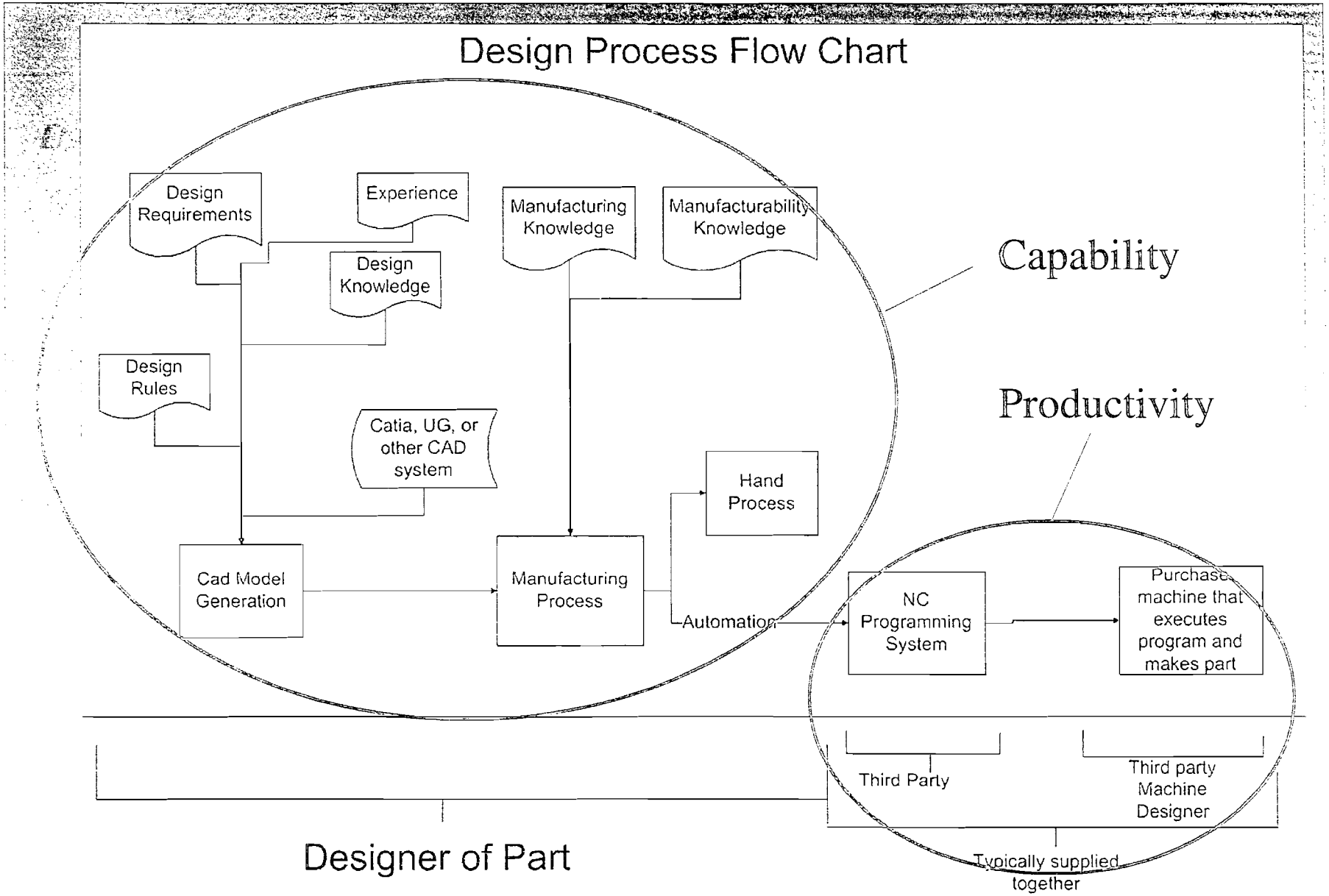
To clarify the machinery in question: 1B001.a,b,c,g and 1B101.a,b

Fiber Placement, Tow Placement, and Filament Winding Machines provide manufacturing <u>productivity</u> gains <u>not</u> capability gains.

Design Process Flow Chart



Electroimpact

Input for Federal Register
Request for industry input

Notice of Inquiry – CCL

15 CFR Part 774

Docket No. 101112562-0577-01

Electroimpact Contact:

Charles Auclair

Global Quality and Export Compliance

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charliea@electroimpact.com

Electroimpact

What industry Calls It

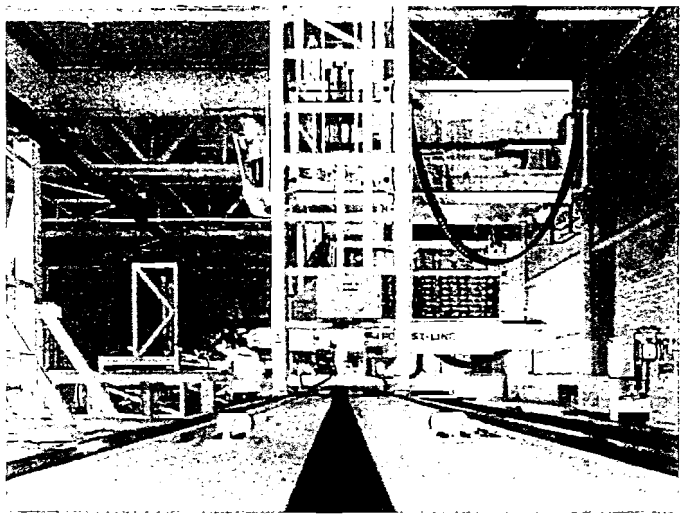
- "Tape Laying Machines" lay wide material by adhesion and usually with complex end cuts
- "Fiber Placement machines" lay "slit-tape tow" by adhesion with square end cuts
- The term "Tow Placement machine" is rarely used, but is synonymous with "Fiber placement machine".
- "Filament winding" is used to describe machines and processes that rely primarily on tension and rotation.

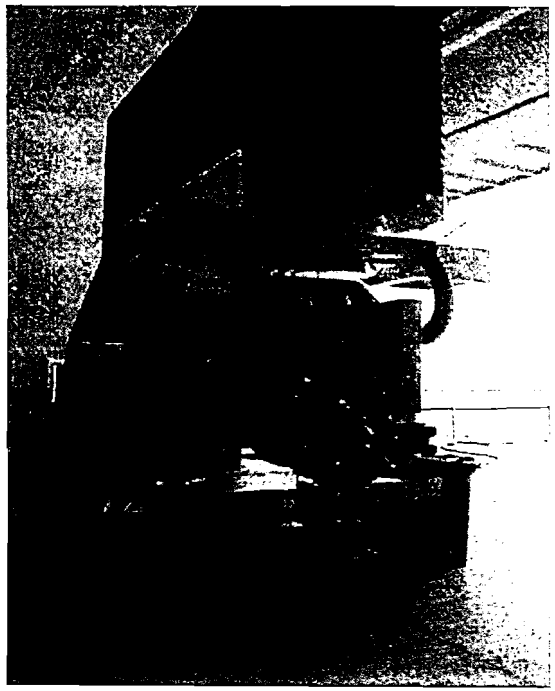
Tape Laying and Fiber/Tow Placement

Our recommendation

1B001b. – available from allied and non-allied nations including: USA, Spain, France, Germany, Macedonia

Move to 2B991



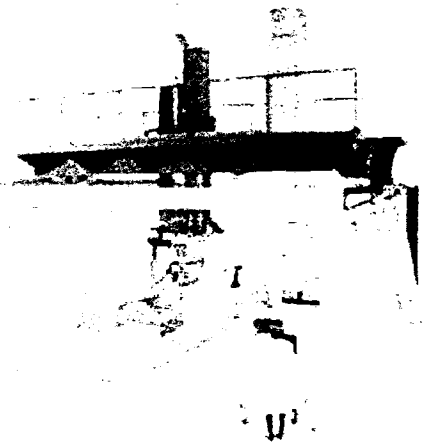


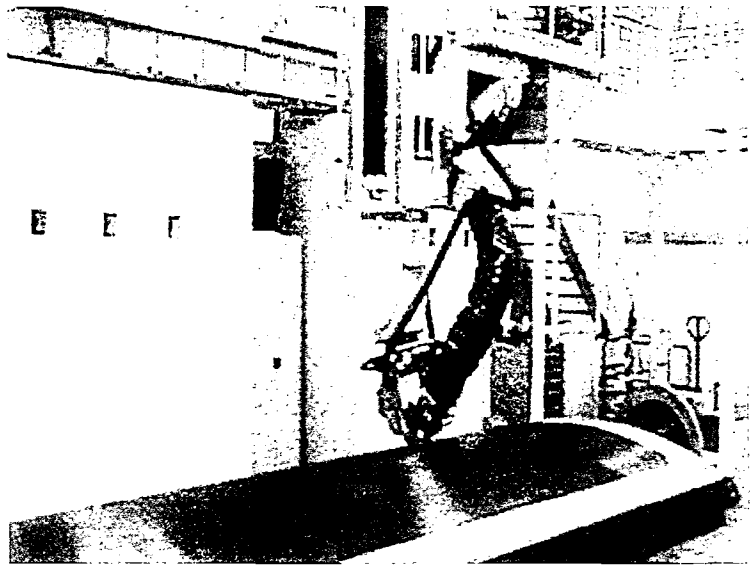
Electroimpact

Our recommendation

1B001g. – available from allied and non-allied nations including: USA, Spain, France, Germany, Macedonia

Move to 2B991

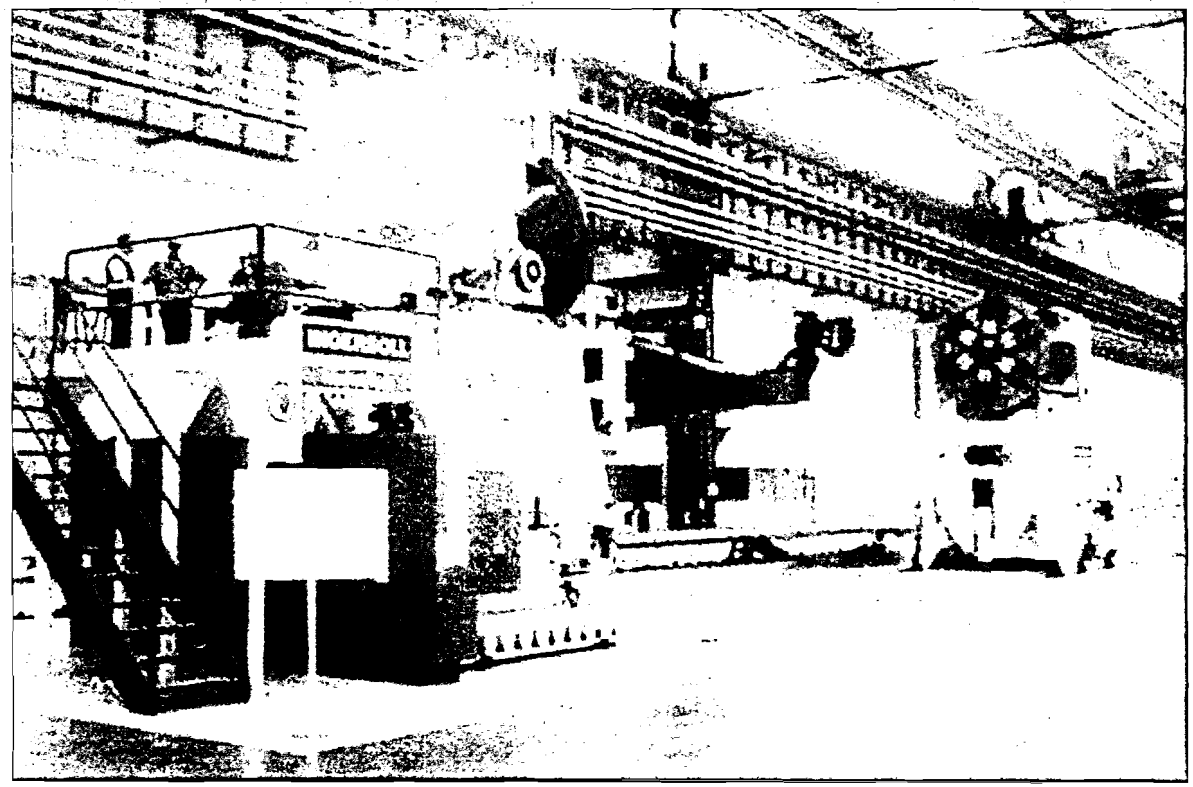




Modern Lay down Equipment

Ingersoll Machine (USA/Italian Ownership)

- Slit Tape tow only

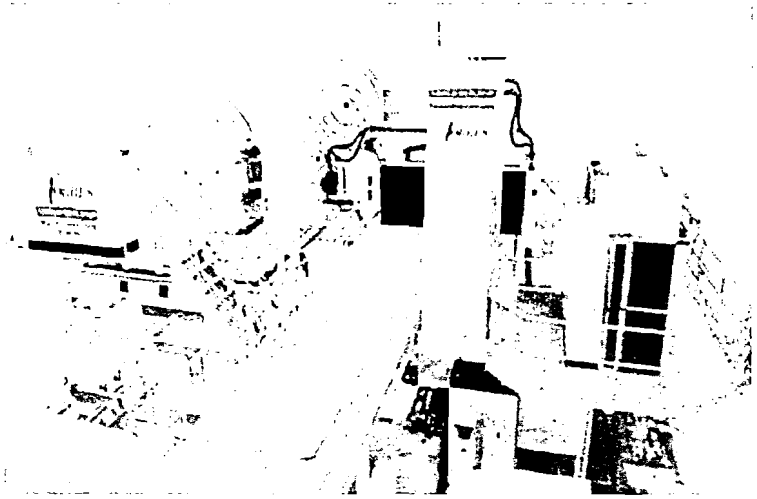


Presumed to be at Alenia in Grotaglia, Italy for 787 Production

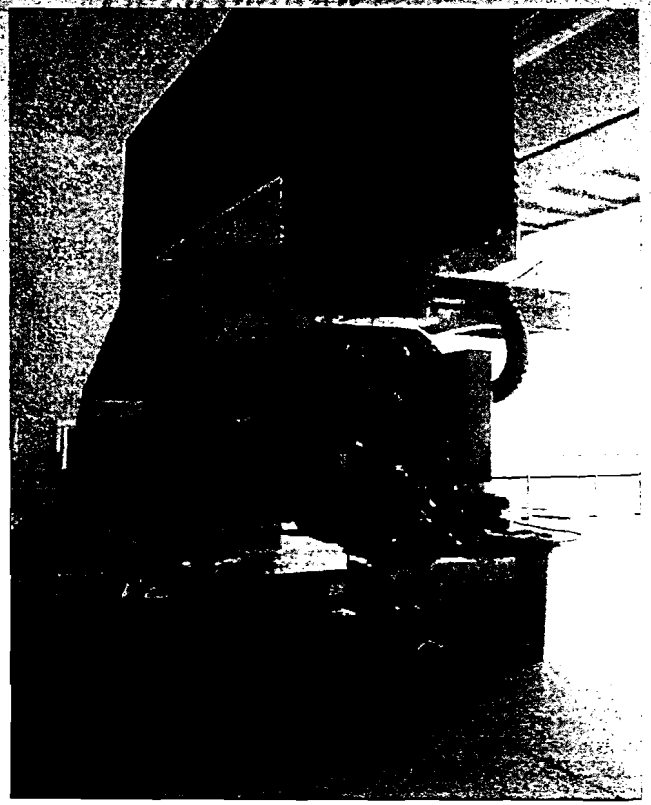
Modern Lay down Equipment

MTorres (Spain)

- **Significant Wide Tape installed Base**
- **Newer entrant into Slit Tape Tow Placement**



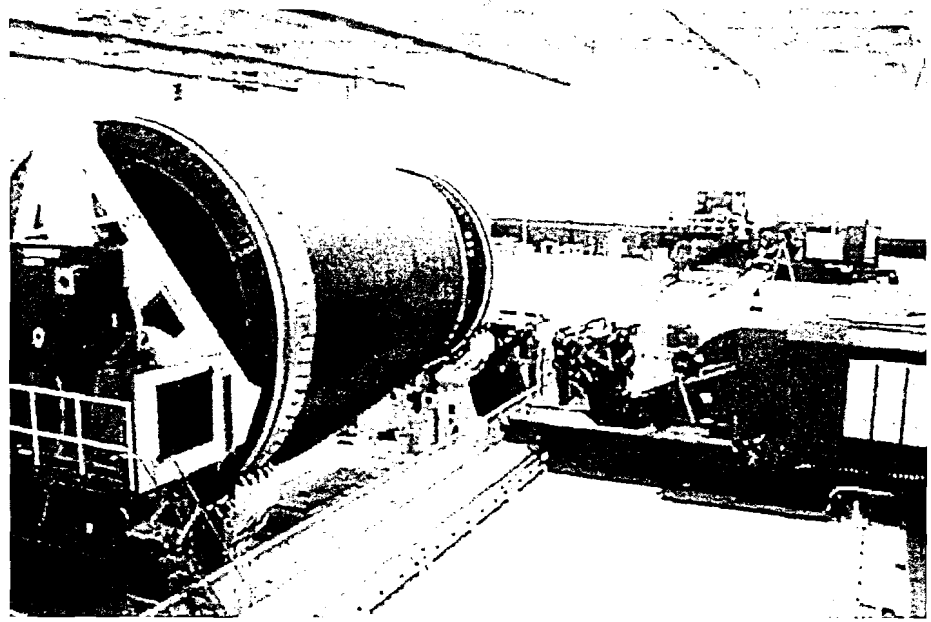
MTorres Tow Placement sold to Chengdu, China
(stock picture)



MTorres Tape Layer installed in Harbin, China
(actual machine in Harbin)

Modern Lay down Equipment

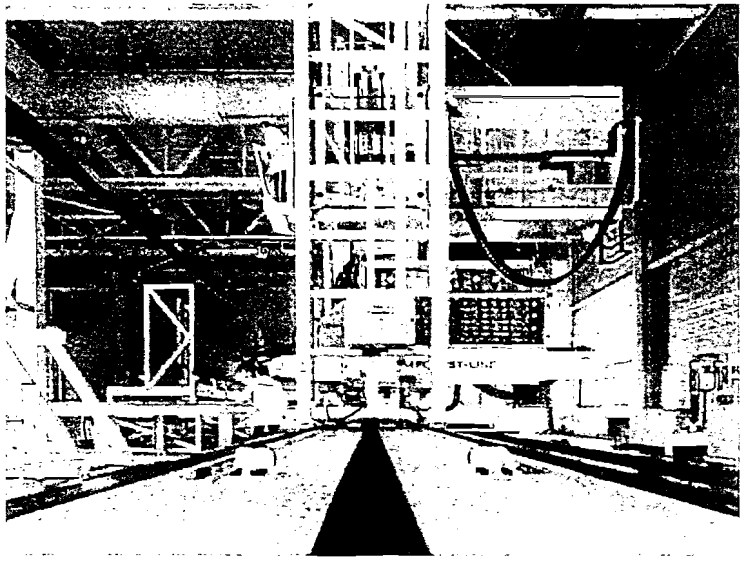
- MAG/Cincinnati (USA) has largest installed base, primarily Slit Tape Tow machines

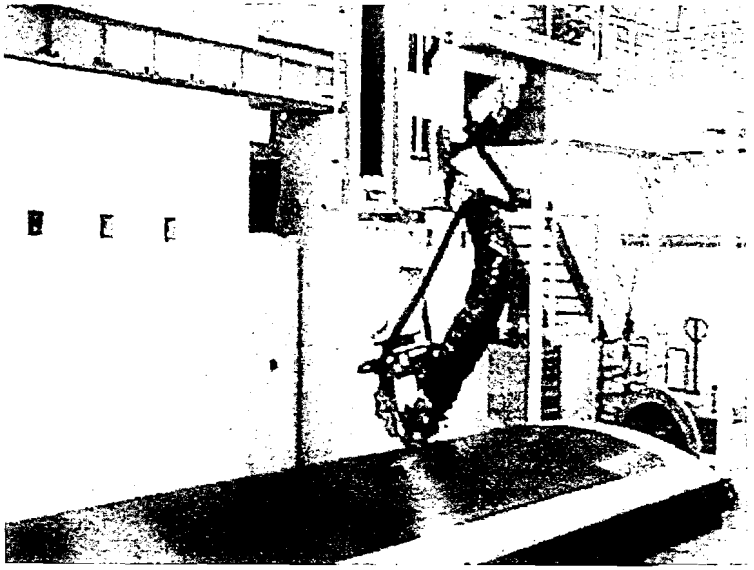


Presumed machine installed in Nagoya for 787 production

Modern Lay down Equipment

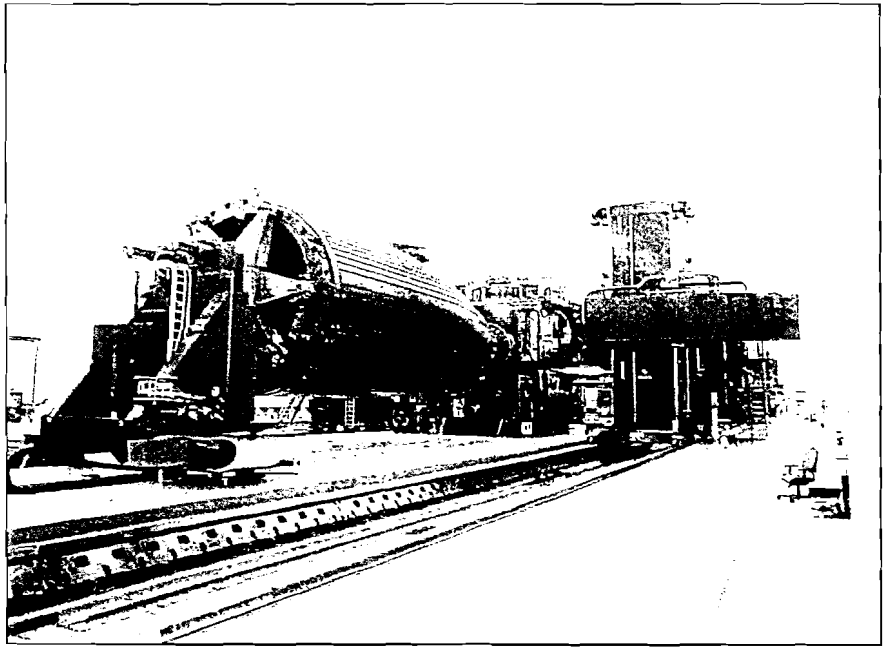
- Forrest Line' (France)
  - Wide Tape machines for 787 wings and some others
  - Limited Slit Tape Tow market – Airbus R&D machines in France (shown)





Modern Lay down Equipment

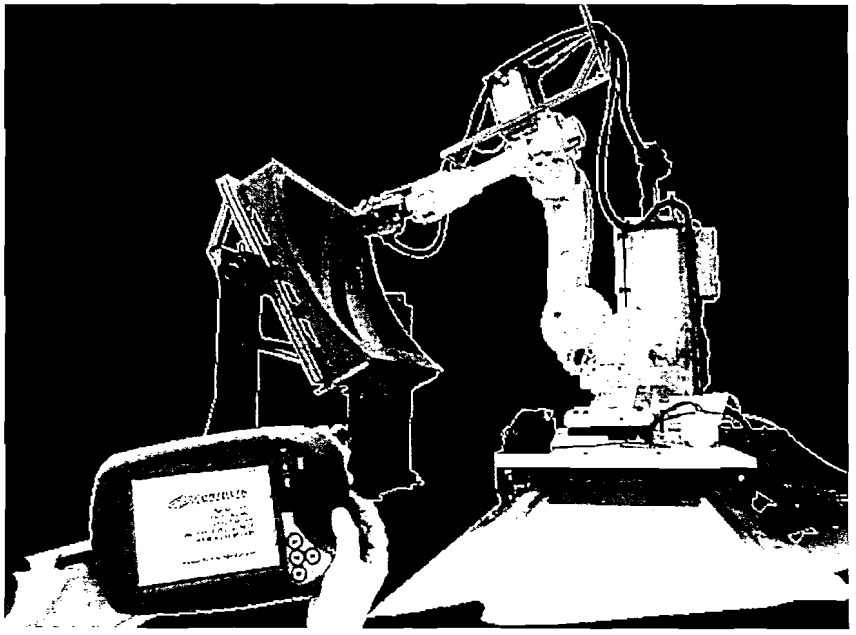
- Electroimpact (USA)
  - New entrant in to Slit Tape Tow Machine market only.
  - 787 Fuselage and A350 Fuselage in production – both US sites



Modern Lay down Equipment

Coriolis (France) with robotic AFP

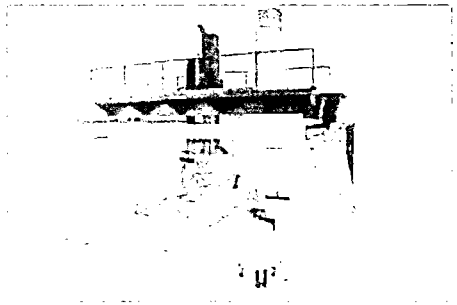
- Robotic Tow Placement



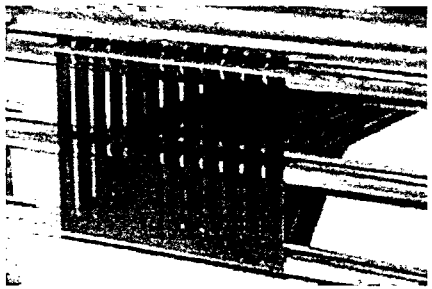
Electroimpact

Modern Lay down Equipment

Mikrosam
(Macedonia)

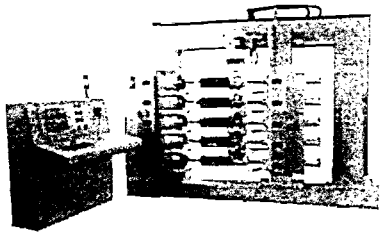


Mikrosam – Tow Placement



Machinery designed for producing pre-impregnating fibers with hot-melt resin in the following forms:
- Unidirectional prepreg (UD)
- Roving prepreg
- Fabric prepreg

using standard types of reinforcement material (carbon, glass and aramid).

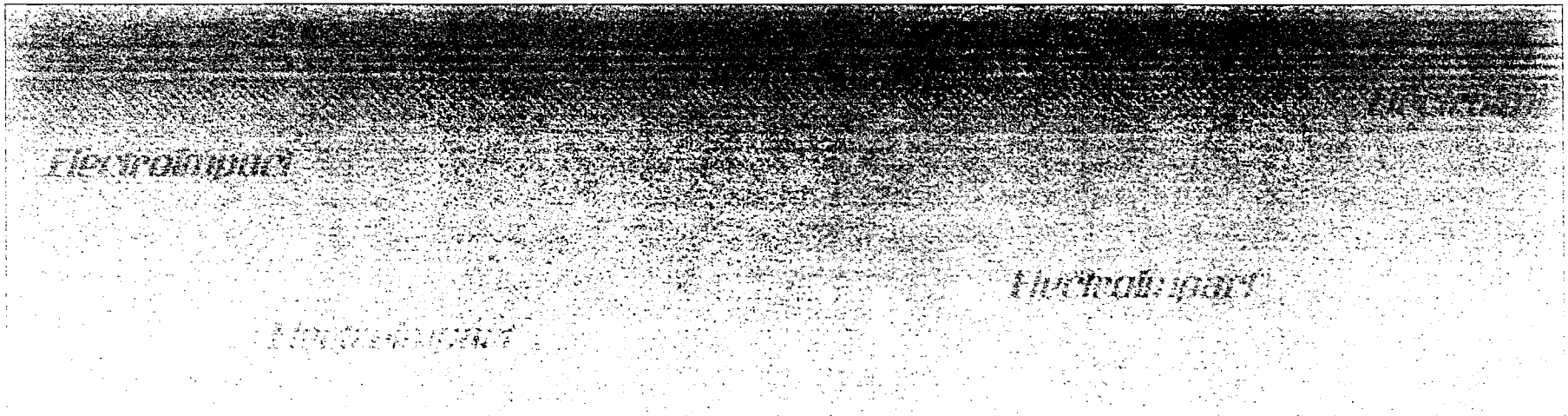


Mikrosam – Filament winding

Modern Lay down Equipment

Other Companies

- Automated Dynamics (USA) smaller specialized machines, all types
- Accudyne (USA) specialized smaller machines, all types.
- Brotje (Germany)
- Zoltek & Entec (USA)
- Lund Engineering (USA)

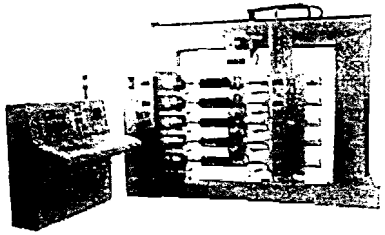


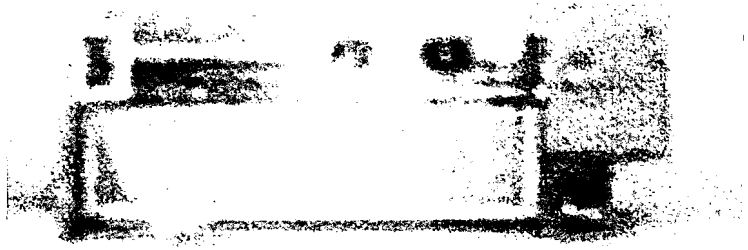
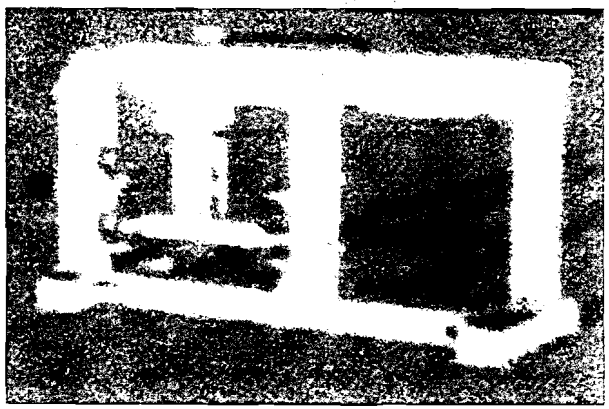
Filament Winding Machines

Our recommendation

1B001a. – widely available from many countries including: USA, China, Macedonia

Move to EAR99



Chinese machines

Widely advertised on the web Filament Winding Machines.
We have no experience with them.