Fig. 7.1: Simulation of cell colony

Multiplication period and number, Coordination number

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Fig. 7.2: Types of artificial heart

(a) Piston-bellows type

(b) Centrifugal type

(c) Screw type
Fig. 7.3: Third angle projection method
Fig. 7.4: Drawing

- **Outline**
- **Symmetry line**
- **Finishing**
- **Dimension line**
- **Diameter**

- φ20
- φ10-0.1

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Fig. 7.5: Measurement of roughness
Fig. 7.6: Arithmetic average roughness: $Ra$

\[ R_a = \frac{1}{l} \int_{0}^{l} |y(x)| \, dx \]  
\hspace{1cm} (7.1)
Fig. 7.7: Maximum height: $R_y$
Fig. 7.8: 10-point average roughness: $R_z$

$$R_z = \frac{1}{5} \left( |y_1 + y_2 + y_3 + y_4 + y_5| + |y_6 + y_7 + y_8 + y_9 + y_{10}| \right)$$  \hspace{1cm} (7.2)
Fig. 7.9: Cell culture with electric stimulation

Electrode 10 mm
Fig. 7.10: Saw-tooth

Rotating

Reciprocating

Surface
Fig. 7.11: Cutting

- Cutting face
- Blade
  - (Lubricant)
- Chip
- Finishing surface
- Flank

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Fig. 7.12: Synthetic polymer in organ

Material → Monomer → Physiological fluid → Organ
Fig. 7.13: Photolithography

Development

Coating

Drawing

Etching

Finishing

Mold release agent

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Fig. 7.14: Micro channel

50 μm

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Fig. 7.15: Connector

Screw

Finished surface