activities in order to create more focus and profit than we have achieved in the past three years.

These changes allow the team to enhance their focus on the important and profitable markets (telecommunications, global positioning and space & defence) and in doing so, opportunities are now being uncovered, where previously people were too busy servicing the unprofitable SWD market. As well, the team has time to develop new and exciting products ahead of our competition.

In addition to these structural realignment activities, we have realigned the balance sheet such that Rakon's bank borrowings have reduced from NZ$36.1 million to NZ$10.9 million, resulting in a net debt position of NZ$6.4 million. This debt reduction has come from cash received from the RCC sale and a large reduction in working capital following the exit from the SWD market.

As announced, during the coming year the company will increase its borrowings up to NZ$22 million. The increase allows us to complete the restructuring changes that we have announced and also ensures there is adequate headroom for the operating requirements of the business. We expect debt to return to current levels once proceeds are realised from sales of surplus property in both the UK and France.

The financial result for the company was an after tax loss and one that is very disappointing to the Board of Directors, but inevitable given all the changes that had to be made to return Rakon to a growth mode again.

Of the reported after tax loss of NZ$83.8 million, NZ$79.4 million is attributable to Rakon shareholders, with the residual NZ$4.4 million belonging to non-controlling interests. Included within the loss, NZ$63.8 million was from non-cash charges resulting from the RCC loss on sale, exit from the SWD market and other impairment charges including goodwill. Within the reported Underlying EBITDA loss of NZ$7.5 million, there was NZ$10.4 million of restructure costs and stock write downs associated with the structural realignment activities undertaken in the year. Adjusting for those changes would mean that Rakon could have shown an Underlying EBITDA of NZ$+2.9 million. In considering the adjustment after these non-recurring costs and the further benefit that can be expected from the changes undertaken, it indicates that Rakon's new platform is capable of producing a future profit within the guidance range as advised at the 2013 Annual Shareholders' Meeting.

This succession of major changes, while producing a highly unacceptable loss in Financial Year (FY)2014, has been necessary to ensure that Rakon has a sound base upon which to build the future. The team that remains has been highly invigorated by these changes and are determined to rebuild Rakon's profit. Their unique skills and technical expertise will be used to create new profitable products for the markets where Rakon is now focused.

To the people who work at Rakon, a big thank you from myself and the Board for your dedication and efforts during what has been a very challenging time.

To our shareholders, I would like to again thank you for your patience over the past few years during what has been a difficult and financially unrewarding journey. We are confident that the fiscal year ending 31 March 2015 will produce a result that will show your patience is rewarded, as Rakon is refocused for a new period of growth and profitability.

I look forward to meeting you personally at the Annual Shareholders' Meeting on 12 September and answering any questions that you have.

Bryan Mogridge Chairman

Managing Director's Report

The 2014 financial year has been a difficult one for Rakon Limited. It has been a year of structural change which has been necessary to return Rakon to future profitability. Action has been taken to position the business toward Rakon's core foundations and strengths – higher margin, technologically advanced products. The divestment of Rakon Crystal (Chengdu) Company Limited (RCC) and the move away from the Smart Wireless Device (SWD) market, means that there is now a renewed focus on the core markets of telecommunications, global positioning and space & defence – markets in which Rakon can leverage off well established and strong relationships with Tier One customers. The financial result of Financial Year (FY)2014 unfortunately reflects the cost of this necessary change and includes a number of impairment related charges.

Financial Overview

Rakon reported a consolidated net loss after tax of NZ$83.8 million for FY2014, of which NZ$79.4 million is attributable to Rakon shareholders. An Underlying EBITDA loss of NZ$7.5 million was reported and was within the range of guidance provided. Net debt was NZ$6.4 million and bank borrowings NZ$10.9 million at 31 March 2014, thereby achieving our target of reducing bank borrowings to below NZ$12 million by that date.

Revenue for the year was NZ$150.0 million, down 15% on the prior year. This was mainly due to the reduced involvement in the SWD market as Rakon sold 80% of its equity interest in RCC to ZheJiang East Crystal Electronic Company Limited (ECEC), on 17 October 2013.

Following the equity sale in RCC, a loss of NZ$33.3 million resulted from discontinued operations and includes an impairment charge of the full value of Rakon's remaining equity investment in RCC. Costs of NZ$7.2 million relating to restructuring activities were recorded for FY2014 – including a provision for restructure costs relating to the planned closure of the Lincoln facility, in the United Kingdom (UK).

Total impairment charges were NZ$19.9 million including an impairment charge against the carrying amount of UK goodwill (NZ$15.0 million). Following the annual testing for impairment of goodwill at financial year end, the value-in-use calculation did not support the carrying amount of UK goodwill once transferred to New Zealand.

Further to the financial year end testing for impairment, certain property, plant & equipment assets were assessed as having a reduced useful life which resulted in an acceleration of depreciation of NZ$7.4 million being brought forward into FY2014. The impact of accelerated depreciation results in a reduction in gross profit in the Statement of Comprehensive Income.

The FY2014 loss includes costs totalling NZ$71.0 million that while a negative on this year's result, are not losses that will reoccur in FY2015. Included within this number are the following: the loss on the RCC sale (NZ$33.3 million), impairments including goodwill (NZ$19.9 million), accelerated depreciation (NZ$7.4 million), stock write-downs (NZ$3.2 million) and restructure costs (NZ$7.2 million).

Operating cash flow of NZ$12.5 million was positive for the year due to a significant release of working capital, following the exit from the SWD market.

Capital expenditure of NZ$5.9 million was significantly lower than in previous years, when we had invested for the SWD market.

Operational Overview

While the loss indicates that it was a very difficult year for Rakon, there was significant progress made in returning Rakon to future profitability through key structural changes to our investments and operations. The key changes include:

Equity Sale of Rakon Crystal (Chengdu) Company Limited

The equity sale in RCC to ECEC in October 2013 means that Rakon has now exited the loss-making SWD market. Rakon retains a 10% equity interest in the newly formed joint venture company ECEC Rakon (ERC), with the remaining investment in ERC fully impaired.

France Restructure

A restructure of the France business was undertaken, with the result that Oven Controlled Crystal Oscillators (OCXOs) are now fully manufactured from Centum Rakon India Private Limited (or 'Centum Rakon'), our joint venture in India. This allows us to further reduce manufacturing costs for the OCXO product range. While there is some finalisation of the France restructure to take place in FY2015, all costs have been provisioned in the FY2014 financial result. Rakon's site in Argenteuil is mainly affected by the restructure and following a planned relocation of the remaining operations (research & development and optical processing of quartz resonators for the space & defence market) in the first half 2015, that site will be disposed of with proceeds used to pay down debt.

Transfer of Lincoln United Kingdom (UK) Manufacturing to New Zealand

As we announced in March 2014, a decision has been made to close the Lincoln, UK facility with all manufacturing to be transferred to New Zealand during 2014. Currently the transfer plan is well underway and we expect to have all manufacturing happening in New Zealand from the second half of FY2015. This project is a significant one for us in the coming year and we expect to deliver financial benefits from the change from the second half. All restructure costs relating to the Lincoln facility closure have been provisioned in the FY2014 financial result.

New Zealand Reorganisation

Following the exit from the SWD business and the planned transfer of the Lincoln manufacturing to New Zealand, the New Zealand business was realigned with Rakon's future business needs. Some organisational change has recently taken place and a stable team is now preparing in readiness to accept the Lincoln manufacturing.

Strategy

During FY2014 management and the Board have put in place a new strategic plan for the company. We have a very clear vision to be "the preferred frequency control product supplier to the telecommunications, global positioning and space & defence markets with best in class application knowledge". There is a clear strategic focus on markets for growth and profitability, technology development and operational excellence. The overarching objective is to focus on shareholder value creation with an objective to achieve a Return On Equity (ROE) of greater than 12% by the end of FY2017.

Outlook

Telecommunications

Rakon experienced continued market share and revenue growth within this sector during FY2014. Our recent efforts now have us supplying all Tier One telecommunication equipment suppliers.

Demand in telecommunications is expected to come from the deployment of 4G LTE macro networks, and then underneath these networks with the infill around 4G and all the backhaul to cope with the influx of data. 4G base stations and supporting infrastructure is expected to drive demand for the next three years. Rakon's product portfolio is well positioned for this new generation equipment, as technology transitions into high speed networks.

Global Positioning

Rakon has a strong market share in global positioning and remains the leading frequency control supplier to this market. Leveraging the superior performance of our products will enhance our shift in focus to more industrial and specialised applications, where margins have the opportunity to improve.

Space & Defence

In the space & defence market Rakon is leveraging off our already established position in Europe to expand our market further into the United States and Asian markets. We have established a growing number of design wins in new product platforms where products have been developed with 'best in class' performance. Due to the nature of these high performance products, the move into production often takes a long time. Extensive testing and qualification is undertaken and they normally have quite a slow ramp up; nevertheless we expect to see revenue growth in this sector over the next 18 – 24 months.

Technology Development

Rakon will continue to focus on disruptive technology where the company has always been at the forefront. Our new strategic plan has a focus to improve Research and Development (R&D) co-operation between the engineering teams in the United Kingdom, France and New Zealand. We are spending effort to set up processes, allowing us to have one view of our total R&D effort.

Operational Excellence

In the coming year we will place focus on finishing the structural change programme – the key project being the transfer of UK manufacturing to New Zealand. We've undertaken a significant amount of organisational change and we will focus on embedding that change. Delivery against our new strategic plan is well underway and we will be ensuring there is an aligned global effort in this.

Closing Comments

During the year we have made some difficult but necessary decisions to restructure the business in order to return Rakon to future profitability. The FY2014 loss includes a number of costs that while negative for this year's result, are not costs that will reoccur in FY2015.

The company has now redirected its focus on the markets where we see value – the telecommunications, global positioning and space & defence markets, where we're confident that we can expand our position.

While it's important that we reflect on the disappointment of this year's financial result, the structural change that we have made in a short period of time provides for an improved performance in FY2015.

Brent Robinson CEO, Managing Director

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Board of Directors

Rakon's strategic focus is on markets for growth and profitability, technology development and operational excellence.

Bryan Mogridge
ONZM, FNZIOD
Independent Chairman

Age 68
Appointed Chairman in 2005.

Bryan has been a public company Director since 1984.

Formerly CEO of Corporate Investments and Montana Wines.

Has chaired BUPA Care Services NZ Limited, Yealands Wine Group Limited, Momentum Energy PTY Limited, Waitakere City Holdings Limited, Enterprise Waitakere, The New Zealand Food and Beverage Exporters Council, The New Zealand Wine Institute and The New Zealand Tourism Board, among many other companies.

Was also Vice Chairman of UBS New Zealand and a former Director of Heartland Building Society Limited.

Other Current Directorships:
Lantern Hotel Group PTY Limited (Chairman), Pyne Gould Corporation Limited (Chairman), BUPA Australia PTY Limited (Director) and Mainfreight (Director).

Bryan is also Chairman of the Starship Foundation.

Brent Robinson
Executive Director

Age 55
Appointed to Board in 2005.

35 years at Rakon which includes establishing a global business.

28 years as Managing Director/CEO.

Under Brent's leadership Rakon has grown into a global and diversified business with revenues increasing from NZ$1 million to NZ$150 million.

Honorary Fellow of the Institution of Professional Engineers New Zealand.

Awarded the New Zealand Hi-Tech Trust – Flying Kiwi Award in 2011.

Bruce Irvine
Independent Director

Age 58
Appointed to Board in 2005.

Managing Partner of Deloitte Christchurch from 1995 to 2007.

Has chaired Canterbury Business Recovery Group Limited, House of Travel Limited and Pyne Gould Corporation Limited among many other companies.

Formerly involved in a voluntary capacity as a trustee of Canterbury Business Recovery Trust.

Other Current Directorships:
Christchurch City Holdings Limited (Chairman), Heartland Bank Limited (Chairman), Godfrey Hirst Limited (Director), House of Travel Holdings Limited (Director), Market Gardeners Limited (Director), PGG Wrightson Limited (Director), Scenic Hotels Limited (Director), and Skope Industries Limited (Director).

Involved in a voluntary capacity as a trustee of Christchurch Symphony Trust and Christchurch Art Gallery Trust.

Sir Peter Maire KNZM
Non-Executive Director

Age 62
Appointed to Board in 2005.

Co-Founder and former President of Navman NZ Limited.

Honorary Fellow of the Institution of Professional Engineers New Zealand.

Made a Knight Companion of the New Zealand Order of Merit (KNZM) in 2008.

Formerly a Director of Orion Health Limited and a board member of New Zealand Trade and Enterprise.

Other Current Directorships:
Callaghan Innovation (Director), Fusion Electronics Limited (Director and majority shareholder) and Invenco Company Limited (Director and majority shareholder).

Darren Robinson
Executive Director

Age 53
Appointed to Board in 2005.

24 years at Rakon as Sales and Marketing Director.

Darren has driven sales for Rakon through exploring new markets, applications and establishing business with many Fortune 500 companies.

Under Darren's sales and marketing leadership, Rakon now has sales revenue of NZ$150 million and a full portfolio of frequency control solutions.

Warren Robinson
Non-Executive Director and Founder

Age 79
Appointed to Board in 2005.

Founded Rakon in 1967 and spent 19 years as Managing Director. Chairman until November 2005.

A member of the Institute of Electrical and Electronics Engineers.

A senior member of the New Zealand Electronics Institute.

A member of The Royal Society of New Zealand.

Warren has a First Class Certificate in Radio Technology.

Herb Hunt
Independent Director

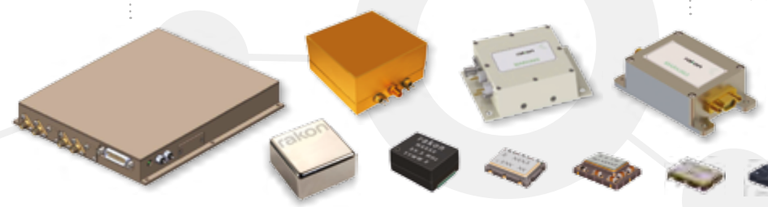
Age 66
Appointed to Board in 2012.

Over 40 years experience in senior global operational and strategic roles in the technology industry with leading companies including IBM, Siebel Systems and Symphony Group.

32 year career with IBM including 12 years at IBM NZ culminating as Chairman and CEO before rising to more senior roles in Australia, Asia, Europe and the USA.

Currently heads his own company, Transformation Services, in the US which focuses on improving performance in sales, services and product development for international technology companies.

Other Current Directorships:
Project Manager Holdings Limited (Director) and Wynyard Group (Director).



The Evolution of Rakon

1967 Founded by Warren Robinson.

1972 Established manufacturing in Singapore.

1985 Developed TCXO product for emerging cell phone market.

1990 Developed miniature 1 ppm TCXO.

1991 Focused on the emerging GPS industry, and grew the GPS business.

1995 Became main supplier to the GPS industry. Singapore facilities closed.

1997 Developed first ASIC based TCXOs.

2002 Became sole supplier to flagship GPS cell phones.

2003 Developed miniature 0.5 ppm TCXO and dominated Personal Navigation Device (PND) market.

2006 IPO – Listed on stock exchange (NZX).

2007 Acquired a division of C-MAC to expand its share in telecommunications infrastructure and develop the space & defence markets. Acquired facilities in Harlow and Lincoln (UK) and Argenteuil (France).

2008 Formed a Joint Venture (JV) with Centum Electronics in India to manufacture OCXO products and to commercialise Rakon France's R&D programme. Formed JV with Timemaker in China to manufacture quartz crystal blanks.

2010 Acquired Temex to expand space & defence solutions. Acquisition included facilities in Mougins and Troyes (France). Rakon announces world's smallest OCXO.

2011 Chengdu (China) facility opened, to be cost competitive in the Smart Wireless Device (SWD) market.

2013 Sale of Chengdu factory to ECEC, Rakon exits Smart Wireless Device (SWD) market. Rakon releases new products within its Ultra-Stable TCXO product portfolio, which offer 'best in class' performance.

2014 Global restructuring of Rakon's operations undertaken in France, the UK and New Zealand.

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Financial Summary

Summary of Revenue and Profit/(Loss) For the year ended 31 March 2014	2014 ($000s)	2013 ($000s)
Revenue	149,951	176,259
Underlying EBITDA*	**(7,531)**	**5,054**
Depreciation and amortisation	(16,446)	(12,116)
Impairment	(41,387)	(17,331)
Loss on disposal of assets (sale of shares in subsidiary)	(8,467)	–
Interest	(1,715)	(1,897)
Adjustment for associates and joint venture share of interest, tax and depreciation	(2,787)	(2,912)
Non controlling interest & other non cash items	(4,390)	(1,147)
Income tax credit/(expense)	(1,076)	(2,472)
Net profit/(loss) after tax	**(83,799)**	**(32,821)**

Summary of Statement of Cash Flow For the year ended 31 March 2014	2014 ($000s)	2013 ($000s)
Net cash flow		
– Operating activities	12,487	(2,670)
– Investing activities	16,730	(11,936)
– Financing activities	(25,890)	6,641
Net increase/(decrease) in cash and cash equivalents	**3,327**	**(7,965)**
Foreign currency translation adjustment	(1,817)	(1,179)
Cash and cash equivalents at the beginning of the period	3,290	12,434
Cash and cash equivalents at the end of the period	**4,800**	**3,290**

Balance Sheets As at 31 March 2014	2014 ($000s)	2013 ($000s)
Assets		
Current assets		
Cash and cash equivalents	9,211	9,779
Trade and other receivables	34,255	47,725
Derivatives – held for trading	–	543
Derivatives – cash flow hedges	1,056	1,378
Inventories	28,443	45,786
Current income tax asset	2	1
Total current assets	**72,967**	**105,212**

*Refer to page 2 for explanation of Underlying EBITDA.

As at 31 March 2014	2014 ($000s)	2013 ($000s)
Non-current assets		
Trade and other receivables	–	5,871
Property, plant and equipment	24,374	86,540
Intangible assets	10,819	24,623
Investment in associate	7,666	8,248
Interest in joint venture	6,210	5,174
Deferred tax asset	6,349	7,759
Total non-current assets	**55,418**	**138,215**
Total assets	**128,385**	**243,427**
Liabilities		
Current liabilities		
Bank overdraft	4,411	6,489
Borrowings	42	22,633
Trade and other payables	23,258	35,655
Derivatives – held for trading	–	71
Derivatives – cash flow hedges	–	1,236
Derivatives – interest rate swaps	23	119
Provisions	6,108	202
Current income tax liabilities	456	1,291
Total current liabilities	**34,298**	**67,696**
Non-current liabilities		
Borrowings	11,132	13,717
Provisions	1,825	2,412
Deferred tax liabilities	2,163	2,916
Total non-current liabilities	**15,120**	**19,045**
Total liabilities	**49,418**	**86,741**
Net assets	**78,967**	**156,686**
Equity		
Share capital	173,881	173,881
Reserves	(23,795)	(29,395)
Retained earnings	(71,119)	8,310
	78,967	152,796
Non-controlling interests	–	3,890
Total equity	**78,967**	**156,686**

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Global Executives

Brent Robinson

Brent has been Managing Director and CEO since 1986. Under Brent's leadership Rakon has grown into a global business with revenues increasing from NZ$1 million to NZ$150 million. Brent also acts as Rakon's Chief Technology Officer, driving the business's technology and innovation.

Darren Robinson

Darren has been Marketing Director since 1990. He leads the sales, marketing and product management activities for Rakon globally and has been instrumental in driving Rakon's strategic direction to attain revenue and market share growth.

Simon Bosley

Simon joined Rakon in November 2012 and was appointed as Chief Financial Officer in February 2013. In his current role he is responsible for Rakon's finance and information systems as well as taking a lead role in the structural change undertaken in the current year. Simon is also Rakon's company secretary. He previously spent ten years with Sony in executive management positions in New Zealand and Australia.

Dr Sinan Altug

Sinan joined Rakon in 2002. In his role as the Managing Director of Europe, he is responsible for all aspects of Rakon's European business units, which generate more than half of Rakon's turnover. Prior to his current role, Sinan was Global Business Development and Applications Director.

Nick Maire

Nick has 15 years of experience within New Zealand founded high-tech, global manufacturing businesses including Navman and Fusion Electronics. Nick was appointed as New Zealand General Manager in 2013 and is responsible for leading the engineering, manufacturing, and supply chain operations along with the development and execution of the New Zealand business's redefined strategic direction.

Andrew McCraith

Andrew joined Rakon in 2010. In his current role as Global Director – Strategic Marketing & Business Development, he is responsible for all aspects of Rakon's global business development and strategic marketing activities. Andrew has spent ten years in the timing industry. Prior to his current role, Andrew was Rakon's Product Manager for the XO and VCXO product lines and previously co-founded Silicon Clocks, a Micro-Electro-Mechanical Systems (MEMS) timing company, acquired by Silicon Labs.

Malcolm Leuchars

Malcolm joined Rakon in 2005. In his role as Global Human Resources Manager (HR), he is responsible for all HR policies and processes. Malcolm has 25 years in HR and prior to joining Rakon has worked in a number of industries and roles including the following: General Manager of HR for Auckland Healthcare, an HR Contractor performing merger and acquisition work and Head of HR for two national retailers.

rakon Global

- Nine manufacturing plants including four joint venture plants and five Rakon research and development centres. Customer support offices are worldwide.

  Locations: China, France, Germany, India, Japan, Korea, New Zealand, Taiwan, United Kingdom and the United States of America.

A Proactive Culture of Innovation and Advancement

"A leader in its field, Rakon has an embedded culture of innovation and advancement – and this is key to our continued success. Adaptability and flexibility are essential to be able to compete with the giants in the industry. As a consequence, the environment within Rakon's global facilities is stimulating and fast paced. Our people are passionate, inspired and engaged through an organisation that supports and develops its team."

Nick Maire
General Manager – New Zealand

"The financial year ending March 2014, saw significant changes in our European business units. There was restructuring of our French operations and the Board's decision to close the Lincoln plant and transfer operations to New Zealand, was also announced. The basis of this extremely hard decision was to eliminate existing duplicate overhead structures and manufacturing capability between the Lincoln and New Zealand operations. Our global restructuring efforts are aiming to make Rakon a more agile and efficient organisation, that is more competitive globally. We are taking all steps necessary to build on our strengths and intensify our efforts on our core businesses."

Sinan Altug
Managing Director – Europe

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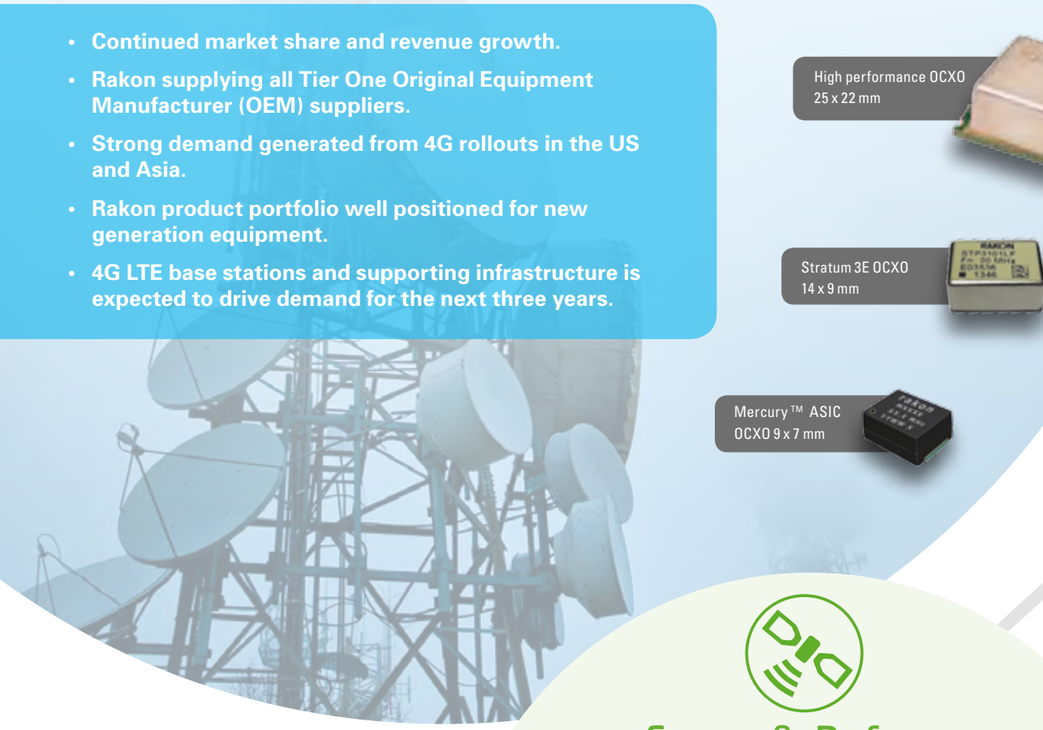
Products and Markets

Telecommunications

The equipment which enables communications networks to operate. Includes base stations, fibre optics, small cells and network timing.

Products: OCXOs, TCXOs, VCXOs, and XOs.

- **Continued market share and revenue growth.**
- **Rakon supplying all Tier One Original Equipment Manufacturer (OEM) suppliers.**
- **Strong demand generated from 4G rollouts in the US and Asia.**
- **Rakon product portfolio well positioned for new generation equipment.**
- **4G LTE base stations and supporting infrastructure is expected to drive demand for the next three years.**



'Best in class' telecommunications OCXO 52 x 42 mm

High performance OCXO 25 x 22 mm

Stratum 3E OCXO 14 x 9 mm

Mercury™ ASIC OCXO 9 x 7 mm

Global Positioning

The global positioning market includes all GNSS equipment and other location and positioning systems. Applications include Personal Navigation Devices (PNDs), high precision GPS (surveying, mining, agriculture), rescue beacons and sport & recreation products.

Products: TCXOs and Crystals.

- **Rakon has a strong reputation in the global positioning market and remains the leading frequency control supplier.**
- **Margins improving as GPS customers focus on more industrial and specialised applications.**

GNSS / GPS TCXO 2.5 x 2.0 mm

GNSS / GPS TCXO 3.2 x 2.5 mm

TCXO 7 x 5 mm

Emergency Beacon TCXO 7 x 5 mm

"The close relationships we have with our strategic accounts and Tier One customers, facilitates our efforts to define the next generation of timing products required. Our products enable our customers' next generation systems. Focusing our resources on these proven opportunities will allow us to accelerate the development and adoption of innovative new products. This is key to expanding and sustaining growth long-term."

Andrew McCraith

Global Director – Strategic Marketing & Business Development

Other

Applications are multiple and include: Wireless control, test and measurement, smart metering and emerging markets.

Products: OCSOs, OCXOs, TCXOs, VCXOs, XOs and Crystals.

Smart Wireless Devices

Products: TCXOs, VCXOs and XOs.

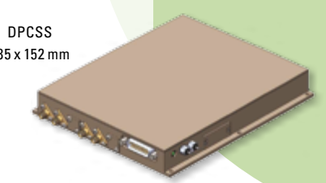
Space & Defence

Products where reliability as well as precision and performance are critical. This market also includes aviation and other high reliability applications.

Products: DPCSSs, OCSOs, OCXOs, TCXOs, VCXOs, XOs and Crystals.

- **A growing number of design wins from new product platforms.**
- **Expanded focus into US, India and Asian markets. Expected to yield revenue growth in 18 to 24 months.**

DPCSS 185 x 152 mm



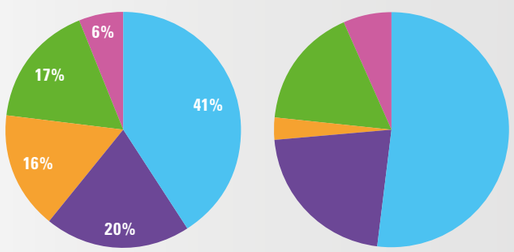
Space Mini OCXO 55 x 50 mm

Ultra Low Noise OCSO 95 x 76 mm

Space XO 23 x 14 mm

REVENUE

- Telecommunications
- Global Positioning
- Smart Wireless Devices
- Space & Defence
- Other



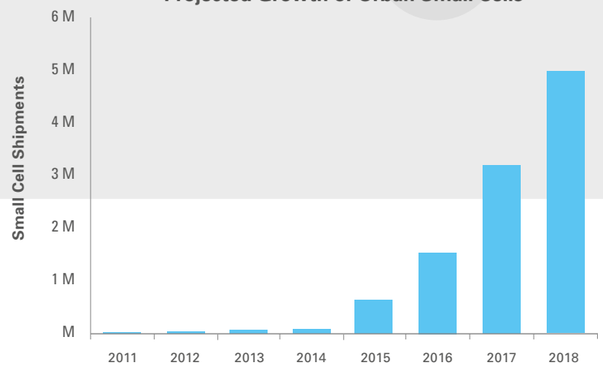
Small Cells

At the end of 2013, market statistics showed the following:

- **7.9 million cumulative small cell shipments (including residential and urban small cells).**
- **At least 60 operators have completed trials and started commercial deployments of small cells.**

Source: The Small Cell Forum.

Projected Growth of Urban Small Cells



Source: The Small Cell Forum.

Interview with Andrew Connell

Business Development Manager

What does the telecommunications market refer to?

The telecommunications market constitutes a very wide range of products. Voice and data can be transmitted over long distances through the use of wired, wireless and optical technologies.

Wired technology uses wires or cables to transmit electrical signals. Copper networks send electrical signals down copper wire, for instance the traditional phone networks and Ethernet cables in your home or office.

Wireless technology uses radio and microwaves to transmit signals. For example small cell base stations transmit voice and data wirelessly.

Fibre optics uses lasers to transmit signals in the form of light down cables made of glass. As the cost decreases and performance improves, the technology will increasingly be deployed to create the high speed networks of the future.

There are various technologies, protocols and standards to enable the products in these networks to communicate with each other, such as the following:

Wired: SONET/SDH, Ethernet, CPRI, PCI-Express, etc.
Wireless: 3G e.g. CDMA, CDMA-2k, W-CDMA; 4G e.g. HSPA+, LTE, LTE-A; WiFi e.g. 802.11 B/G/N/AC; etc.

Rakon is focused on providing extremely accurate reference clocks which are the 'heart beat' required for these technologies to work.

What are small cells and how does this technology differ from WiFi?

Small cells are very small cellular base stations. They fill in coverage gaps – for example in an apartment downtown that has poor coverage. 4G has indoor coverage limitations compared to 3G and therefore small cells will be a necessity for a complete 4G roll-out.

Rakon has been involved with the small cell industry from the beginning. Rakon's proprietary oscillator technology is a key enabler for small cells and because of this, the majority of small cells include a Rakon oscillator.

WiFi is also being used to fill in the coverage gaps but only for data at present. Currently it is not well suited for mobile voice communications because you can't maintain a call when moving between WiFi hotspots and voice quality is more inconsistent than when using 3G/4G technologies. Rakon is working with small cell suppliers who are incorporating the use of a combination of WiFi, 4G LTE and 3G technologies – in order to ensure maximum coverage.

What do you see are the biggest growth opportunities for Rakon?

There are several big oscillator technology shifts required by the telecommunications market, that are currently being designed to support the next generation networks. Rakon is uniquely positioned because of our Business Development (BD) team's close relationships with our customers. The BD team works closely with our customers' advanced engineering teams. Information is relayed back to Rakon's Research and Development teams to create new products integrating technology that has been uniquely designed in-house; this is as opposed to integrating 'off-the-shelf' components from multiple suppliers. Rakon can differentiate itself further in the market by offering superior performance which is cost competitive and tailored specifically for these new opportunities.

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Connectivity Everywhere

Rakon Components in Comet-Chaser

The spacecraft Rosetta, due to reach the comet 67P/Churyumov-Gerasimenko this year, uses several frequency control components from Rakon. The mission is one of the most technologically advanced – to land on a comet moving as fast as 135,000 kilometres per hour.

Rakon crystal oscillators and crystal filters, are used in the CONSERT (COmet Nucleus Sounding Experiment by Radiowave Transmission), which is designed to probe the interior of the comet by using radio waves transmitted through the nucleus between the Philae lander and the Rosetta orbiter.

The Rosetta was launched by the European Space Agency. It was sent into a slumber in June 2011 and exited deep space hibernation in January this year. This 'sleep' was so it could save energy for its long journey to the frozen rock.

In May the first of three big orbital 'pushes' was carried out to get the spacecraft lined up for meeting the comet in August. It is part of a series of burns that will reduce Rosetta's speed with respect to the comet so that it arrives at 67P on 6 August with a relative speed of about 1 metre per second.

It will drop its Philae lander and docks onto the comet's icy surface in November – a move that has never been attempted before. By studying the comet's dust and gas, Rosetta will help scientists learn more about the evolution of the solar system.

"The shift away from the low margin smart wireless market enables Rakon to play to its strengths. Rakon's foundations lie in delivering high performance, technologically advanced products. For example, in the telecommunications sector we are consistently the first to market with cutting edge products incorporating new technology. We keep actively involved with the industry to understand the next generation network standards and their impact on oscillator requirements. With this in-depth understanding we can develop products that meet the performance, size and cost targets by design. Rakon's Mercury and Pluto+ technology for example, is designed into many of the new LTE small cells today."

Mary Carbin
Business Development Manager

The Rosetta orbiter
Image: European Space Agency.

Photo: Indian Space Research Organisation.

The Mars Orbiter Mission (MOM) Spacecraft attached to the PSLV-C25 and ready for heat shield closure.

Centum Rakon Oscillators On Board Spacecraft to Mars

The Mars Orbiter Mission (MOM) spacecraft was launched on board PSLV-C25 on 5 November 2013 by the Indian Space Research Organisation (ISRO). Rakon's Joint Venture (JV) partner Centum Rakon is one of the ISRO's local component suppliers – its oscillators are on board PSLV-C25 as well as the Mars spacecraft.

It is India's first interplanetary mission and if successful, ISRO will become the fourth space agency to reach Mars, after the Soviet space programme, NASA, and European Space Agency. In April, India's Mars Orbiter spacecraft crossed the half-way mark of its journey to the red planet. It is expected to enter orbit around Mars, on 24 September 2014.

The Mars mission aims to explore the planet's surface, look for methane gas and develop technologies that will help in interplanetary travel.

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Glossary

Global Positioning
The global positioning market includes all GNSS equipment and other location and positioning systems. Applications include the following: Personal Navigation Devices (PNDs), high precision GPS (surveying, mining, agriculture), rescue beacons and sport & recreation products.

Small Cells
Small cells are low-powered radio access nodes that have a range of 10 m to 2 km. As an integral part of 4G/LTE networks they are an important element of heterogeneous networks (HetNet) as mobile operators use small cells to extend their wireless service coverage and/or increase network capacity. The term 'small cells' is frequently used by analysts and the industry as an umbrella term to describe the different implementations of femtocells, picocells, metrocells and microcells.

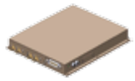
Smart Wireless Devices (SWDs)
Portable devices with added data functionality such as internet access, computing and video capability. Examples include smart phones (such as iPhones, Android phones etc) and tablet PCs (such as iPads).

Space & Defence
In some industries reliability and high precision performance are critical. Rakon's high reliability solutions are found in space, defence, aviation and industrial applications which require the most stringent performance criteria.

Telecommunications
All the electronics infrastructure that connects you to the rest of the world by wired, wireless and optical communications networks.

Crystal Oscillators (XOs)
XOs are quartz crystals combined with basic oscillation circuitry. XOs can offer high frequencies with low performance. They are typically used in telecommunications networks and other broadband applications.

Crystals (Xtals)
At the heart of XOs, VCXOs, TCXOs and OCXOs are quartz crystals (Xtals).



Digital Pulse Compression Sub-Systems (DPCSSs)
DPCSSs are fully programmable and are used to upgrade existing radars and to extend their life. DPCSSs have high speed digital processing capability, enabling remarkable increases in the overall system performance of radars.

High Stability Temperature Compensated Crystal Oscillators
High Stability TCXOs are used in high volume, high performance markets such as mobile phone devices where small oscillator size is important. High Stability TCXOs have a typical performance of 0.5 parts per million (ppm) over wide temperature ranges. They are available in sizes as small as 1.6 x 1.2 mm.

Oven Controlled Crystal Oscillators (OCXOs)
OCXOs are used in applications where precise reference clocks are needed to secure high volume data traffic. Stabilities can be better than 0.1 part per billion (ppb). Used in telecommunications infrastructure and space & defence applications.

Oven Controlled SAW Oscillators (OCSOs)
OCSOs are oven controlled oscillators with embedded Surface Acoustic Wave (SAW) technology. SAW technology enables high frequency fundamental outputs (available from 320 MHz up to 2 GHz). OCSOs also deliver ultra low phase noise performance. They are commonly used in test and measurement equipment, high speed converters, radar systems and other precise communication applications.

Temperature Compensated Crystal Oscillators (TCXOs)
TCXOs are essentially quartz crystals combined with electronic circuitry to make oscillators which remove much of the error in frequency, caused by variations in temperature.

Ultra Stable Temperature Compensated Crystal Oscillators
Many applications demand an even higher level of performance than our high stability TCXOs. Using unique technology, Rakon's Ultra Stable TCXOs can achieve stabilities better than 50 parts per billion (ppb) over temperature. They are used in telecommunications networks and other high precision applications.

Voltage Controlled Crystal Oscillators (VCXOs)
VCXOs are oscillators designed to have their oscillation frequency changed significantly by a controlled voltage. Customers using high performing OCXOs for base stations and telecommunications infrastructure also use many VCXOs at different frequencies as part of their timing network requirements. VCXOs can offer much higher frequencies as well as low noise performance.

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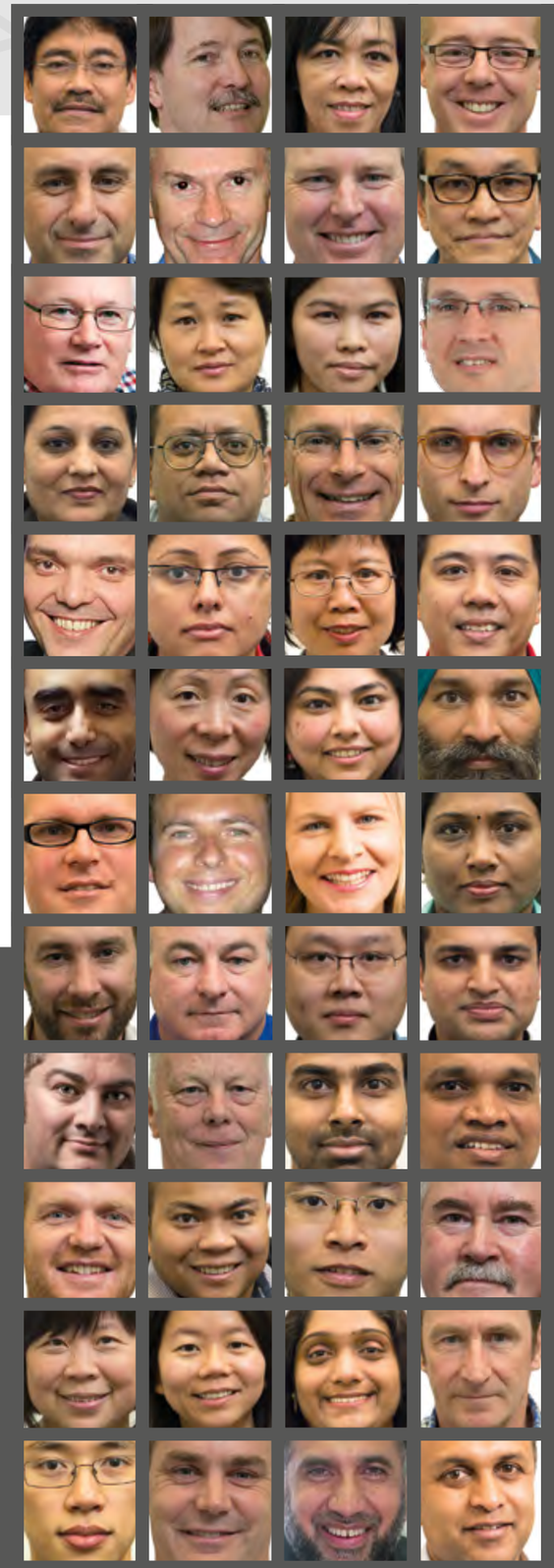
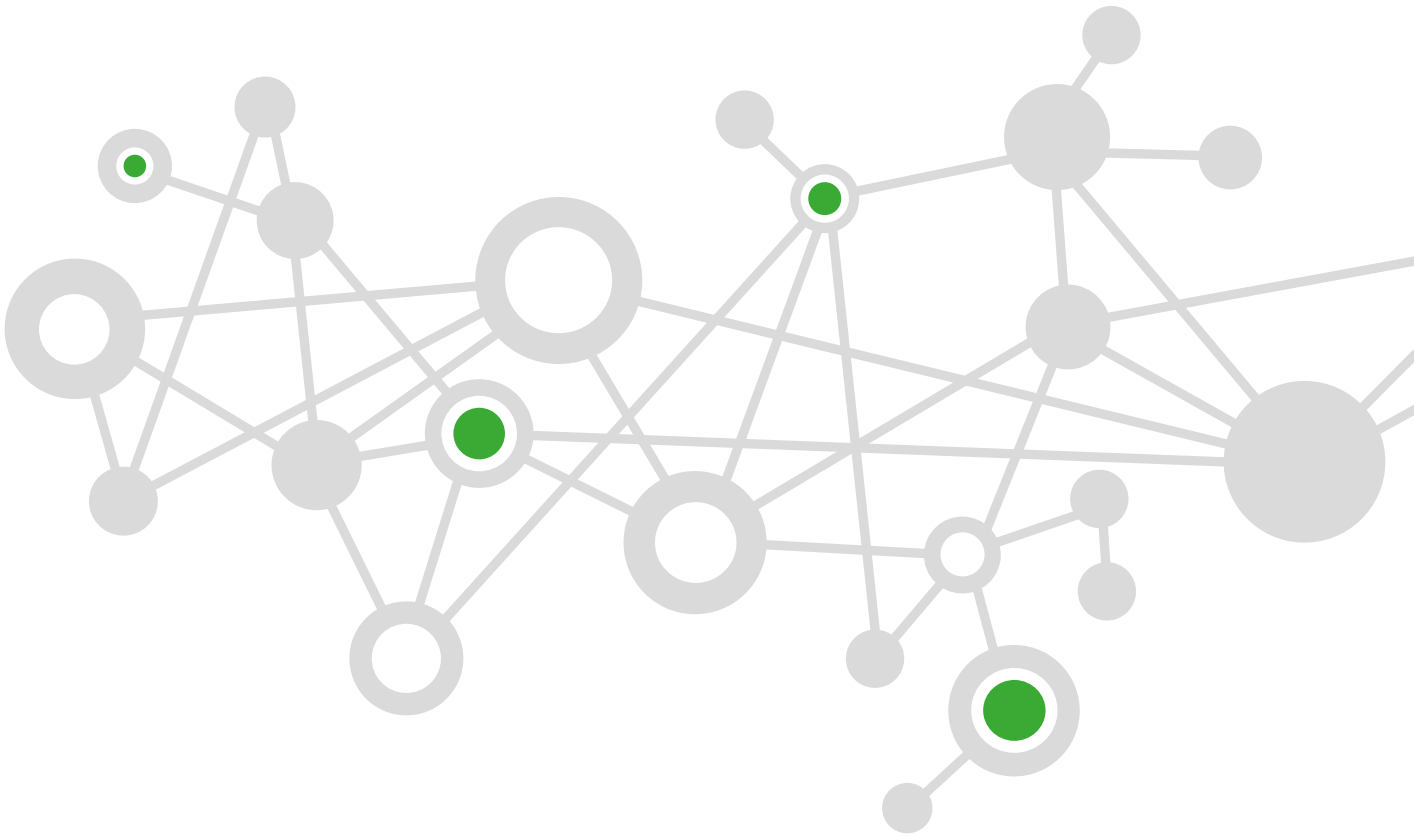
The Many Faces at Rakon

Rakon has a highly skilled team across its global facilities. There are a diverse range of roles within the company including the following: equipment development, product engineering, process engineering, electronics engineering, maintenance engineering, research and development, business development, quality, production planning, purchasing and sourcing, production, continuous improvement, customer services, product management, sales, field application engineering support, marketing, communications, finance, administration, information systems and human resources.





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