Venture IQ

Rijksdienst voor Ondernemend Nederland

Dutch Semiconductor Industry

Value Chain Overview

15 December, 2022

General Conclusions:

Growth in worldwide revenues & employees (FTE): In 2021 the Dutch semiconductor industry grew by around **31.1%** , to **€39.1 bn** in estimated worldwide revenues (sales of semiconductors). In comparison, according to research firm Gartner, global semiconductor revenues grew by **26%** in 2021 to $595 bn (from $450 bn in 2020). In number of FTE's employed worldwide, the Dutch semiconductor industry grew by **10%** (8,451 FTE) in 2021.

Growth in Netherlands-based revenues & employees (FTE): When zooming in on the industry's operations in the Netherlands only: In 2021 the total growth in semiconductor earnings was **28.6%,** estimated to be around **€22.0 bn,** which is slightly lower than the growth in worldwide revenues. This is still significantly more than the overall GDP growth of **5%** of The Netherlands in 2021. Growth of FTE in the Netherlands in the sector was **12.4%** in 2021. Given the faster growth of revenue vis-à-vis FTE, it seems that the productivity of the sector has increased overall.

Segment-specific Conclusions:

- **Semiconductor manufacturing equipment-related value chain segments are dominating in size and growth**: In 2021 the *Equipment*, *Equipment Components* and *Inspection & Metrology* segments drove **90%** of the total NL earnings capacity growth and **89%** of NL FTE growth. Together they grew by **28%** in NL-based revenue and **11%** in NL-based FTE. They showed similar growth figures for their worldwide revenue and FTE.
- The ***Equipment* segment is by far the largest value chain segment** in the Dutch semiconductor ecosystem in terms of earnings capacity and FTE.
- When excluding ASML, the ***Equipment Components*** segment becomes the largest segment in terms of organisations, FTE and earnings capacity.
- The ***Inspection & Metrology* segment grew fastest in number of FTE's** (NL: **+58%,** WW: **+62%** over 2020-2021**).**
- The ***Integrated Device Manufacturing*** segment grew with **32%** in worldwide revenues, mainly due to NXP, comprising 29% of the total sector growth in 2021.
- The ***IC Design* segment grew fastest in NL-based (+59%) and worldwide revenues (+62%),** although business volume is still very small (less than 1% of the total semiconductor sector growth)
- The **Dutch *Integrated Photonics* eco-system has expanded**, in particular in the number of start-ups engaged in Photonic IC applications and in the number of technology and R&D partners. The number of FTE's increased with around 30% for the core segments of the value chain (design, fabrication, packaging and applications). Even though this is still a young segment, a number of companies that have reached the commercial stage are showing strong revenue growth.
- **The "big four", i.e. ASML, NXP, ASM and BESI, are the main drivers behind the growth and size of the Dutch semiconductor industry.**

*The worldwide revenue consists of (1) NL revenue, i.e. from activities in the Netherlands, for all organisations in the dataset and (2) the foreign revenue of Dutch-owned organisations.

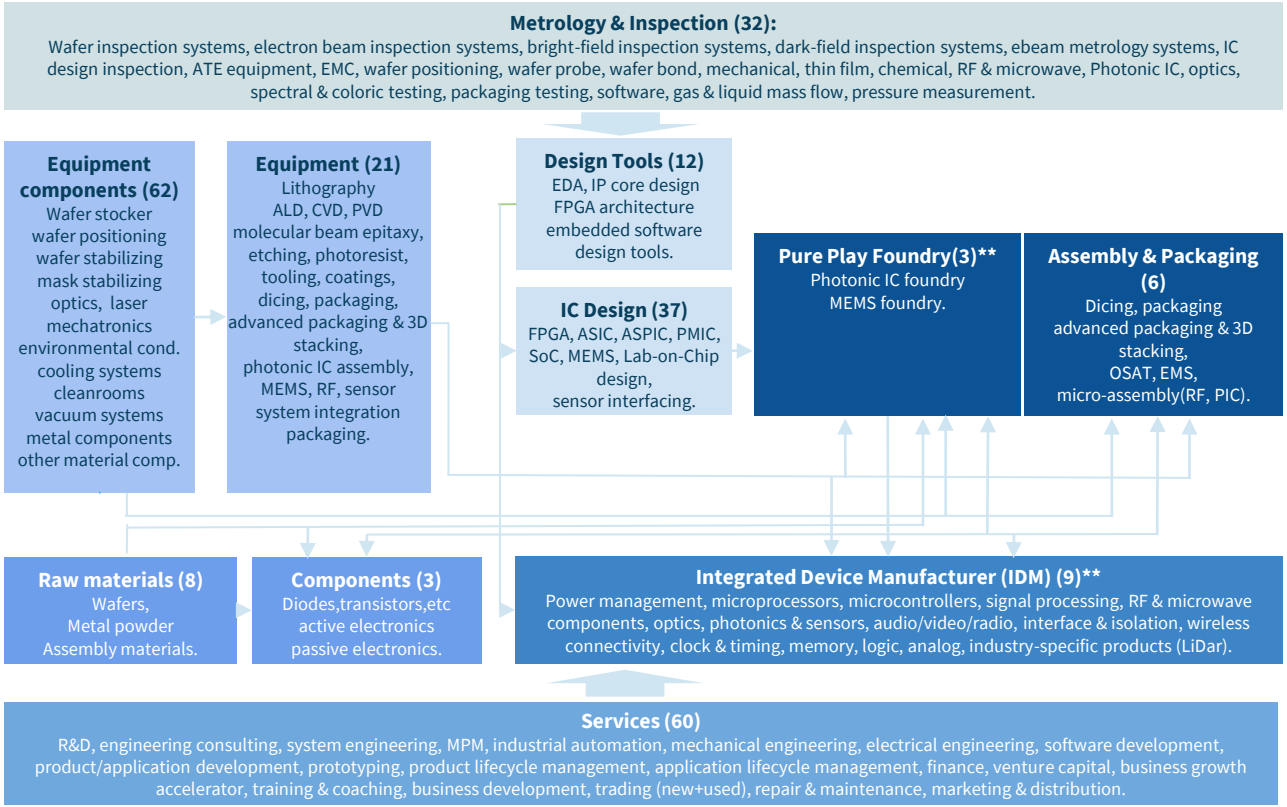
Taxonomy

In order to make the segments of the value chain distinguishable, a taxonomy of value chain segments has been made by RVO and all organisations* are classified in one of these value chain segments. This classification represents the basis of the analysis in this report. In addition, a number of general subclassifications (e.g. ownership) and specific subclassifications per segment have been applied to allow further refinement of the analysis.

Value chain			
Applications	Organisations such as ODMs and System Integrators that make an end product	**IC design**	Design (services) of semiconductors, and/or sale of intellectual property in the field of chip design
Assembly and packaging	Service providers that assemble and package semiconductors	**Integrated device manufacturer**	Company that designs, manufactures, and sells integrated circuit (IC) products.
Components	Active and passive components for the fabrication and assembly of semiconductors (e.g. diodes, etc.)	**Metrology and inspection**	Suppliers of equipment & services for metrology, inspection and testing
Design tools	Chip architecture design software	**Pure play foundry**	Manufacturing of semiconductors with own foundries solely for third parties
Equipment	Semiconductor manufacturing, assembly and packaging machines	**Raw materials**	Materials for semiconductor manufacturing, such as wafers, metal poweder and assembly materials
Equipment components	Components for *equipment* that make, test, package, assemble semiconductors	**Services**	Service providers, including those for R&D, enigeering, finance & development, trading & logistics, etc.

*With the exception of ASML, for which a distinction is made between Equipment and Metrology and Inspection activities.

Dutch semicon value chain: 280 organisations*



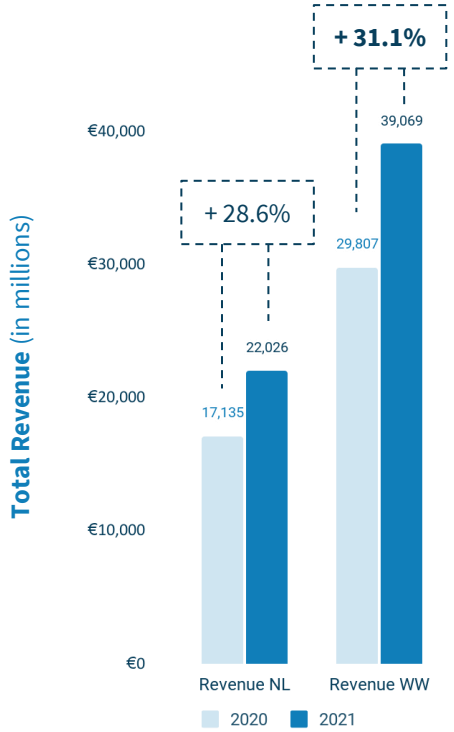
Applications (28)

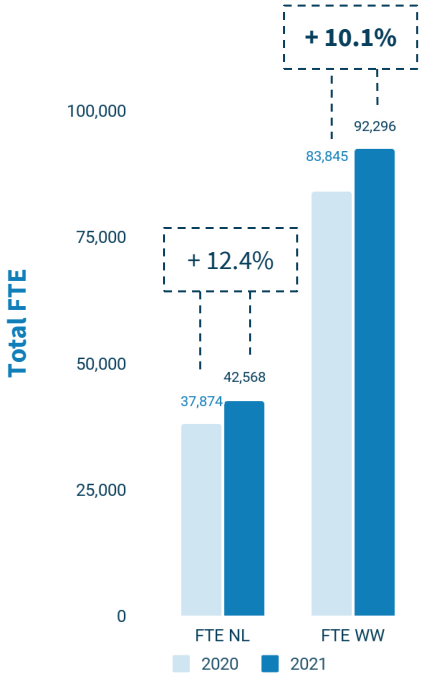
Aerospace & Defense
RFIC, radar, optical sensors, PIC
Satellite Communication
Antenna, amplifiers, phase shifters
Agri-food
RFIC, optical sensors, PIC
AI applications
AIoT IC, neuromorphic AI-IC
Automotive
SoC, MEMS, RFIC, NFC, LiDar, PMIC, optical sensors
(Consumer) Electronics
PIC, RFIC, RFID-IC, LED lighting
Datacom
Optical SoC, PIC, chip cooling
Life Sciences & Health
Measurement device PIC, Lab-on-Chip, optical SoC, photonic biosensor, diagnostics, Smart SFP
Industrial
Testing equipment, calorimetry IC, gas/vacuum sensors, OLED process simulation software
Audio & Video
ASSP, Audio IC, Video DSP systems
Renewable Energy
optical measurement PIC
Telecom/Mobile/5G
RFIC, wireless devices, optical data transmission, Smart SFP))
Photonic devices (PICs)
Security
RFID inlays, biometrics, bank cards
RFID antenna
Science / R&D
Biosensing research instrument
Semiconductor
IC manufacturing equipment
Smart solutions:
Smart card IC/RFIC/SoC, IoT

Source: Netherlands Enterprise Agency (RVO)

*Organisations can be active in more than one segment of the value chain.
** Foreign-owned IDMs and Pure Play Foundries are listed as service providers when they do not conduct full IDM and Foundry activities in NL.

The **earning capacity** and size in terms of **revenue** and **FTE** of the Dutch semiconductor industry* increased by **31.1%** and **10.1%** respectively (2020-2021)



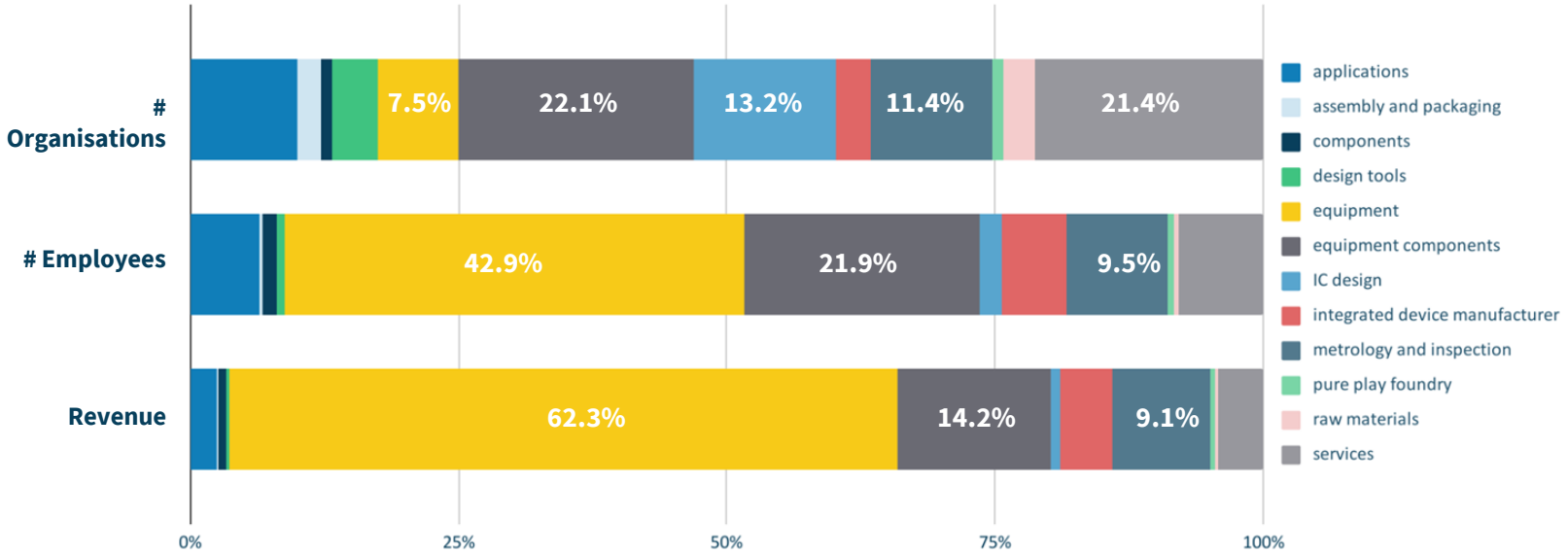


*Both Dutch and foreign owned organisations with significant activity in the Netherlands are included.

Equipment is, mainly due to ASML, the largest value chain segment in number of employees and earning capacity (revenue).

Percentage share per segment of total number of organisations, employees and revenue in the Dutch semiconductor ecosystem*

280organisations** **42,568 NL employees (2021)** **€ 22 billion NL revenue (2021)**



*NL revenue is scaled to Dutch employees. See the Methodology slide for details.
** For ASML a distinction is made between Equipment and Metrology and Inspection activities, therefore the company is considered for both segments.

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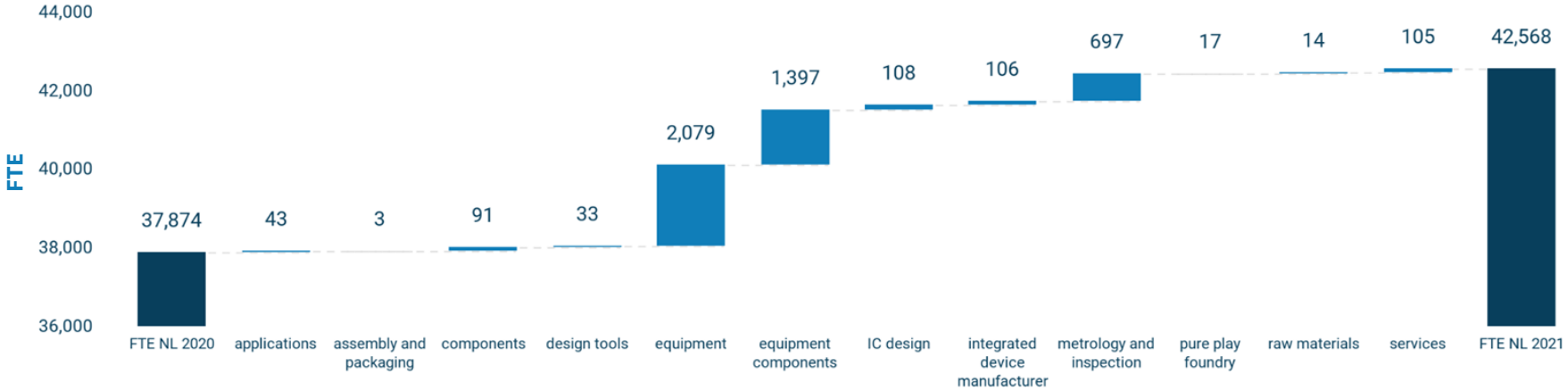
NL-based FTE grew by **12%** (4,694) in 2021

- ***89%*** *of this growth was driven by Equipment (44%), Equipment Components (30%) and Metrology & Inspection (15%)*
- *Fastest growth is in the* ***Metrology & Inspection*** *segment (+21%)*

Change in the total FTE 2020-2021 per segment in the value chain

Netherlands



% change per segment	+2%	+3%	+2%	+12%	+14%	+18%	+14%	+4%	+21%	+7%	+10%	+3%

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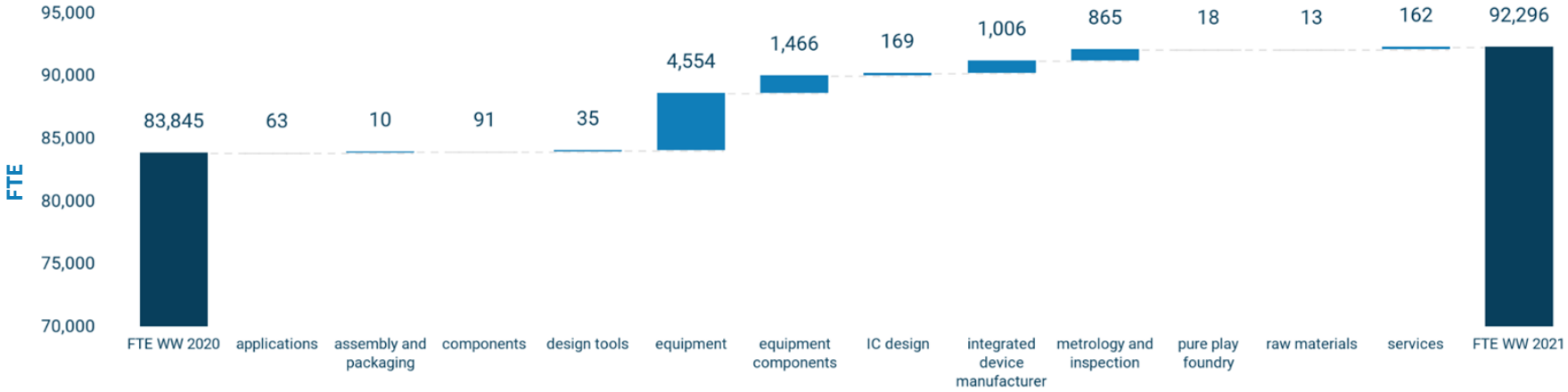
Overall Worldwide FTE grew by **10%** (8,451) in 2021

*- Most of the growth (**81%**) is **equipment-related**: Equipment (54%), Equipment Components (17%) and Metrology & Inspection (10%).*
*- Fastest growth is in the **Metrology & Inspection** segment(+22%)*

Change in the total FTE 2020-2021 per segment in the value chain
Worldwide



% change per segment	+2%	+6%	+20%	+12%	+13%	+16%	+18%	+3%	+22%	+8%	+9%	+4%

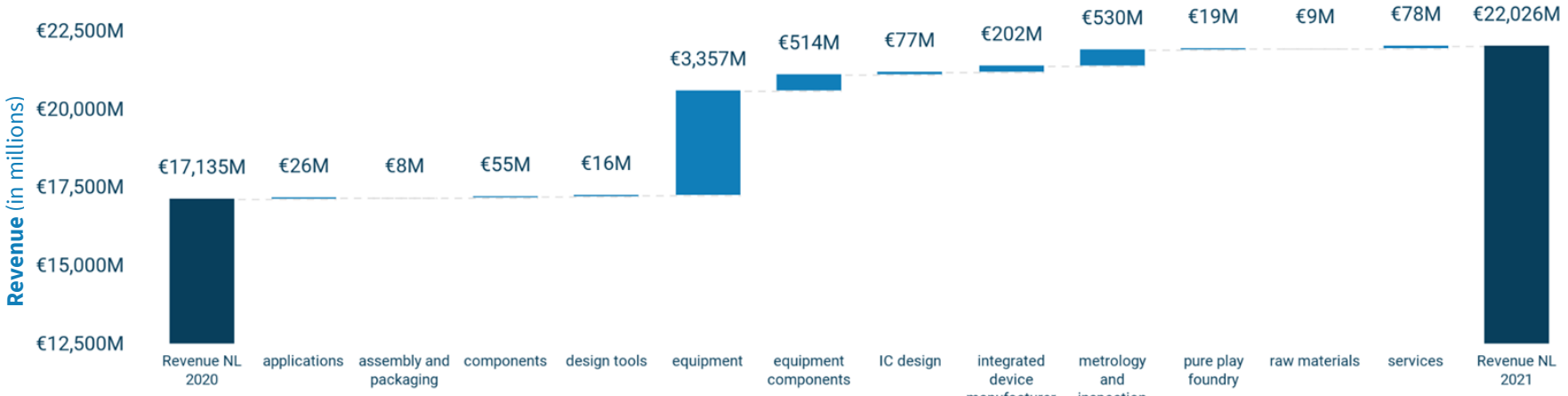
Overall NL-based revenue grew by **29%** (€4,891M) in 2021

*- Most of the growth (**90%**) is **equipment-related**: Equipment (78%), Equipment Components (6%) and Metrology & Inspection (11%).*

*- Fastest growing segment is **IC design** (+58%), although business volume is still small (1% of total industry growth)*

Change in total revenue 2020-2021 per segment in the value chain

Netherlands



% change per segment	+5%	+5%	+52%	+40%	+29%	+20%	+58%	+23%	+36%	+19%	+21%	+9%

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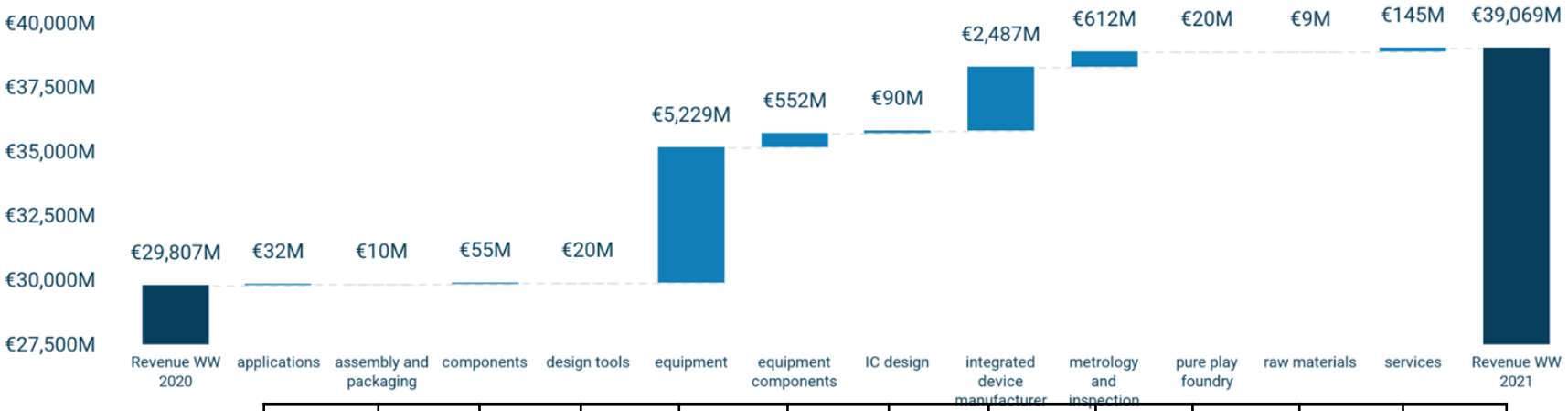
Overall worldwide revenue grew by **31%** (€9,262M) in 2021

- ***2/3*** *of the growth (69%) is* ***equipment-related****: Equipment (56%), Equipment Components (6%) and Metrology & Inspection (7%).*
- *Nearly* ***1/3*** *of the growth (29%) is from* ***integrated device manufacturers***
- *Fastest growing segment is* ***IC design*** *(+63%), although business volume is still small (1% of total industry growth)*

Change in total revenue 2020-2021 per segment in the value chain

Worldwide



% change per segment	+6%	+44%	+52%	+47%	+33%	+19%	+63%	+32%	+38%	+20%	+20%	+14%

The “Big Four” Dutch Semiconductor companies jointly have a worldwide revenue of **€31 billion** in 2021, representing **79% of total WW revenues** by Dutch industry.

ASML

Revenue: € 18,6 bn
Employees: 32,016
Percentage NL FTE: ± 55%
Change in revenue (2020-2021): € 4,6 bn (+33%)

NXP

Revenue: € 9,8 bn
Employees: 30,000
Percentage NL FTE: ± 7%
Change in revenue (2020-2021): € 2,5 bn (+34%)

ASM

Revenue: € 1,7 bn
Employees: 3,312
Percentage NL FTE: ± 5%
Change in revenue (2020-2021): € 405,9 m (+31%)

Besi

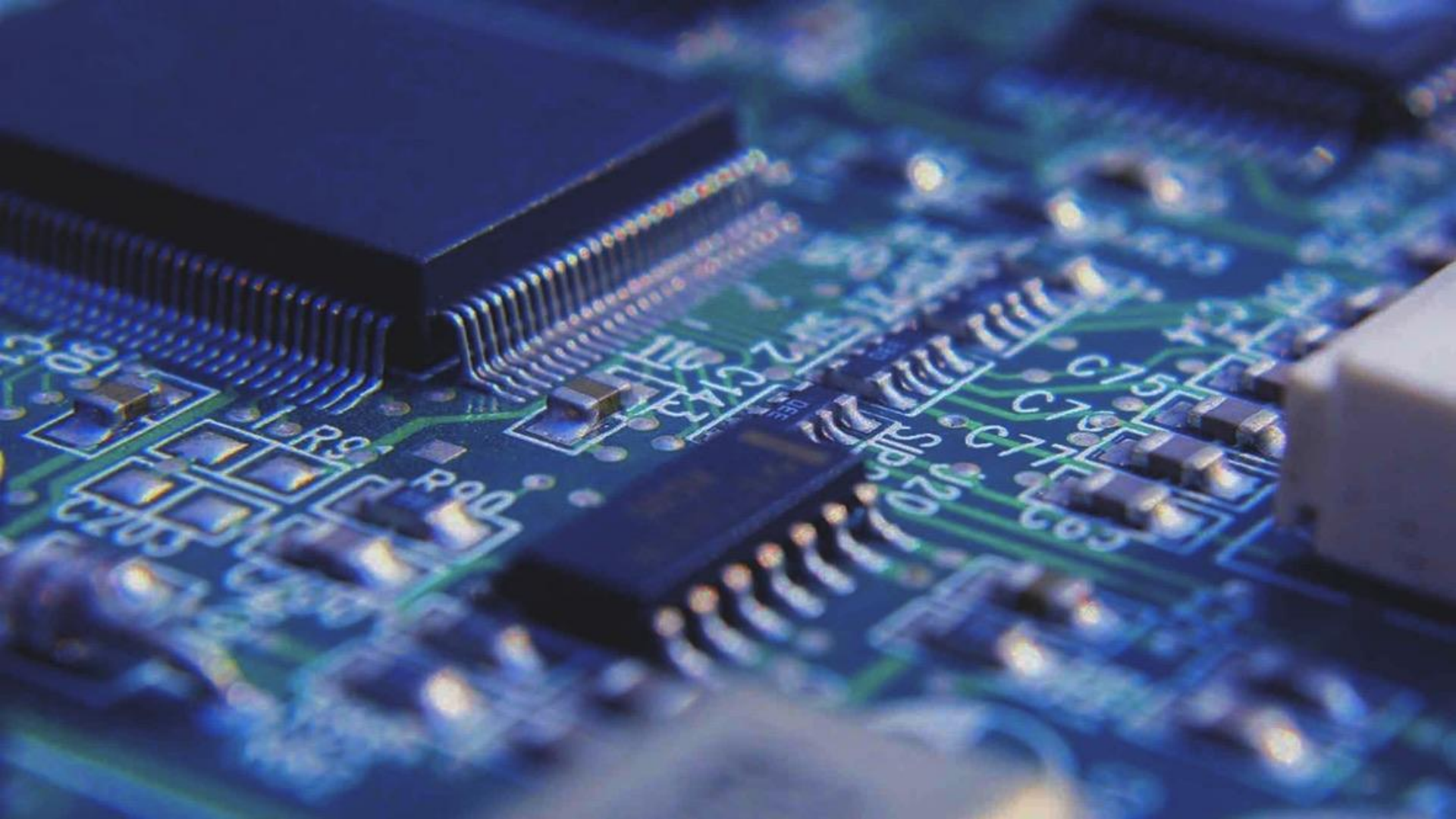
Revenue: € 749,3 m
Employees: 1,645
Percentage NL FTE: ± 9%
Change in revenue (2020-2021): €315,7 m (+73%)

Disclaimer

This Report has been prepared by Venture IQ for the Netherlands Enterprise Agency (RVO or “the Client”) and is intended solely for use by the Client in the context of the scope of this Report.

The content of this Report is based on publicly available information and information provided by third parties and has been analyzed by Venture IQ in the period since the start of the project in mid-October 2022, based on the scope agreed on with the Client. The dataset of assessed companies as well as the applied taxonomy was provided by the Client and amended jointly between the Client and Venture IQ using our best judgment. As a result, organisations may be classified differently than how the Client or other parties would do when applying their own taxonomy.

Since not all data was consistently available across all organisations and sources Venture IQ has agreed a methodology with the Client using estimates and assumptions to be able to provide the required insights and conclusions from the dataset. In particular, Venture IQ has used a combination of Annual Reports, self-reported data, Orbis, Dun & Bradstreet and Zoominfo sources for revenue data. For FTE data Venture IQ has relied on Linkedin and self reported data mainly. The information stated in the Report may not be current because the sources used contain only historical data, the organisations in question have not confirmed the data nor have they reported the data as being incorrect to the sources used, or have misrepresented data. Venture IQ cannot take any responsibility for the accuracy of the data used.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