Lecture #33

ERDM

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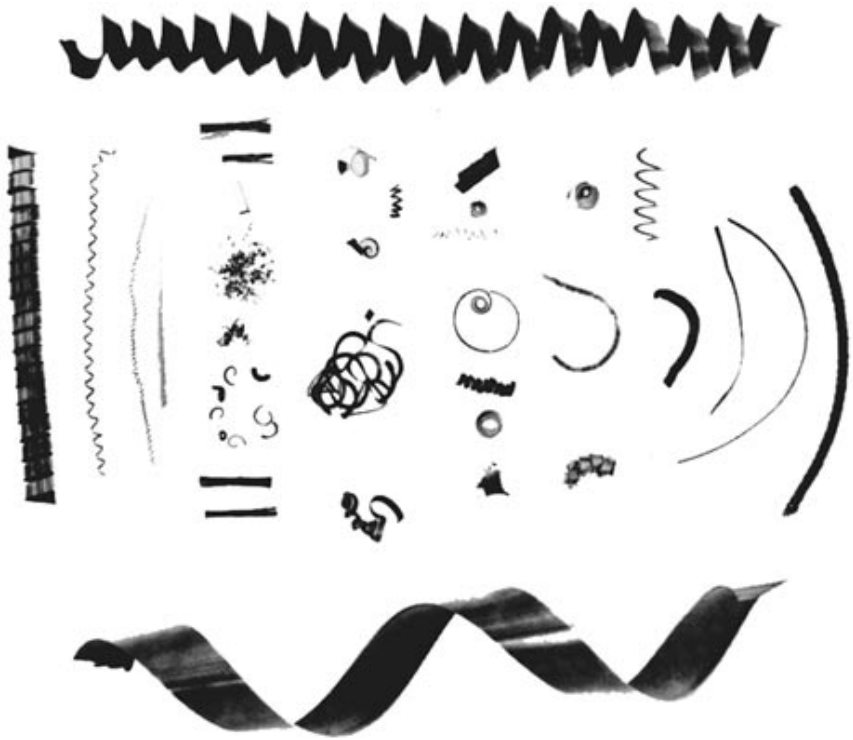
What About the Chips

- **A paradox.... We didn't want them, but we deliberately performed an operation to create them!!**



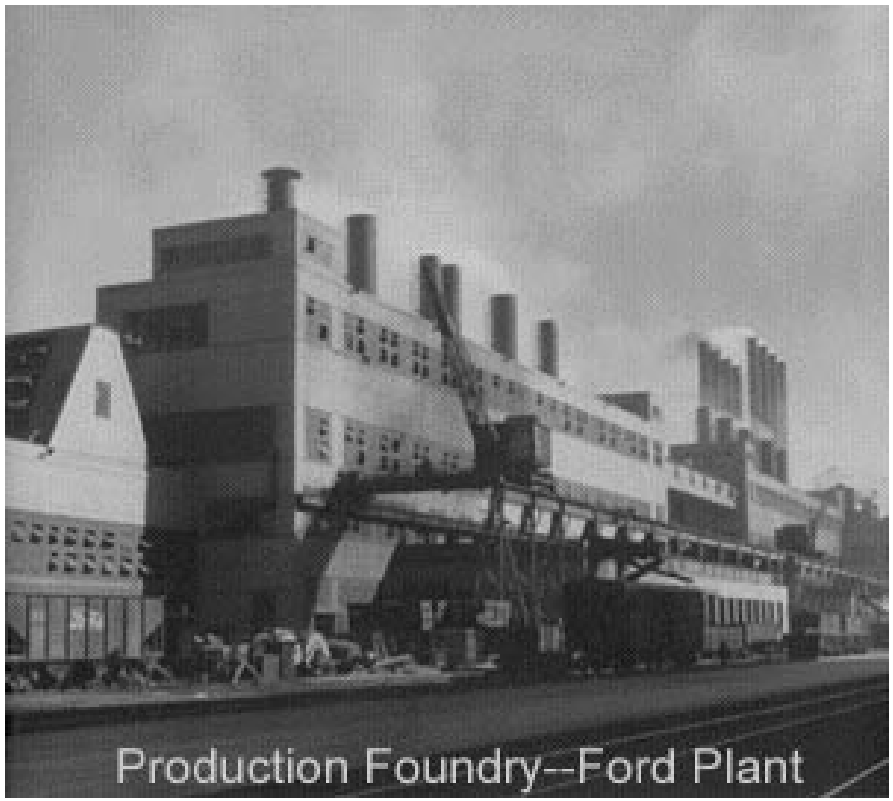
Source: MIT

What chip shapes are easiest to handle in an automated system?

Chip Handling

www.jorgensenconveyors.com

http://www.people.virginia.edu/~mwk2c/sheeler/sh1927.html
Michael Kidd



More on Chips

- **What makes free machining steel, free machining?**
- **Chips contaminated with fluid**
- **Chips of different types mixed together**
- **AAP St. Marys Ohio: Aluminum wheel machining**
- **A typical wheel at the plant loses up to 40% of its weight in the machining process**
- **Waste chips: around one million pounds of aluminum per month -- 6,000 tons per year**

St. Mary's Chips

- **Previously, contaminated chips transported by truck from the plant to a third-party recycling center. Chips cleaned, re-melted, and reformed into aluminum ingots. Ingots transported back to plant, melted again, and poured into molds.**
- **Chip reclamation process moved in-house. Eliminate transport and re-melt**
- **New approach reduces the energy consumption by 15.6 billion BTUs. Aluminum waste has been reduced from 8% to 1.5%**
- **Cost savings of $1.60 per wheel (100k wheels/month): $1.9 million per year. 18 months payback.**

Characteristics with Environmental Concerns

- ~~Chips~~
- Cutting fluids
- ~~Worn tooling~~
- ~~Scrap parts~~
- ~~Energy~~

Need mechanistic models - predict these characteristics