European tooling and mould making industry: global perspective and Italy role

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In this paper we look at the trends in the world system of tools, dies and moulds from an UE25 perspective, based on available data (including 2005 trade data) and we also review the related Italy data. Finally some policy considerations are reviewed.

Trade on tools, dies and moulds is reported under several codes in Eurostat as well as in UN Comtrade databases of international trade. We aggregate them under three main groups:

- “industrial moulds”, including moulds for plastics, for metals and other materials (typically the moulds for plastics are the dominant contribution within the group, around 60 to 80%, depending on the countries),
- tools for pressing and punching (“tools”)
- cutting and extrusion dies (“dies”).

The EU25 international trade in tooling

Figure 1 presents the extra EU25 imports and exports of all classes of tools, dies and moulds. It is clear that EU is a net exporter with a net balance of 700 billion euros in 2005. The net balance has doubled in the last ten years. By EU25 imports and exports we are only considering flows from and to outside the EU economic space (EU25 extra in Eurostat jargon). Later we will discuss the intra EU25 trade flows.

The structure of the EU25 imports and exports (figure 2) by class (tools, dies and moulds) shows the importance of the industrial moulds in the export trade. Both EU25 exports and imports are dominated by industrial moulds: they mean 71% of EU25 imports and 78% of the exports. Press tools are more important in EU25 imports (27%) than exports (17%).

It is a well known fact that industrial moulds “travel” much easier than tools and dies. Structure of international trade flows is different from the structure of internal production.
Figure 3 shows the estimated structure and values (million Euros) for the EU25 external trade flows, production, production for the internal market and the internal market for tooling and moulds. EU25 internal market is estimated to be around 13 billion Euros and production around 14 billion Euros. Industrial moulds contribute around half the production and 40% of the internal market. Press tools and related tools contribute 36% for production and 39% for the internal market. The conclusion is that industrial moulds (especially moulds for plastics) are the key contributors for exports (and also for imports), but they mean only half of the internal market. Tools and dies are a much more localized business than industrial moulds. Proximity to the client is more important for tools and dies trade than for moulds (especially for moulds for plastics).

From the estimated data at the EU25 level we can also conclude that:

- Production for the internal market means around 85% of the EU25 production (but only 75% in industrial moulds, against 90 to 95% in tools and dies)
- Imports to EU25 contribute around 10% for the internal market (15% in industrial moulds but less in tools – 7% - and much less in dies).

Net balance for press tools and for cutting and extrusion dies is small and positive in 2004 and 2005, but reversed in some of the previous years. Export driven balance is due to the industrial moulds trade (figure 4), where the positive net balance is the dominant contribution to the positive balance. The conclusion is that EU25 positive balance of 700 million Euros in international trade is basically the result of a positive balance in the trade of industrial moulds.

Figure 5 shows the yearly change rate for the exports and imports volume (value) for industrial moulds only.

Both UE25 extra exports and imports shown positive changes in 2004 and 2005, after a negative trend during years 2002 and 2003 – but far from the two digit growth of the 90’s, especially for exports.

If exports to outside EU25 space seem to be growing again, the trend in the internal trade between UE25 countries has been very negative during 2005 and the trend is
negative form 2002 (really, from 1999, if the recovery from 2001 to 2002 is omitted). Intra EU25 trade decreased 23% during 2005!!

Figure 6 shows the internal trade volumes for tools, dies and moulds. The intra EU25 trade (measured by imports by EU countries from other EU countries) is very active and large and again dominated by the industrial moulds volume, although press tooling represents close to 30%. But internal trade in industrial moulds shows a negative trend in the last two years. It is clear that the overall negative trend is due to a reduced trade in industrial moulds, but tools and dies trade does not show a decreasing trend.

The importance of the UE25 external trade in the total international flows of tools, dies and moulds is shown in figure 7: exports to outside EU25 countries are much more important in industrial moulds than in tools. The same applies for imports, although the gap is smaller.

What happened from 2004 to 2005? EU25 exports lost more than half a million Euros: a loss of 554 million Euros in the internal market versus a gain of only 17 million Euros in the exports to non EU25 countries. In industrial moulds, there is a gain of 59 in extra exports against an internal loss of 465 million Euros. In tools, both exports and internal trade showed a loss: 59 and 90 million euros. In dies, exports increase 17 million Euros while internal trade was stable. Figure 8 helps to show the structure of the changes from 2004 to 2005.

The conclusion is that EU25 both internal and external demand for tools had a substantial loss of volume (value) during 2005 and that the loss in demand for industrial moulds in the internal market was much higher than the increase in EU25 industrial moulds exports. Why? The search of the origin of the loss needs additional exploitation of data, not within the present paper.
EU25 countries: main actors

Data for tooling production per country is difficult to find in a reliable basis. Based on ISTMA statistics data (2004), estimates of EU25 countries production for industrial moulds and for tools and dies have been done and the results are presented on figure 9, showing individual data for Germany, Italy, France, Spain and Portugal and the aggregated data for all the other EU25 countries. Germany production for all types of tools and moulds approaches one third of EU25 (30%), followed by Italy (16%).

Figure 10 shows the intra and extra EU25 exports of industrial moulds (tools and dies not included) for the same countries. Figure 11 presents the same data in the index format and not accumulated (1995 = index 100), It is clear that 2005 has been a declining year for all the EU25 countries in the intra EU25 trade, but for the extra EU25 trade (EU25 exports), France and Italy showed improvements during 2005. Overall, the same indexes for the consolidated EU25 trade are in figure 12: a decline in the intra trade for 2005, but not for the extra trade.

Italy data

The evolution of Italy imports and exports for the three types of products (industrial moulds, tools and dies) is summarized in figure 13. A positive net trade along these years, around 700 to 800 million euros for the last years, is clearly visible. The structure of the trade surplus is shown in figure 14: industrial moulds make the main contribution for the trade surplus. The evolution of the import and export trade for each of the three types of tooling is presented in figure 15.

Germany, France, United States of America, Spain, Switzerland and Austria are the main destinations of the exports of Italian industrial moulds (figure 16, 2005 data, with 1995 values plus additional growth during the last ten years). Germany accounts for nearly one third of industrial moulds exports from Italy.
Figures 17 and 18 show the structure of industrial moulds exports for the top 25 destination countries in value and percentage of plastic moulds in the industrial moulds exports. Around 65% of industrial moulds exports are accounted by moulds for plastics, although the share of moulds for plastics has a substantial variance along the several countries. The Eurostat codes for the several countries are presented in figure 19.

A global perspective

Data for the main actors (countries) in the world tool and mould markets for 2004 are presented in figure 20, with on our best estimates based on reviewed data from different sources. The value for the internal market or apparent consumption is estimated from the production, import and export data.

EU as a group is a major actor, side by side with USA and Japan, and clearly ahead (in volume) of China. EU has a very large internal market, and it is the second largest exporter (after Japan), although close to 80% of the production is for the intra EU market. Please note that EU exports considered are only for non EU countries, so the relation with German exports is complex: German exports are both for EU and non EU countries. Italy is also included in the picture. Indeed, Italy is one of the central players in the world tooling trade, specially active in the exports trade.

Figure 21 repeats the exercise for industrial moulds for plastics only (at the same scale for the ordinate). EU again has a powerful position as the leading exporter and with an internal market very close to the leader.

International trade in industrial moulds is concentrated in a few number of countries. Around 25 countries represent close to 90% both of imports and exports. The system can be visualized in figure 22, as a network of bidirectional trade flows visualized through the energizing 2D Fruchterman Reingold algorithm. Distance between nodes (countries) express the strength of their ties as closely as possible, allowing the identification of a
central core of countries that dominate the international trade, and also how close the several actors are. The figure was generated by Pajek software for network analysis (http://vlado.fmf.uni-lj.si/pub/networks/pajek), based on a squared matrix from UN Comtrade data relative to 2004 (full data for 2005 is still not available). Only flows with value higher than of 1 million USD were considered.

The countries in the core region dominate the international trade. Three parts of the core can be identified: the European sub core, the Americas (USA, Canada and Mexico, closely tied) and the Asia subcore.

China is now clearly positioned in the central subcore from Asia, close to Japan, USA and Germany / Italy (from the European subcore). India is still clearly in the periphery, far from the core.

Italy is strongly positioned within the European subcore.

European policy

In previous papers and presentations (see list at the end of the paper) we have addressed some of the issues that the European tooling industry is facing in a changing global business environment. Let us review some of the key points we have covered:

- Tooling industry is changing and needs to review its business model and competitive positioning.
- Exports from China has been changing the competition landscape in the low and medium levels of the market, specially in industrial moulds (and moulds for injection of plastics within these) and has changed the international pricing levels in those segments.
- European tooling industry must concentrate in the high end of the tooling markets where it has a leading role in the international markets and to develop a business culture based on international networking and international trade
• The portfolio of services and competences offered by the tooling companies is extending, both upside and downside, and the integration of the tooling competences with specialized molding is becoming more and more important for mouldmakers.

• Commercial investments are becoming as important as technology ones and soft skills for international networking are needed.

• Financial and capital requirements (specially for operating funds) are also increasing and becoming more demanding.

• European research programs are important to consolidate the engineering edge of European tooling industries and to foster an European knowledge base for engineering and tooling.

We anticipate that soon both OEMs and their first tier suppliers of plastic systems and components will purchase around 70% of their industrial moulds from low cost countries (Eastern Asia / China in special) and that european and north American mouldmakers will compete for the remaining 30% of high precision and high complexity moulds on a basis of concurrent engineering, certified quality and advanced technologies competences, together with strong partnerships in design, manufacturing (and even assembling and logistics).

The management of the supply chain with multinational OEMs calls for new commercial competences and relationship building.

We also argue that specialized independent “custom molders” in the international markets are becoming more and more important for the European tooling companies.

Finally strong tooling industry is critical for a sustainable industrial European policy and for its geostrategy ambitions in the world system. Tooling competences and imbedded skills for advanced product design and production are key factors to the defense and aerospace related industries. Recent USA evidence strongly supports that view: replacement parts for heavy defense equipment is becoming a difficult issue for military procurement due to the outsourcing of casting activities and related tooling to Asian companies.
The industry needs to add a strong and continuous effort for institutional recognition in Brussels and EU governing bodies, as well as by the national governments. Tooling industries are very much fragmented and small / medium size enterprises. An active European policy to support the tooling industry competitive edge is important and should be high in the agenda for European companies. An international forum can add visibility for that. ISTMA Europe is a main contributor and promoter for these objectives.
Related papers and presentations from the authors:


Figure 1: Extra EU25 imports of tools, dies and moulds, 1995 to 2005.
Units: million euros. Source: Eurostat database for international trade.
Figure 2: EU25 exports and imports of tools, dies and moulds to non EU25 countries, by type of product (1995 to 2005).

Units: million euros. Source: Eurostat database for international trade.
Figure 3: EU25 production, trade flows and internal market for tools, dies and industrial moulds (estimate, 2004)

Units: million euros (top figure) and % (bottom figure).

Source: Estimates based on ISTMA data (production) and Eurostat data (imports, exports)
Figure 4: Net trade (exports minus imports) of EU25 with non EU25 countries, by type of product, 1995 to 2005.

Unit: million euros. Source: Eurostat database for international trade.
Figure 5: Annual change rate of EU25 extra trade (imports and exports) and intra trade, 1996 to 2005.
Unit: % per year. Source: calculated from Eurostat database for international trade.
Figure 6: Internal EU25 trade of tools, dies and moulds (as reported by EU25 importing countries), 1995 to 2005

Units: million euros. Source: Eurostat database for international trade
Figure 7 – EU25 internal trade as percentage of the total trade (EU25 intra plus extra), for all tooling products (top figure) and for industrial moulds and for tools (bottom figure)

Units: %. Source: calculated from Eurostat data.
Figure 8 – Changes from 2004 to 2005 in UE25 extra and intra exports, by type of product (top figure) and reverse view (bottom figure)

Units: million Euros. Source: calculated from Eurostat data.
Figure 9 Production of industrial moulds and tools and dies in EU25 countries: Germany, Italy, France, Spain, Portugal and other EU25 countries (2004)

Figure 10 – Exports of industrial moulds by main EU25 countries, to EU25 countries (intra trade) (top figure) and to outside EU25 countries (extra trade) (bottom figure).

Units: million euros. Source: calculated from Eurostat data
Figure 11 – Evolution of EU25 intra and extra exports, by country. Index: 1995=100.

Source: calculated from Eurostat data.
Figure 12 - Evolution of intra and extra EU25 exports (1995 = 100), 1995 to 2005

Units: index (%). Source: calculated from Eurostat data
Figure 13 – Italy imports and exports of industrial moulds, tools and dies, 1995 to 2005.

Units: million euros. Source: Eurostat data.
Figure 14 – Italy net trade (exports – imports) in industrial moulds, tools and dies, 1995 to 2005.

Units: million euros. Source: calculated from Eurostat data.

[Graph showing net trade data for the period 1995 to 2005]
Figure 15 · Italy imports and exports of industrial moulds (top), tools (middle) and dies (bottom), 1995 to 2005.

Units: million euros. Source: Eurostat data.
Table 16 – Italy exports of industrial moulds by country, 2005: 1995 and posterior growth

Units: million euros. Source: Eurostat data
Table 17 – Italy exports of industrial moulds by country, 2005: moulds for plastics and other industrial moulds

Units: million euros. Source: Eurostat data
Table 18 – Italy exports of industrial moulds by country, 2005: share of moulds for plastics in the industrial moulds exports

Units: million euros. Source: Eurostat data
Table 19 – Codes for countries in Eurostat database: destinations of top 25 destination countries for Italy exports of industrial moulds

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Figure 20: Principal actors (countries) for 2004 of the global tool, dies and mould markets (exports, imports and production for internal market).

Units: million USD. Sources: several (based on Beira, 2006b)
Figure 21: Principal actors (countries) for 2004 of the industrial moulds for plastics global markets (exports, imports and production for internal market). Units: million USD. Sources: several (based on Beira, 2006b)
Figure 22: World system of international trade of industrial moulds between 93 different countries (2004).

Based on UN Comtrade database data. Colors identifies the continent of the country.