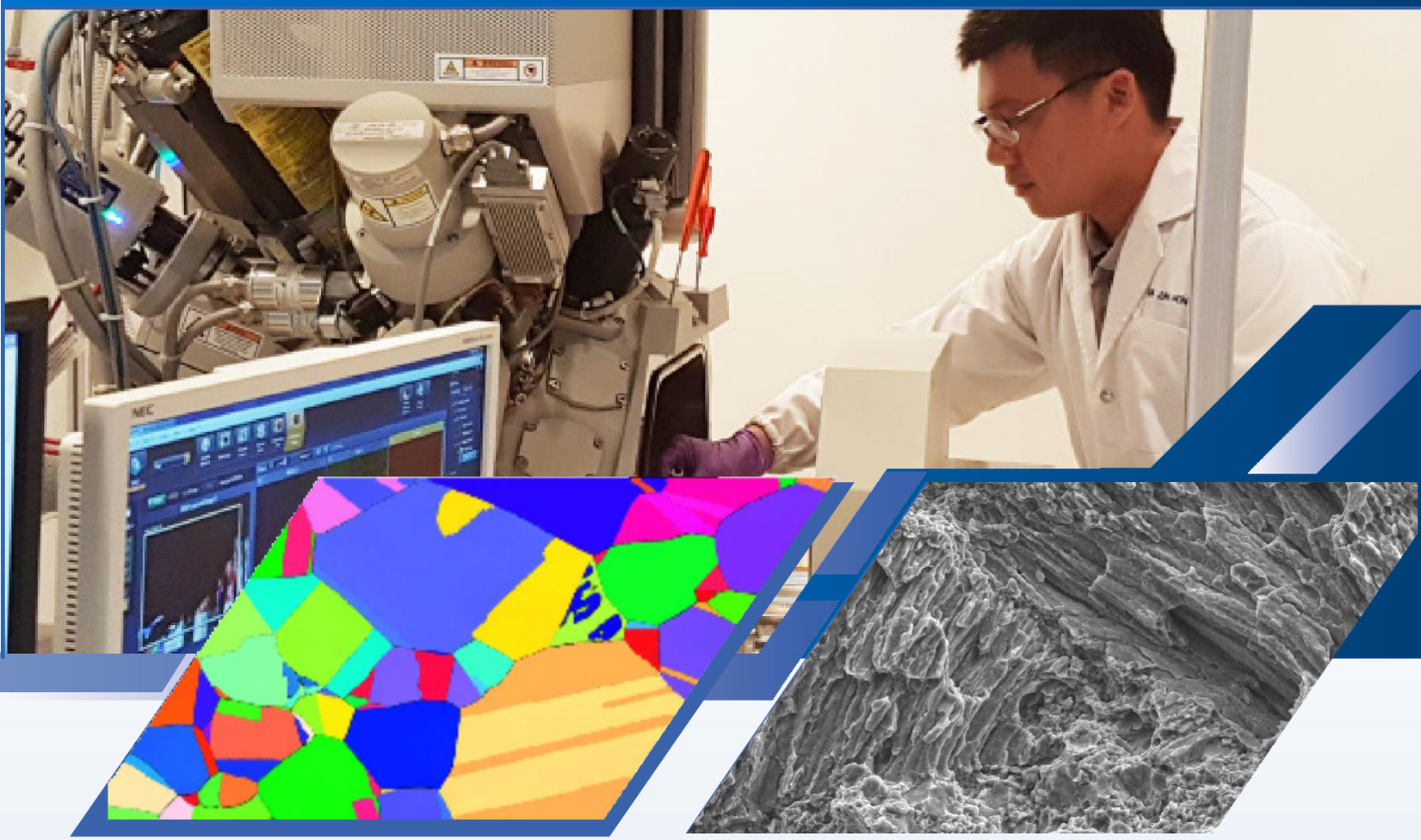

DIAGNOSIS & MEASUREMENT UNIT (DMU)

Singapore Institute of Manufacturing Technology

SIMTech

for Industry

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ABOUT US

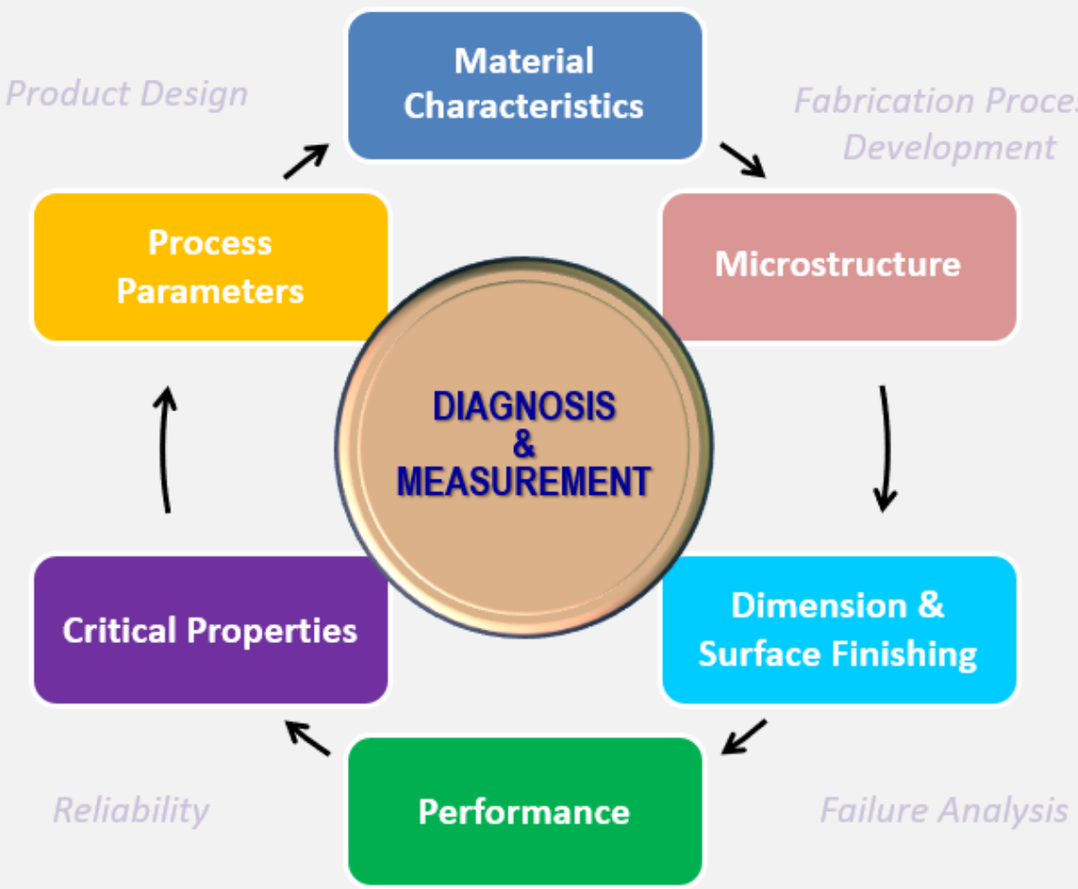
Driven by the rapid development of new materials and advanced manufacturing technologies, quick qualification and quantification are highly sought after to speed up their time to market. With competences in advanced material characterisation and dimensional measurement methodology, DMU readily provides material insights and engineering solutions to the industry.

VISION

To be a diagnostic powerhouse for advanced manufacturing and engineering domain

MISSION

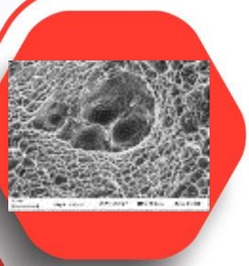
To qualify and quantify new materials and advanced manufacturing process technologies with advanced diagnosis and measurement techniques and methodologies



MATERIAL CHARACTERISATION

The key to improved performances and failures prevention is to understand the intrinsic material properties and its interactions with the environments.

Metallurgical Analysis



- Morphological analysis
- Fractography
- Microstructure analysis

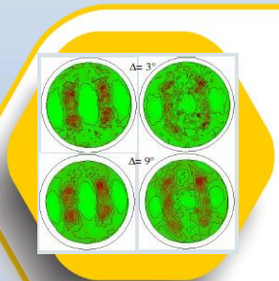
Grain Morphology

Surface Analysis

- Chemical composition and structure
- Surface cleanliness and impurities
- Surface modification & improvement

Surface modification

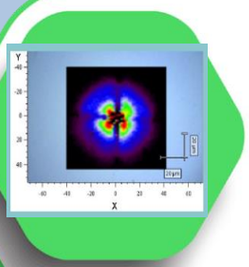
X-ray Crystallography



- Chemical analysis (Phase identification)
- Crystallographic and texture analysis
- Residual stress measurements

Crystallographic Texture Analysis

Spectroscopy Analysis

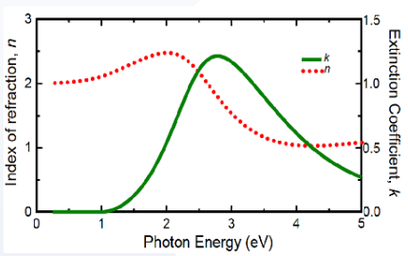


- FTIR analysis for organic and polymeric materials
- Raman analysis of oxidation and contaminations

Stress distribution on Si wafer

With expertise and extensive range of analytical equipment, we aim to support the development of new materials and advanced manufacturing technologies used in different industrial applications.

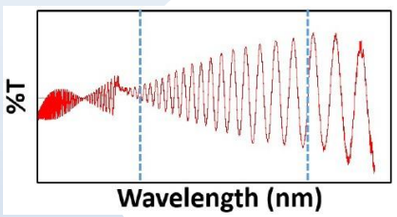
Thin Film Characterisation



Optical Constants

- Elemental composition (surface/depth profiling)
- Micro-mechanical properties extraction
- Film thickness and optical constants (n&k)

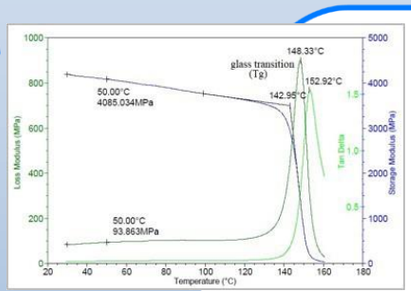
Optical Spectroscopy



Film Thickness Measurement

- Light transmission, reflection, absorbance
- Haze, color, thickness measurement
- Radiance and irradiance measurements
- Optical lens measurement and performance test

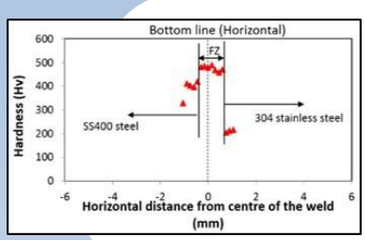
Thermal Analysis



Thermal Stability of Polymer

- Thermal transitions: glass transition, melting and crystallisation
- Thermal expansion, dynamic mechanical analysis
- Thermal stability and decomposition
- Viscosity and rheological properties

Mechanical & Environment Stress Test



Hardness Distribution Of Micro-Joint

- Mechanical strength: tensile, compression, bending
- Hardness: Rockwell, Micro and Nano-hardness
- Temperature humidity test
- Temperature cycle/shock

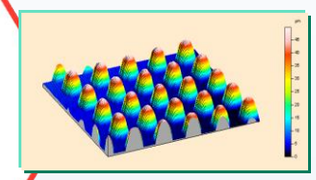
DIMENSIONAL MEASUREMENT

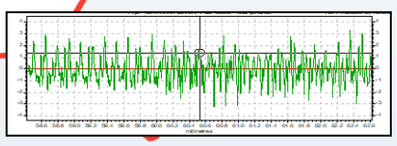
Dimensional metrology laboratory provides a suite of metrology services at world class standards. We support product and process development with a wide range of state-of-the- art equipment.

Surface Finish Measurement

Surface roughness measurement

- Both contact and non-contact methods
- Measurements of surface texture, roughness, waviness, curvature, slope with high resolution
- Line scan and area imaging for 2D and 3D topography measurements

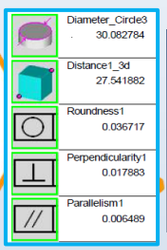




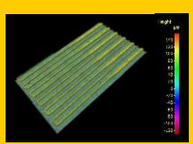
Dimensions & Tolerances Measurements

Contact measurement

- CNC high accuracy and high precision 3D free-form profile measurement
- Measurements of coordinates, dimensions and tolerances of features with regular shape
- Gear and blade measurements



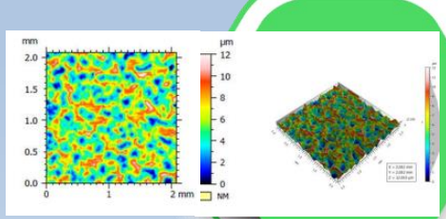
Optical 3D Scanning



3D measurement

- Measure surface topography and roughness of components
- Suitable for smooth, medium rough and rough surfaces
- Applicable for complex and miniaturized geometries

Microscopic Measurement

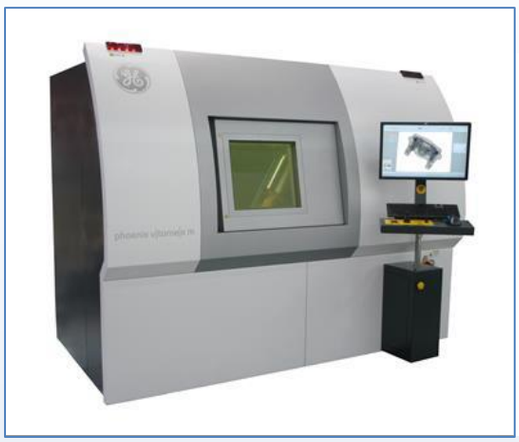


3D topography

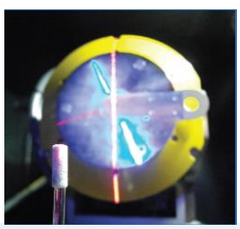
- Roughness analysis and topographical characterization in according ISO 4287 standard.
- 2D (profile) and 3D (area) measurements of tiny features

High Resolution X-ray CT

With expertise and extensive range of analytical equipment, we aim to support the development of new materials and advanced manufacturing technologies used in different industrial applications.

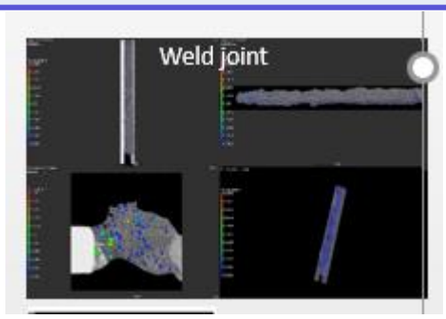


High performance and production-oriented X-ray system with 240kV microfocus and 180 kV nanofocus X-ray sources for outstanding x-ray inspections and computed tomography



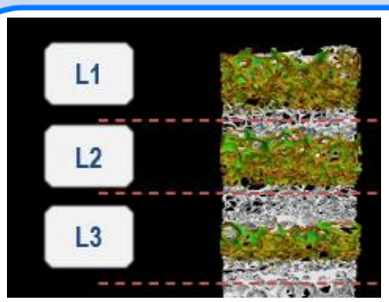
Nanofocus X-ray source

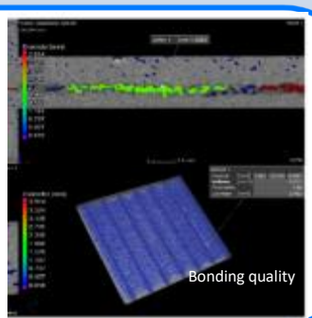
Non-destructive Inspection



Weld joint integration

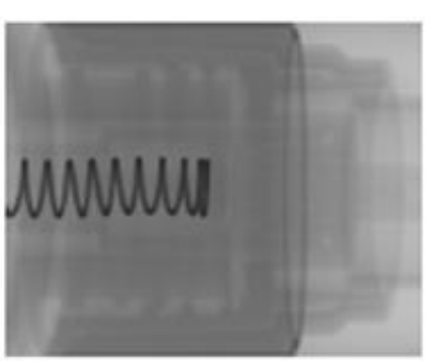
Internal Fine Feature Analysis





Porous/foam features

3D Metrology with High-resolution CT



Internal parts assembly of pump bottle

- To measure complex parts with hidden or difficult accessible surfaces

Lab **EQUIPMENT**

ADVANCED MATERIALS CHARACTERIZATION

FE-SEM
/EDS/WDS

Dual Beam FIB-SEM
/EDS/EBSD

XPS

RELIABILITY & QUALIFICATIONS

FTIR

Raman Microscope

UV-VIS-NIR
Spectrometer

Ellipsometer

Mechanical Tester

DSC TGA TMA DMA

Rheometer

Thermal Analysis

Lab **EQUIPMENT**

X-RAY ANALYSIS & 3D X-RAY CT

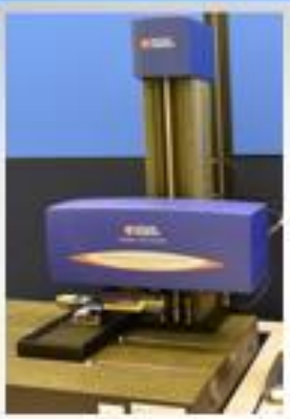
High Resolution X-ray CT

X-ray Diffraction (XRD)

XRF

PRECISION MEASUREMENTS

GOM



Profilometer

InfiniteFocus System

CMM

SPM

Nanoindentation tester

White Light Interferometer

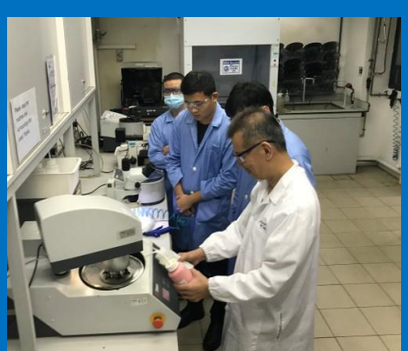
TRAINING & COURSES

Being at the forefront of scientific discovery and technological innovation, we constantly update our training programmes to help our industry partners in keeping abreast with the latest technologies. Our technical training ranges from short courses, workshops and seminars to corporate classes and WSQ graduate diploma modules in collaboration with the SkillsFuture Singapore (SSG) and Workforce Singapore (WSG).

WSQ TRAINING MODULES

Materials Characterisation for Manufacturing Industry

Material characterisation and analysis can yield higher product quality and productivity by identifying latent defects early. This course provides the necessary core knowledge and skillset to effectively apply advanced analytical tools and techniques in material characterisations and testing for materials/process optimisation, failure analysis, and production quality control. The main topics to be covered include:



- Metallography & Failure Analysis
- Plastic and Composite Materials Characterisation
- Thin Film Coating Characterisation

Course Details: Materials Characterization

Course Leader: XIE Hong

DIMENSIONAL MEASUREMENTS AND METROLOGY

This module aims to introduce the fundamental concept, theoretical and practical knowledge of precision dimensional measurement technology and nanoscale measurement technology for applications in the precision engineering industry, and as well as other related industrial sectors. Specifically, this course covers:

- Fundamentals of measurement errors, error analysis and uncertainty, geometric dimensioning & tolerancing (GD&T) for measurement purposes:
- Precision measurement systems for dimensional measurements
- Surface roughness measurements
- Focus variation optical microscope), precision machine tool calibration
- Advanced nanoscale dimensional measurements.

Course Details: Dimensional Measurements and Metrology

Course Leader: LIU Yuchan

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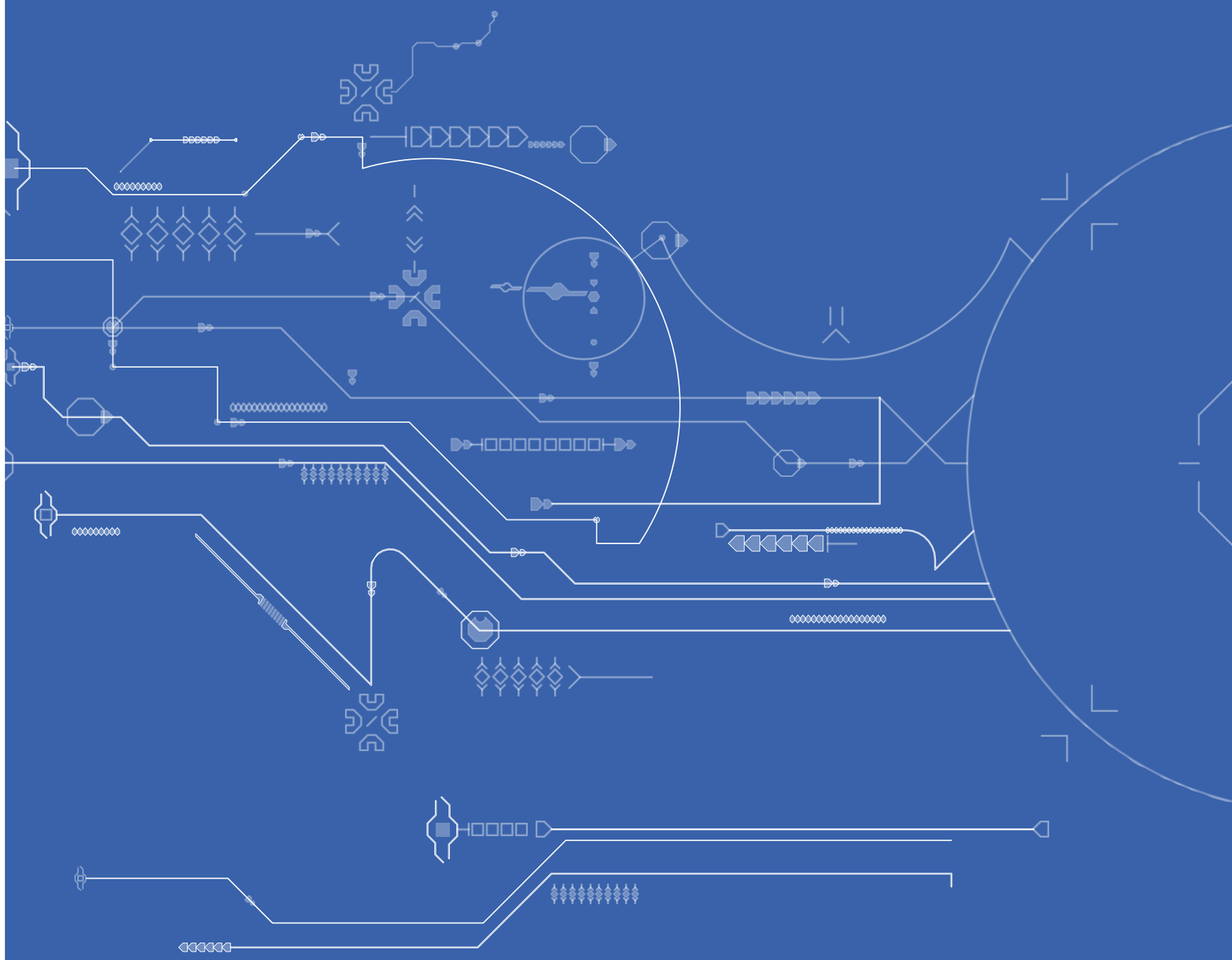

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