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Update on Market Trends in the Investment Casting Industry

Paris 1992

Blayson Olefines Ltd
Investment Casting Wax

UPDATE ON MARKET TRENDS IN THE INVESTMENT CASTING INDUSTRY

Presented at the EICF Conference in Paris, France 1992
By R BWilliams, Blayson Olefines Ltd, UK

INTRODUCTION

At the 1989 BICTA conference on Investment Casting, I presented a paper called 'Market Trends in the Investment Casting Industry'. The paper was made up of a series of statistical data collated as a result of numerous discussions with many people throughout the industry. It considered data up to the end of 1988. Recently it was thought it would be beneficial to update the information. Therefore in this latest paper I have used the figures of the previous lecture as a starting base which includes data from 1982 and 1988 and have endeavoured to project what has happened to the industry since then.

The data could only be prepared as a result of numerous discussions with many people throughout the industry Worldwide and I am extremely grateful for their cooperation and assistance. The paper is broadly divided into two sections. The first section records the statistical data obtained on the industry up to 1991 and I feel that this is best presented by projecting a series of slides. The second section has a brief look at possible future trends.

SECTION 1. TRENDS IN THE INVESTMENT CASTING INDUSTRY

First we can look at turnover and number of foundries for the major investment casting markets in the World and compare the data for 1982, 1988 and 1991.

Figure 1. UK Investment Casting Industry

Turnover and number of foundries

	1982	1988	1991
TURNOVER	£105M	£250M	£290M
FOUNDRIES	49	55	60

Figure 2. EUROPEAN Investment Casting Industry

Turnover and number of foundries
(Not including UK and Eastern Europe)

	1982	1988	1991
TURNOVER	£120M	£250M	£330M
FOUNDRIES	60	80	80

Figure 3. USA Investment Casting Industry

Turnover and number of foundries

	1982	1988	1991
TURNOVER	£800M	£1200M	£1300M ($2200M)
FOUNDRIES	240	400	350

Figure 4. JAPANESE Investment Casting Industry

Turnover and number of foundries

	1982	1988	1991
TURNOVER	£50M	£190M	£235M (¥54000M)
FOUNDRIES	35	65	70

Secondly we can look further at these major markets and examine the numbers of people employed within the industry and make a broad turnover percentage breakdown between commercial and non-commercial (aerospace) castings.

Figure 5. UK Investment Casting Industry
Turnover, number of foundries, employees and turnover percentage split between commercial and non-commercial (aerospace) castings

	1982	1988	1991
TURNOVER	£105M	£250M	£290M
FOUNDRIES	49	55	60
EMPLOYEES	5000	6000	6500
COMMERCIAL CASTINGS	33%	30%	30%
NON-COMMERCIAL (AEROSPACE) CASTINGS	67%	70%	70%

Figure 6. EUROPEAN Investment Casting Industry
Turnover, number of foundries, employees and turnover percentage split between commercial and non-commercial (aerospace) castings (not including UK and Eastern Europe)

	1982	1988	1991
TURNOVER	£120M	£250M	£330M
FOUNDRIES	60	80	80
EMPLOYEES	6000	6500	7500
COMMERCIAL CASTINGS	45%	40%	45%
NON-COMMERCIAL (AEROSPACE) CASTINGS	55%	60%	55%

Figure 7. USA Investment Casting Industry
Turnover, number of foundries, employees and turnover percentage split between commercial and non-commercial (aerospace) castings

	1982	1988	1991
TURNOVER	£800M	£1200M	£1300M ($2200M)
FOUNDRIES	240	400	350
COMMERCIAL CASTINGS	50%	40%	40%
NON-COMMERCIAL (AEROSPACE) CASTINGS	50%	60%	60%

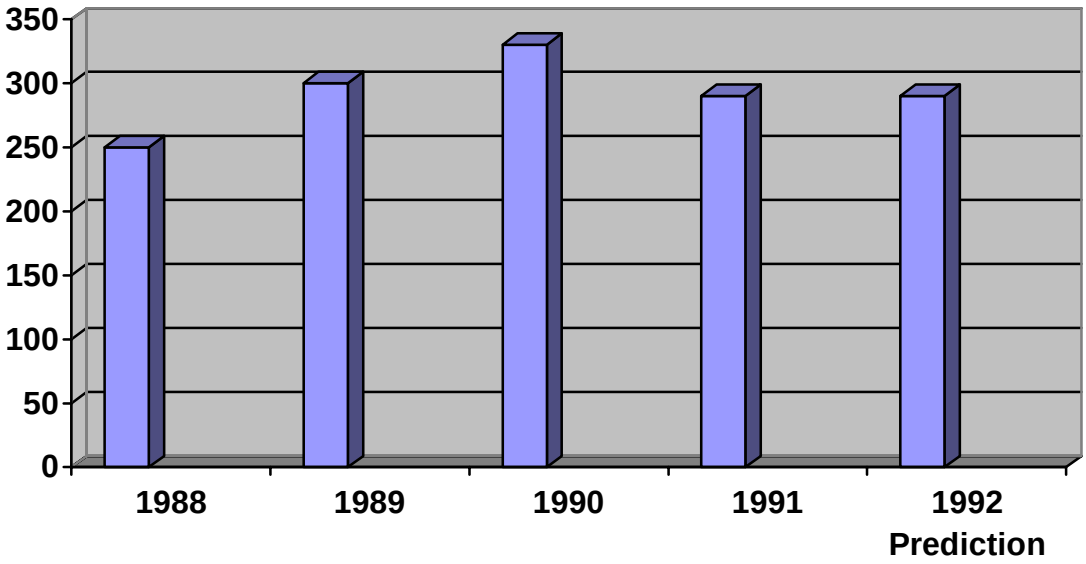
Figure 8. JAPANESE Investment Casting Industry
Turnover, number of foundries, employees and turnover percentage split between commercial and non-commercial (aerospace) castings

	1982	1988	1991
TURNOVER	£50M	£190M	£235M (¥54000M)
FOUNDRIES	35	65	70
EMPLOYEES	3500	6500	7000
COMMERCIAL CASTINGS	90%	80%	80%
NON-COMMERCIAL CASTINGS	10%	20%	20%

As a third stage it may be interesting to look in greater detail at the way turnover has developed during the years 1988 to 1991 for each of the major markets and include a prediction on how this may change throughout 1992. The predictions have been made after consulting numerous views throughout the industry.

Figure 9. UK Investment Casting Industry Turnover Changes 1988-1991

(Turnover £M)



UUUFigure 10. European Investment Casting Industry Turnover Changes 1988-1991 (Excluding UK and Eastern Europe)

(Turnover £M)

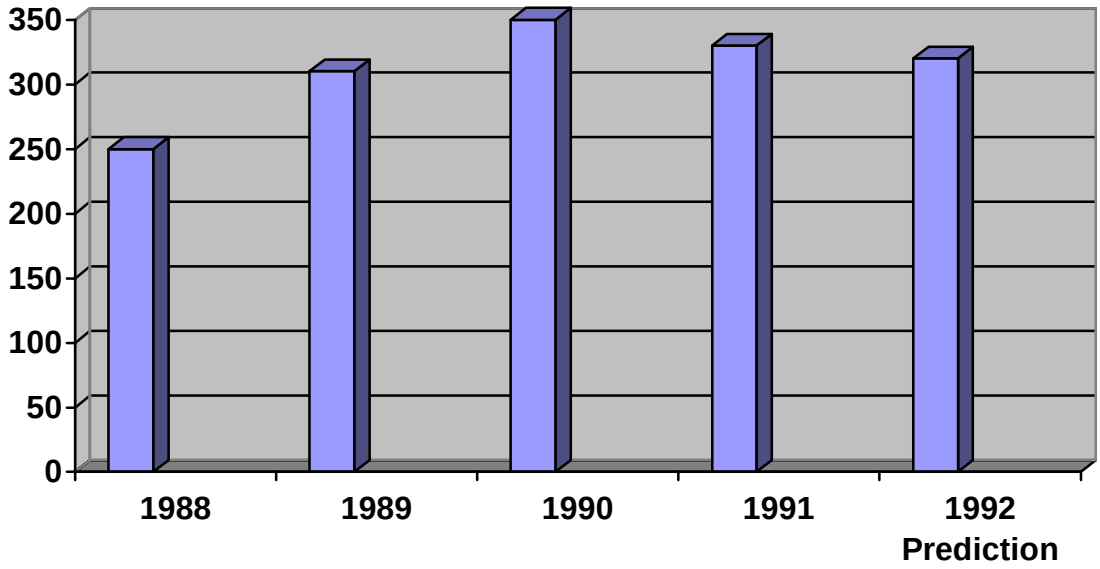


Figure 11. USA Investment Casting Industry Turnover Changes 1988-1991

(Turnover £M)

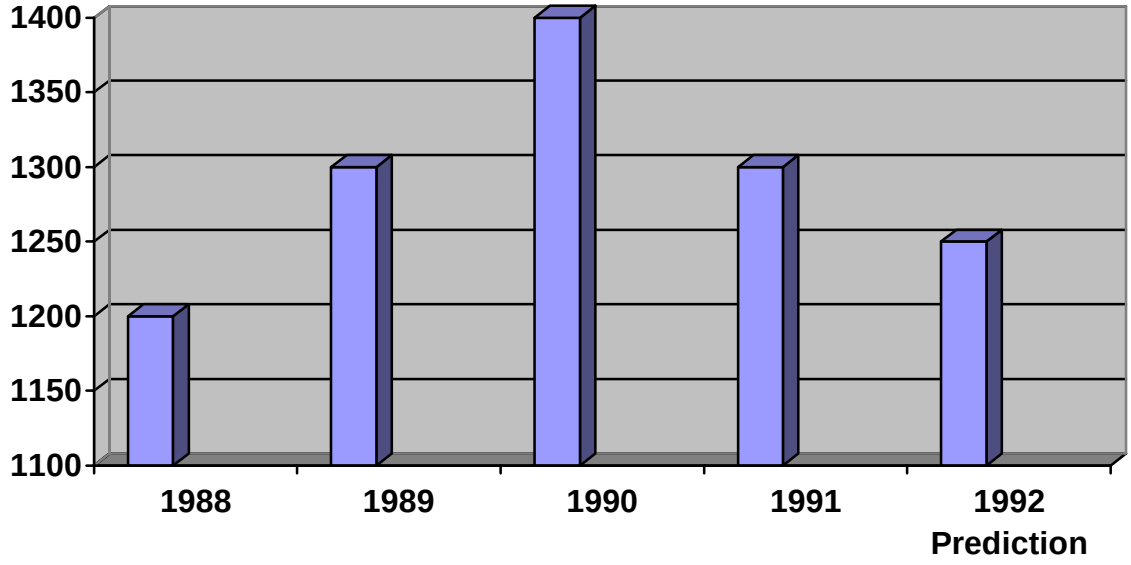


Figure 12. Japanese Investment Casting Industry Turnover Changes 1988-1991

(Turnover £M)

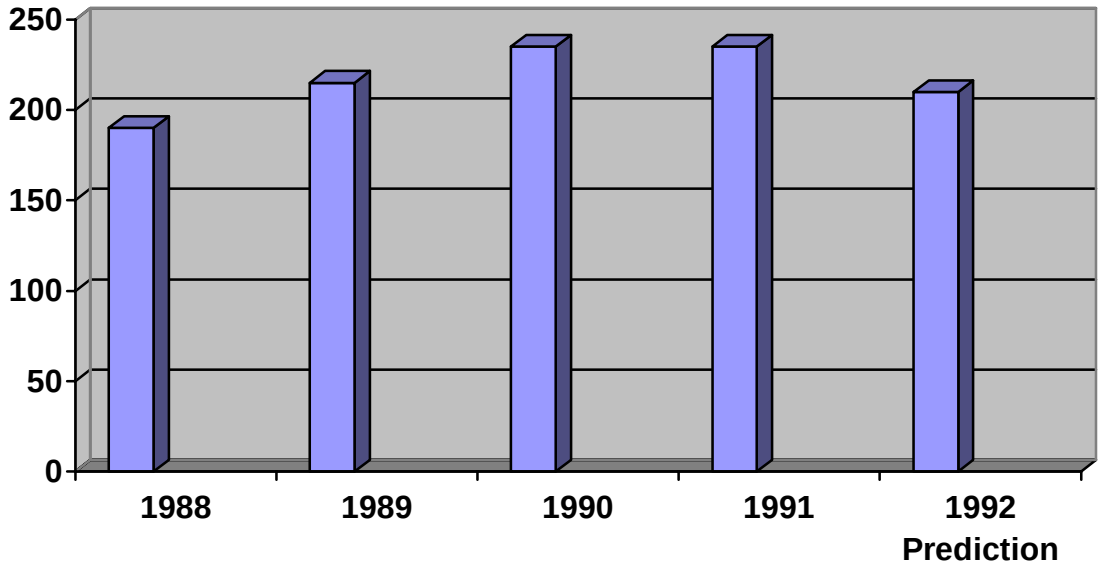
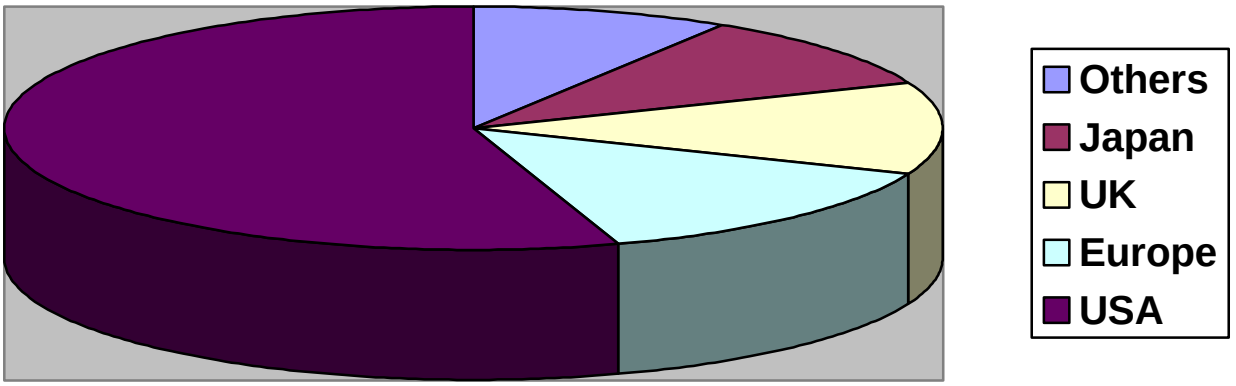


Figure 13. World Investment Casting Market Turnover Share 1991
(Excluding old USSR, Eastern Europe, China)



As a fourth stage within the first stage of the paper we can have a look at some additional data to further review the situation on market trends.

No figures are available for turnover from the investment casting industries of Eastern Europe, the old USSR and China. Within Eastern Europe there are approximately 30 known foundries. The USSR had a large investment casting industry and China is reported to have many investment casting foundries. For the rest of the World excluding the above an estimate of £150M turnover was made for 1988 and this is thought to be approximately £230M for 1991.

In the previous lecture we mentioned that data published in the USA showed that although the non-commercial or aerospace section of the US investment casting industry contributed to approximately 60% of the turnover it only made up about 25% of the overall tonnage. This should still be relevant in 1991 and in the same way the non-commercial or aerospace percentages of turnover for other market areas would represent much lower percentages of overall tonnage.

Some estimates of tonnage of investment castings produced have been made. In the USA, an article by T Gibson of TDC Consulting Inc in a publication ‘The Future For Foundry Casting’ gave an approximate figure for the total US market for 1990/1991 as 210,000 tonnes. Coupling this with data from all other market estimates on World tonnage of investment castings produced in 1990/1991 a figure of between 400,000 and 500,000 tonnes is estimated.

The Worldwide distribution of metals cast by investment casting in 1991 has been approximated as follows: -

Figure 14. Worldwide Distribution of Metals Cast by Investment Casting in 1991	
Super alloys	50%
All steels	35%
Other non ferrous (Including aluminium and titanium)	15%

SECTION 2. A LOOK TO THE FUTURE

In the previous figures we have seen how World investment casting industry turnover has grown to 1990. Since then it has suffered the effects of recession like most other industries. Predictions on the future are difficult and depend on many variables, but listed below are a number of points that may be useful to discuss when considering the future.

Figure 15. Points to consider in reviewing the future of the Investment Casting Industry

1. General economic factors
2. Situation in major industries
    a) Aerospace
    b) Automotive/motor industry
    c) Other markets
3. Competition from other processes and materials
4. Technical developments
5. Structure and forecast for the industry
6. World size and forecast growth

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1. General economic factors

During 1991 the factors of the Gulf War, the changes in the USSR and Eastern Europe and the cutbacks in defence requirements all combined with the recession to produce a decline in real terms within the investment casting industry. In trying to analyse the many factors that could influence the future progress of the investment casting, or any other industry, one cannot avoid considering the influences of general economic affairs. It goes without saying how important it is to be aware and updated on forecasts on economic behaviour in a wider context and this might open discussion later.

2. Situation in major industries

a) Aerospace

Despite the problems of the last year or two the log term forecasts for the investment casting industry in connection with aerospace are still thought to be good. Ageing fleets will still need to be replaced, noise and environmental regulations point to the development and requirement of new engines. More intricate castings that carry a higher value may well be produced. Already there are signs that through 1992-1993 there will be some recovery in supply in the spares market but the general prediction is that further growth in new engine work will come in 1994-1995. Of course a factor of most new projects will be their financing through collaboration and certain aspects of the future of the industry will depend on the nature of the collaborative agreements established.

b) Automotive/motor industry

Throughout the majority of the World automotive industry, 1991 saw a period of no growth and some retrenchment. The year 1992 seems to be level with a possible increase during 1993. However it could be 1994-1995 before real signs of growth appear.

Within the major investment casting markets there are a number of foundries producing investment castings for the motor industry. However with greater automation and mechanisation to enable the investment casting process to compete with other processes it is still viewed as a potential market where investment casters can increase their activity.

c) Other markets

The list here is long. The computer industry, electronic equipment, valves and fittings, land based turbines, machine tools, office machines, medical parts, golf clubs, leisure industry, pumps, hand tools and numerous others. There have been varying degrees of activity within these industries but it is worth highlighting the growth and predicted growth of casting for land based turbines.

In summary the crucial factor is to continue to expand upon these markets by maintaining a competitive method of manufacture and supply.

3. Competition from other processes and materials

As mentioned in the previous lecture the cost to the industry of capital, labour and raw materials can be expected to continue to increase the competitiveness and attractiveness of all processes capable of offering fully net/or close to net shape products in all fields. These fundamental economic reasons have been part of the reason for the continued success of the investment casting industry but complacency should not set in.

The injected shell and the Replicast process are no longer regarded as a threat to investment casting. Also research on ceramics has not moved forward and therefore poses no immediate threat to the industry. However it is important for investment casters to be aware of possible competition from areas such as powder metallurgy, plastics, intermetallic compounds and metal matrix compounds and to endeavour to stay ahead of these.

4. Technical developments

We should still see a growing tendency towards automation and mechanisation in the future for the industry to remain competitive and take on the benefits of quality and consistency.

CAD/CAM technology continues to become more important in die and pattern making, single crystal and directional solidification are processes that will continue to be important in the production of gas turbine blades and the hot isostatic process (HIP) is becoming more widely applied. It gives casters the opportunity to produce high integrity or fully sound castings economically on a repetitive basis.

5. Structure and forecast for the industry

We have seen a tendency towards some amalgamation within the industry and this may be a trend for the future. We have already stated how important automation and mechanisation could become technically but again this could influence structure of the industry. Quality control and efficient cost effective quality control is also becoming increasingly important as the industry moves forward and the single European market must be looked on as an opportunity to the future structure of the industry.

Perhaps the most prominent area that will affect the future structure of the industry is the environmental issue. There is interest in water based shell chemistry due to problems associated with the use of ethyl silicates. The issue has enormous ramifications for many foundries. Also reclamation, especially of wax, is becoming an increasingly important issue both environmentally and economically as the industry approaches the future.

There are a number of associations throughout the World representing investment casting interests (eg EICF in Europe, VDG in Germany, SGFF in France, BICTA in the UK, ICI in the United States and 3 associations in Japan). There may be a greater degree of cooperation between such associations in the future that could benefit the industry in general.

6. World size and forecast growth

On an optimistic note encouraging growth in investment casting turnover is still forecast for the future. The 1991 approximate World turnover for investment casting of £2.4Billion (US$4.0Billion) is predicted to reach £3.5Billion (US$5.8Billion) in the second half of the decade.

CONCLUSION

The investment casting industry experienced excellent growth through the 1980's but unfortunately, like many other industries, declined in 1991. However if the industry can remain competitive and cost effective against other processes, then predictions on the future of the industry are good. It is important though, even in recessionary times, for the industry to remain abreast of technical and structural developments and to continue to sell itself to ensure predictions on the future are achieved.