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ASSISTANCE IN UPGRADING MANAGEMENT AND MODERNIZING ENGINEERING OF AGRICULTURAL MACHINERY INDUSTRY

TF/POL/90/802

REPUBLIC OF POLAND

Final Report: Agricultural Machinery Industry Transformation *

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Prepared for the Government of the Republic of Poland
by the United Nations Industrial Development Organization

Based on the work of Anders G. Lundberg and Ian Urwin,
Experts in Agricultural Machinery

Backstopping Officer: Fumio Beppu, Engineering Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

UNIDO's Substantive Comments

TF/POL/90/802

Assistance in Upgrading Management and Modernizing Engineering of Agricultural Machinery Industry

Technical comments on the final report of Messrs. A.G. Lundberg and Ian Urwin prepared by Mr. F. Beppu, Backstopping Officer, Engineering Industries Branch

The report covers the missions of the experts undertaken during August to October 1991 and April to June 1992 and reflects the activities under these assignments.

Based on the assessment and analysis of the present situation of the Polish agricultural machinery industry, the experts provided valuable guidance and recommendations for the counterpart.

The report contains very useful information on the latest situation of the individual enterprises and institutes which are struggling for restructuring themselves. The experts observed that the industry needs upgrading, especially in industrial management skills such as quality control, cost control and marketing. The report also recommends the new role of PIMR, which holds a vital position in the industry.

The experts' recommendation, the discussions and conclusions of the seminar given herewith should be carefully considered by the national counterpart PIMR, the industry and the government concerned in order to define the objectives and the activities of the transformation process to a free-market economy. UNIDO should also continue to assist the Polish agricultural machinery industry in their effort to restructure by providing expert know-how to the training of managers/engineers.

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Abstract

The project TF/POL/90/802, Assistance in Upgrading Management and Modernizing Engineering of Agricultural Machinery Industry, is based at the Industrial Institute of Agricultural Engineering (PIMR) in Poznan.The project started 25 August 1991 and the duration is 12 months. The assignment has been carried out by two UNIDO Consultants, A.G. Lundberg (Design Engineer) and I.M. Urwin (Production Engineer). The team undertook two missions to Poland and visited 15 Farm Machinery Factories and institutions dealing with various aspects of agricultural mechanisation. The project also comprised training for local engineers in the form of Study Tours and Fellowships. The project also provided some scientific equipment.

This Report describes the activities of Factory Visits, discussions with relevant bodies, services provided and participation in the National Seminar in Poznan in June 1992.

The findings of the Project Team are as follows :

1. The Industry is in need of new managemens skills to enable it to function within the framework of a Free Market Economy
2. PIMR should be the medium for the introduction of these skills through Training Programmes
3. UNIDO should continue to support this transformation process through the assistance and provision of expert know-how to the training courses

Explanatory notes.

1 US $	=	13500 Zloty
1 mld Zt	=	1 milliard Zloty (1,000,000,000)
IBMER	=	Instytut Budownictwa, Mechanizacji i Elektryfikacja Rolnictwa (Institute for Building, Mechanisation, and Electrification in Agriculture)
PIMR	=	Przemyslowy Instytut Maszyn Rolniczych. (Industrial Institute for Agricultural Engineering)
GP	=	General Purpose.
NC	=	Numeric control.
SP	=	Special Purpose

INTRODUCTION

The project TF/POL/90/802, Assistance in Upgrading Management and Modernizing Engineering of Agricultural Machinery Industry, is based at the Industrial Institute of Agricultural Engineering in Poznan under the supervision of the Director of PIMR, Professor Kazimierz Mielec.

The whole project period is 12 months. The project consists of three main parts: The Missions, Study Tours and Fellowship Training and an Equipment Component. The project operations started 25 August 1991 which was also the start of the first mission. The first mission ended 9 October 1991 and the second mission started 22 April 1992 and will last for two months to 21 June 1992. The Study Tours, the Fellowship Training and the delivery of Equipment have taken place in the meantime. The Mission activities have been carried out by two UNIDO Consultants, A.G. Lundberg Design Engineer, and I.M. Urwin, Production Engineer. The project has been located in PIMR which has the necessary established liaison services with the industry and facilities and staff to ensure smooth counterpart support. The project is financed by the Government of Japan.

BACKGROUND.

As a consequence of the socio-political-economic liberalization programme initiated by the Government of Poland, the market for agricultural machinery has undergone radical changes. New products must be developed and the manufacturing process made more efficient. Also the marketing of the products now follow a different pattern which requires introduction of a new marketing system. All these changes have put a great strain on the industry.

This project was initiated to study the agricultural machinery industry in Poland and work out plans to assist the factories in product development, production and marketing including plans for financial and information technology support.

The products now coming from the factories have been developed over a long period of time. In some cases the designs have been based on documentation transferred from the Soviet Union. New products have then been developed based on previous experience. Most factories have their own design departments working on design and development of new products and improvements to the old products. PIMR has also been assisting the industry in the design and development of new products.

A CAD system is installed at PIMR and operations have started. A few factories are also beginning to introduce CAD in their product development operations.

Efficient product development is necessary for the agricultural machinery industry because the market has changed radically. New products must be designed and appropriate changes in the old product ranges introduced to suit the new market situation. Licensing arrangements and technology transfer should be used to speed up the process.

In the old system the factories did not need marketing in the sense it is used in the west. The factories had to plan their production according to the size of the orders placed by the Government agencies. The whole production was then received by these agencies. In practice Marketing departments were therefore not necessary. Now the system has changed and the manufacturers are themselves forced to find the buyers. They are therefore now in a process of setting up their own marketing departments. It seems however that the marketing skills need to be improved. Training programmes in marketing should therefore be initiated.

Previously the Government controlled all the prices of farm inputs and farm produce including credit facilities. This system made it possible for at least bigger farms to invest money in the production process. This of course also created a market for the agricultural machinery manufacturers. Now the system has changed and the farmers are supposed to compete on the free market with their produce. Cheap import of food from countries subsidizing their food production has created a situation where farmers are forced to sell at a price which is below the production cost.

Table 1 shows the changes in the prices of combines and potato harvesters in relation to the prices of wheat. From 1983 to 1988 the situation was stable with only a moderate increase. Since 1988 the price of a combine/potato harvester has doubled.

Table 1

Cost of combine or potato harvester in tons of wheat.

year	Z056-- grain	Z058--grain	Z350--potato
1983	82.9	112.5	98.2
1984	92.0	128.2	89.0
1985	103.9	145.0	87.0
1986	102.3	138.1	78.8
1987	109.9	141.1	116.4
1988	115.9	136.9	111.1
1991	228.6	285.7	n/a

In January 1990 the Polish Government introduced the system of convertible currency transactions in all export/import operations. This change affected the trade with the Soviet Union, although it was observed that the trade was already diminishing.

The Polish industry has tried to re-establish contacts on a decentralized basis with customers in the Soviet Union. The trade with some other East European new markets has been difficult partly because of money transfer problems.

Some factories have sold a rather large part of their production to the Soviet Union under the old system. Their range of products has therefore been very much designed to satisfy this market. This export has now almost stopped with a rather fatal effect on the factories involved. All these factors have disturbed the farm machinery market. It can also be said that the free market is not yet fully established. The export to the west has been small, in most cases only 5 - 6 % of the total turn-over. This export has remained stable.

The Polish agricultural machinery industry has been very production centred. Under the old system the industry produced its products without considering the market. All efforts went into the manufacture of the products. In the new structure it is necessary to first check the market and then produce products which can be sold. The old system had the production in the centre while the new system should have the market in the centre.

Previously, the relation between the price of the product and the production cost was not always closely monitored. A system of subsidies guaranteed that the factories could survive even if the economic result was negative. Now all subsidies are cut and it is therefore extremely important for the factory to control its cost structure and balance it to the income from the sales. The factories are aware of the need and are looking for effective means of cost control including use of computers. However computers can only be a part of an updated factory production philosophy.

Because of the radical changes in the monetary system the rate of inflation has been very high. The cash-flow which previously was Government controlled is now free. These sudden changes have led to disturbances and very high interest rates. The high interest rates have slowed down all investment activities including investment in farm machinery.

SUMMARY OF INDUSTRIAL VISITS

A large part of the work during the missions was to visit manufacturers and other institutions in order to find the facts regarding the present system of operation. As a result of the interviews profiles were prepared giving a brief account of the present situation regarding administration, prouucts, market, finance and then plans for the future, restructuring, product development, production, marketing, investments.
Two of these factories were visited in both first and second missions.

First visit to Agromet, Poznan.

Factory to produce trailers, binders,self-propelled forage harvesters.
Factory has integrated system consisting of foundry, forge, machine shops, sheet metal cutting, bending welding, paint shops and assembly lines with underfloor towed trolleys.
Machine shops have GP machines, up to 20 NC lathes, mills and one machining centre with integral tool magazine.
Stated factory capacity is 10,000 binders, 300 tractor mounted combines, 250 SP foragers, 1000 trailers.
Establishment staff is 800.
Present production is mainly some decorative castings for garden furniture, plus a run of pivoted axle trailers for Norway. An order for 10,000 mesh sided stillages for Germany appears to have run out after only 2,000 have been produced.
1990 turnover said to be approx 12 milliard Zloty (approx $12m). It is predicted that this year turnover will fall to 50% but with predicted sales of 800 binders and 200 trailers , a possible further 200 binders to the Sudan and the stillages, this seems to be a very optimistic forecast.
Agromet Poznan are beginning work under a licence deal with Landtechnik of Germany which involves the manufacture of some shafts and may lead to build/manufacture of the total machine in place of their own.
Computer systems are confined to accounting and stores control,further computers will be used in production control.
The factory problems are claimed to result from the collapse of the market, the farmers have no purchasing power, and salesmen are on the road to try to increase or generate sales.

Second visit to Agromet Poznan, now named Sanpoz.

This former self-contained unit of Agromet has begun a process of restructuring under threat of Bankruptcy. As long as three years ago the company began a process of forming a corporation under the Trade Laws then in force. This corporation was established last year on the security of part factory fixed assets (Building and plant) and part Private funds in the proportion of approximately 60-40.

This corporation is now restructuring the company and has so far set up a number of independent organisations based around elements of the original PFMZ.

1) Ferex. The foundry and forge have been re-organised as an independent company using assets of the old Foundry site. So far the new company has income in the first three months of this year of 2mld zloty after making an initial oss last year. 90% of its output is exported.

2) Nagros. The Toolroom has been established as a going concern with the opportunity to make and sell machine tools and services . It made 1 mld zloty profit last year and currently exports 30-35% of its output.

3) Agrosoc. Several peripheral service groups of the old company with strong social aspects have formed this organisation. The control of holiday facilities and recreational areas has passed to a company whose major shareholders are the workers' Trade Union and the workers themselves.

4) A Service Company to act as Site Management has been set up to provide common services to the site, such as Electricity, heating, first aid etc.

5) Sanpoz. The core activities of the plant are retained under this name. Sanpoz therefore designs, manufactures and markets Agricultural machinery under the its new trading name and its product line includes the former range of trailers and binders. The old FMZ Self-propelled forage harvester range has been replaced with a range designed by Landtechnik of Germany and marketed under the name MARAL. There is a German export credit guarantee system "Hermes" which has established a medium for exporting Forage harvesters to Russsia and Sanpoz is using this to gain an export market for about 60% of its output. It is understood that an agreement was signed earlier this week to continue this agreement with the new CIS.
Enquiries have been received for horse-drawn equipment from these states as a result of fragmentation of the old Russian Collective farms but Sanpoz are treating these enquiries with caution.

Rofama, Rogozno.

Factory to produce grain and feedstuffs driers, mixers, and pelleters. Factory integrated on single site with facilities for casting, forging, sheet metal cutting, forming, welding. Machining mainly GP machines. Large painting facility consisting of wash, degrease, sandblast, prime, topcoat, oven dry. 5km of conveyor associated with paint process which is air blast with some electrostatic.

Factory capacity is 600 drying installations with several thousand food mixers and pelleters. The driers are capable of operating with sawdust, bone, chalk, wood, limestone, chicken droppings etc.
Currently part of the factory is leased to a subsidiary, ROCON Ltd who manufacture cargo containers at the rate of 6 x 20ft per day using in-house facilities leased at commercial rates. Rofama also produce collapsible pallets and dust cart bodies for Germany. This is a departure from normal operations.
Normally 75-80% of the factory output would be shipped to the Soviet Union but this trade has collapsed.
The normal staff of 1400 has been reduced to 1200, a further reduction of 200 is likely.
Computer systems are confined at present to production accounting and personnel records.
There are no plans at present for investment in new technology, the perceived advantages are outweighed by the cost penalty.

Kraj, Kutno.

Factory to produce Seed drills and horse drawn fertiliser distributors
Factory sprawling on town centre established about 100 yrs ago. Machinery seems to have been slowly replaced on a rolling programme, nevertheless most are 10 to 30 yrs old GP machines for cutting, pressing, welding, machining and painting. Hoppers and guards in fibre-glass are bought-in.
Some Polish built robots are used to pick and place components in a suite of presses.
A new factory site was erected beginning in 1987 and to date is complete with energy and ventilation systems .A large Zugil painting facility is installed in the Main hall (8000 sq m). The Assy and stores building (6000 sq m) was not in use and the Machining hall (3000 sq m) contained only a suite of 11 injection moulding machines of which 3 were being used to produce seed drill parts.
The 1991 production is estimated to be about 30% of normal. A price reduction of 30% has not produced any increased sales.
The 900 staff were reduced to 700 in August but a further 200+ must be shed.
A German consultancy 'Integration' has been engaged to aid restructuring and the first advice is to sell off the new site and reduce the capacity of the old.
The Kraj management see three avenues to recovery
1) Factory must diversify into different product lines
(An Italian microcultivator "BCS" is being investigated together with a wood chopper)
2)Product line must extend
(Collaboration is underway with Hassia of Germany and Fiona of Denmark for seed drills, grass seeders and potato planters)

3) The market must recover and new markets be explored
(Use the outcome of 2) to expand into the export business.)
Computers are used in the plant for storage, accounting, and personnel records, they would like to have the facility of day to day cost control.

FMZ, Plock

Factory to produce combine harvesters. Began about 100yrs ago to make horse-drawn mowers and winnowing machines. Combine production began in 1954 using Russian design with local redesigns. This range of combines continued until 1969 when a new generation - BIZON- was introduced. Full factory capacity of 6000 p.a. was achieved in 1989 and sales continued into 1990 at the rate of 500 per month. This year, to August, sales have been 500 total.
The product range is 4 combine sizes although not all are currently being produced, alternative header types, trailers (1/2 ton automotive to 18 ton 4 wheel) and a whole-pig shaver
The factory employs 2500, down from a peak of 4000, and is still overmanned. The plant covers 60 hectares, with 16 roofed, the assy hall being one 7 hectare building.
Export deals have been made with many countries but is only 10% of production.
The Polish combine park is said to be 80,000 with an annual replacement market of 1500. 60% of the polish harvest is combined, being about 115 Ha per machine.
The fall in farm income and withdrawal of govt support to farmers is claimed to have led to a fall in farmers' purchasing power.
The Polish combine is 1/2 the price of an equivalent European combine.
Plock are seeking are partner from the west, so far have approached Rosenlew to expand the range to include a smaller sized machine.
Computers are used at present in finance, production scheduling, engineering documentation and service records.

Pilmet, Wroclaw.

Factory producing crop sprayers and hydraulic components.
From 1950 factory built a varied product mix and began current product line in 1970. This comprises plant and orchard pesticide sprayers with tank capacities from 1/2 litre hand-held to 2000 litre trailed.
The hydraulic product line was quick release couplers, hydraulic cylinders, connecting hardware, and mechanical/hydraulic servo steering systems for Ursus/Zetor tractors.
Most of the hydraulic business passed to another factory when the Danfoss licence was being implemented.

A completely new machining area has been installed for the Danfoss product equipped with precision machine tools from Germany and Switzerland. The hydraulic component factory is very impressive, with a clean environment, a sealed floor and good housekeeping. The design level however is up to 1984. The machinery otherwise is general purpose cutting, bending, welding, assembly, painting and packing. There is a plastics department which contains injection , blow and rotational moulding facilities for production of the tanks, pumps and nozzles of the sprayers. There was no use of metal inserts in the moulding processes. Raw material was partly Polish, partly imported.
The staff of 1000 has already been reduced by 300, a further reduction is expected. The mandatory redundancy payment of 3 months salary was also mentioned by this factory as an abnormal burden.
The turnover last year was 165 Md Zloty, production and sales dropped dramatically from March 91.
The capacity of the plant is 15,000 of the 300 - 2000 litre sprayers,
100,000 hand and knapsack sprayers,
100,000 hydrostatic servovalves and motors.
The hydraulic programme was geared to the tractor business of 70,000 units p.a. with 30,000 to the combine, fork truck and other industries.
Currently exports are to CSSR, Libya, Albania, Australia, with sales of hydraulic components to France and possibly to Minsk. The bulk exports to the east have stopped.
The company is paying for the recent investment in high precision machine tools and bank interest rates are excessive.
The survival programme is based on seeking new export markets and achieving joint ventures with western partners, perhaps German. They recognise the need to set up their own marketing organisation and also avoid the handicap of management decisions being blocked by Union "interference".
Computer use at present is in design optimisation and calculations,but not drawing; technological preparation for production, stockholding and finance. The next step - when cash is available - will be production control.

Agromet, Brzeg.

Factory currently producing fertiliser spinners, lime spreaders, fodder trailers (self-load/unload)
This factory which produced boilers, steam generators and steam engines was severely damaged during WWII. Present factory was built from a 2,000sq m site in 1951 and expanded to 12,000 sq m by 1989. The first post-war products were horse-drawn fertiliser spreaders. The original staff of 200 also rose to 1500.
Over this period of 40 years development and expansion has been about 5 - 10% p.a.

The stated factory capacity is 40,000 spinner broadcasters, 8000 3-ton spreaders, and 500 5-ton spreaders.
In addition to the fodder trailers, some stone picking equipment is also produced.
The home market and the eastern bloc market has stopped, Soviet Union was not a large market, but the U.S. market (some 10,000 spinner broadcasters) is still holding up.
The factory has had a policy of machinery replacement, but all investment has now stopped. The latest improvements have been a high speed band-saw for bar and strip preparation and their own development of a broadcaster hopper spinning machine to produce the hopper from one piece eliminating unsightly welds.
Over the past 10 years Brzeg claims to have produced chain sprockets for all of the agricultural industry and have become specialists in angle drive boxes.
The headcount is now down to 700, and facilities such as the works buffet have been shut down. The normal turnover was 20 mld Zloty and the minimum economic turnover is said to be half that. Today's figure is only 2-3 mld Zt, well below the minimum. The current bank charges on the factory are greater than the wage bill. When orders first fell, Brzeg began to make many of the parts in-house. They would like to sell off the old factory buildings, and privatise parts e.g. machine shops.
It is hoped that the government's negotiations with Russia or USSR will result in trade financing the sale of equipment to farmers.
Computers are used for material costing, accounting and finance and are planned for use in design and production control.

First visit to Agromet, Strzelce Opolskie.

Factory to produce Potato Lifters, Potato Harvesters inter-row cultivators, haulm pulverisers and animal feed mixers.
This 25 hectare (16 under cover) factory is equipped with all facilities for casting grey iron, and with the usual complement of guillotines, shears, presses; and general purpose turning, milling, drilling, gear cutting and welding equipment. Some of the larger sub-assemblies are prime painted before being fed to the final assembly lines. The paint shops are capable of accepting complete machines.There are eight 100 kw fans exhausting these paint shops
The foundry at present is undergoing modernisation. The old equipment has largely been stripped out from the main foundry, a new roof has been erected and the foundations and some steelwork for a new moulding line is in place. The transformer room for the electric furnaces is prepared but the transformers are not delivered. Nor are the furnaces or any of the sand mixers. The capacity of the new unit will be 6000 tons p.a. of which the factory will take 4,500. The extra capacity will be available for sub-contract.

Today's requirement for about 1000 tons p.a. is met by a small unmechanised foundry on site.
The work is said to be a 30mld Zt investment with a further 20mld Zt required to complete the modernisation. The factory claimed that 90% of the funds had been committed.
The acting director has visited the Minister to discuss all operating problems and was advised that a restructuring programme be formulated. Ministerial finance would, it was claimed, follow as soon as the plan would be approved by an international adviser. Immediate plans are to sell off some assets e.g. staff hotel.
In the past some 20% of output has gone to the Soviet Union but this dried up over the last 3 years.In 1990 sales were about 8000 and as late as Sept '90 farmers were waiting at the gate to buy. Today the factory works at 30% capacity.
The directors see this recession as only temporary but feel it is Government induced and therefore needs govt action to resolve - such as resumed trading relations with the Soviet Union, govt support to home agriculture and restrictions on the "subsidised" imported food which is flooding the market.
The factory has set up a marketing dept which is attempting to sell by direct contact with the farmers and Soviet Union buying groups.

Second visit to Strzelce Opolskie

This was return visit to see how factory had survived since September 1991
The factory is still a Government unit but could be sold or privatised without penalty.
The foundry modernisation programme is on ice at the moment, the factory director is unwilling to commit further funds until either the market improves and his own factory needs the output or a buyer is found to take the complete investment over.
The production of Potato harvesters in 1990 was 8,000 units and current Market Research suggests a maximum sales figure this season of 3,500.
The company is attempting to expand into export markets but is finding that competitive machines are technologically superior. Finland, for example are interested in units but only after the unloading mechanism is improved from tipping to chain link conveyor in the interest of reducing damage to newly picked potatoes. Similar criticisms were made at the Verona Fair in Italy, particularly of the Balko machine.
The company is trying to meet or create demand for other products. A range of potato planters for both chitted and unchitted seed potatoes has been negotiated from Gruse of Germany, and similarly a range of seedling transplanters has come from Accord. Series production of the transplanters is scheduled to commence in September. The company strategy is to expand the product range to embrace all stages of potato production and thus spread the sales season. Inter-row cultivators and ridgers are also included, but much more attention is being paid to what the market - the customer - wants.

To further use production capacity and widen the range of product, several small recreational and light industrial products are also offered; barbecues, anvils for hobbyists, leisure equipment and household requisites (fire grates, folding stepladders, cake moulds etc) are available.
Considerable income has been generated by the co-operation deal with Gruse, both from product sales and from the sale of parts to Gruse.
In order to re-establish the old trading links with the former Soviet Union, there is a possible deal with Beorussia and the Ukraine involving the supply of Balko harvesters in CKD form for local assembly. Payment for these units looks like being in the form of small tractors, 10hp, at the rate of 3 tractors for one harvester. The equivalency rate in Poland is about one and a half tractors per harvester so it appears to be a good deal.
The most difficult obstacle to be overcome in the factory management sphere is the current debt repayment schedule with the interest rate now at 80%, down somewhat from last year's charge of 140%.

Unia, Grudziadz.

Factory for the production of Ploughs, Rotary and tined cultivators,toothed and disc harrows singly and as tandem units.
Factory established in centre of town in 1882 on 14 hectare site. Some capacity moved to new building 5 km away in 8000sq m building. This production mainly rototiller gearboxes but also main production source for baler drive gearboxes.
New factory is planned to give capacity of 50,000 ploughs,23,000 cultivators, 8,000 tandem sets 10,000 rototillers. This year output expected to be 13,000 ploughs, 2,000 rototillers, 4,000 cultivator sets. (20 - 25% of normal) In addition some 150,000 ploughshares have been sold from a capacity of 1,200,000.
The company currently is running at a loss. Last year's profit of 26 mld Zt has become a loss over 7 months of 20 mld Zt. Running costs are 3 times income, working capital is used directly for salaries and suppliers are giving extended credit.
Over a period of 10 years exports have stabilised at 4 - 5% but over the last 2 years have risen to 11%. The major export item is the small rototiller with the main market being USA, via Denmark. Small quantities are also sent to Hungary.
Deals are being worked out with German companies eg Rau, but the factory has not yet been able to match the specification of the products.
Among new products being investigated/designed are Forestry equipment, new mowers, and "land trains" i.e. one - pass - cultivation. This latter is thought to be an expanding technique.
Swedish consultants, "Indevo"are being used to aid factory reconstruction.
When this plan is approved by a neutral body the government will levy lower taxes on the company.

Previous attempts at financial agreements with international companies have been blocked by union veto.
Meanwhile the factory is "asset stripping", by selling off its holiday homes, creche, yacht club, hotel and closing down the buffet and apprentice school.
Computer systems are currently used only in storage systems and finance.

Powogaz, Pila.

Factory established about 100 yrs ago to produce agricultural equipment.
Currently can produce horse and tractor drawn hay tedders and cattle drinking bowls.
From 1972 the factory began to diversify starting with sewage treatment plant and equipment and these are now seen as a major output together with cast iron heating radiators and domestic wheeled rubbish skips (1 cu m capacity)
Production capacity is 20,000 horse drawn tedders and 180,000 drinking bowls.
Agricultural content of production pre 1990 was about 70%, now fallen to 25% with 30% of production being radiators and 10% skips.
There is no export history to Soviet Union but sewage equipment is exported to Asia, Middle east, Egypt and eastern bloc countries.
Factory site is over 6 hectare, with 2 1/2 being roofed. The full establishment of workers is 800, and today stands at 320.
Before 1972 factory also produced a range of field rollers, slurry tankers and cattle troughs. Powogaz - Pila was one of three factories, the group HQ being in Poznan. The research and design centre was also in Poznan, Pila being production only. They have recently turned to PIMR for a new design of tractor tedder with vertical axis rotors.
A marketing dept was set up in 1990 and enquiries sent to farmers, but no policy has evolved from the replies.
The company last year made 7 mld Zt profit with 45% being paid to the govt as taxes. This year they are running with a 2 mld Zt overdraft and inflation is eroding any profit.
There are no plans to further reduce the workforce.
5 computers are independently used for salaries, inventories and calculations.
There is a cad/cam system but it is used only by production.
Investment plans are for foundry modernisation and upgrading the electrical supply lines.

Famarol, Slupsk.

Factory was built in 1930s to manufacture cultivation equipment. After WWII factory was developed with licences from German beet harvester (Kleine) and Rotary mower (Fahr).

Production facility now is for sugar beet harvesters, top and bottom drive rotary mowers, brush cutters, maize and beet precision seeders and planters. Production capacity includes 1,900 complete harvesters and 25,000 mowers. Factory is typical of polish industry with most facilities in-house and with certain social amenities. Policy of continuous investment means that some machines are replaced each year, the latest being a Spectrometer for the rapid analysis and identification of metallic materials. Together with the permanent installation in the central laboratory is a portable unit which can give instant comparative results on the shop floor. Another recent purchase is an Amada plasma punch/cutter from Japan with a locally manufactured adaption to increase cutting capacity from 10mm to 60mm. This machine is NC programmable and tape controlled but not yet fully integrated into the design computer.
Commercial situation is very difficult, large harvesters were designed to meet needs of state farms, who have stopped buying. Factory management expects situation to improve in near future when they will return to full production. With the change to a market economy there have been changes in sales and distribution. They have a network of 160 dealers selling complete machines and spares, with service mechanics and training facilities. The selling price of the harvester is an economic one, there are no special offers or inducements. A successful sales figure this harvest is vital for survival. Deals are being struck between sugar factories, banks and farmers to fund new equipment sales this year.
Exports, which take up 5 - 6% of production are limited to the west, some beet harvesters go to Yugoslavia and the factory is trying to increase the percentage.
Because of the sales position the staff has been cut from 1000 to 520. Computers, (CAD) are used in the preparation of design drawings and also in setting up production. About 20 engineers in each dept are trained in their use.

Ursus, Warsaw

State tractor factory established in 1890s to produce engines and agricultural machinery.
Between the wars it produced a wide range of vehicles including tractors based on a Lanz licence.Current range of "Ursus" tractors designed in 1950s and heavy range in collaboration with Zetor of Czechoslovakia. Licence for Massey-Ferguson tractors in 1975 resulted in major expansion and erection of new 5 building complex for all machining, presswork, engine, transmission, painting and assembly of 75,000 complete tractors and a further 15,000 engines, plus spares.
Problems with investment, oil crises, martial law, inflation and recessions have all delayed the project and today it only has the capacity for 60,000 tractors but actually produces less than 20,000per annum.

Ursus is the central production facility in Warsaw of the Ursus union and 5 satellite factories elsewhere in Poland produce steering and hydraulic parts, brakes, lift linkage and welded assemblies,radiators, aluminium castings and pipework, and clutches. Western licences have been obtained to assist several of these factories.
Proprietary items for tractors are bought from other industrial sources in Poland, - hardware, tyres, bearings, electrics, plastic parts.
Although there is considerable buffer storage,(excessive by any western standard) production seems to be limited by quantity and quality of raw materials and purchased parts.
The "old" Ursus production capacity is about 20,000 of the small 30 hp tractor and 6,000 of the heavy 80 - 150 hp models. Production of the medium range has diminished owing to technical problems with the worn out manufacturing facilities in the old plant.
Overall the facilities within new Ursus for manufacture are fairly comprehensive with foundry, forge and tool manufacture on site. All castings, gears and shafts are manufactured in house as are sheet metal and engine parts. Fuel injection equipment and pistons are notable out-sourced parts of the engine.
Overhead conveyors interconnect all 5 buildings for the transfer of components and again there is considerable buffer storage in this system.
Despite the new technology the licensed tractors have carried a price premium which must have damaged sales, aggravating the inefficiencies caused by production problems of parts shortages and directed labour.
The computer facilities within the Engineering Dept are based on stand-alone CAD stations equipped with Autocad release 10.
There are three stations, each with an A2 plotter dedicated to; Engine design, transmission design, and chassis design. At present there is no interconnection but a network will be set up as funds allow.
Production uses a RIAD 32 computer made in USSR and said to be equivalent to IBM. This has data base for all Ursus production in terms of finance and material control (costings).
Within production depts, eg engine build, computer is used to log all incoming material which is then downdated as engines begin on assembly.

Sipma Lublin.

Factory producing PTO shafts, Balers, round and square, Walking tractors, bale handling equipment, fruit harvesters, grain crushers.
Sipma was born out of the former AGROMET-Lublin works in about 1990. It was formed as a joint-stock company with three Italian partners: Ruggerini (Engines); Barbieri (Small tractors); and Oman (Round balers).
The stock holding is split approximately 65% Agromet, 20% Italian,and 14% Sipma with a 1% private holding.
The former Agromet works employed some 1800 persons but that has been slimmed down to the present level of 200 in Agromet and 450 in Sipma.

Agromet make about 300,000 pto shafts per year while the Sipma output is more mixed with 2-3000 square balers and 500 round balers. Both these figures are about 50% of last year's output. The factory has a capacity for the manufacture of about 10,000 baiers per year. 60-70% of the baler is made in, supplies of bought-out parts (main gearbox) are at present limiting output. The main customer for Round balers - the state farms - are at present being restructured.
Among the product line developments are more pieces of equipment for round bale handling, including the developement of Bale wrapping for Norway using special wrapping tape imported from Denmark.Sipma employ their own design staff.
Under the previous system the sales in the home market were handled by Agroma and Agromet-Motoimport looked after export. Now they must do it themselves and they sell directly within the voivodship and elsewhere it is through a dealer network.
The company claim to be operating in profit at present.
There is a feeling that the Italian side are to withdraw support and Sipma have sought other backers. One such, Same of Italy were interested but are thought to be more interested in the local light van factory - Zuk Lublin. The Agromet name is being phased out as they themselves are being privatised.
Current selling price of square baler is $3700 and round baler $5000

IBMER.

Institution responsible to Ministry of Agriculture and represents farmers' interests in the mechanisation sector. It carries out studies into building materials and methods, tractors and farm machinery, and farm electrification. The headquarters are in Warsaw, the main operating site is at Kludzienko and there are a further 12 out-stations situated around the country. Tne institute is divided into sections on management and power, economics, crop production, animal production,and various support services. There is a training school attached to the institute which provides teaching aids for the industry .Of immediate interest to the machinery industry, Kludzienko is becoming equipped to be the official OECD test station. There are also research facilities for soil-tank testing, seeding mechanism testing as well as computerised engine and pto test cells, cab strength testing and cold chamber testing.
The research and testing activities are aimed at improving the functional side of buildings and machinery.
IBMER works with the agricultural industry in areas of market research; the director would like to have two farm mechanisation specialists available in each voivodship for extension work.

PIMR

Institution responsible to the Ministry of Industry and Trade established to carry out research into farm implement design and use, to check and certify general manufacturing quality and machine safety, to abstract information from international agricultural publications. PIMR has contact with about 400 producing units of which 24 are main manufacturers. PIMR has three specialist departments; Land cultivation, Root harvesting, and Grain and fodder harvesting. These are supported by hydraulics laboratory, Instrumentation dept (including noise and vibration), Information dept, Marketing dept and Computer dept. There is a workshop with a range of rather old machine tools capable of manufacturing almost all the parts needed in the institute's work. The workshop was decommisioned at the end of 1991 and is currently being liquidated. A separate department develops plastic injection moulded parts for crop sprayers. In recent years the hydraulics lab has led the development of a small tractor (13 kw pto power with full electrics, safety cab and hydraulic lift), but sadly the project seems to have been abandoned. The computer dept is equipped with hardware and software from GIXI, IBM, VAX and ASKA. This comprises CAD and support programs such as finite element analysis. The computer network is used by some of the machinery manufacturers. The computer equipment has recently been upgraded with the addition of Pro-ENGINEER software (CAD package).

PIMR was founded in 1946.

Value of assets	43.378	mld Zł	
Area of buildings	11400	m^2	
Plot size	4.4	ha	
Arable land	32	ha	
No of workers	284	persons	31.12.91
	103	university degree	
	14	doctor's degree	
Departments	8		
Turn-over	16.625	mld Zł	1990
Type of property		Government Owned	

Research and development.

The Institute is dealing with the following fields of activity: Research, innovation, implementation, design, consulting, information, production and marketing.

Field of activity.

Research work and technical work resulting in progress in agricultural tractors and machinery and equipment. Research in the field of animal feed processing and conservation of grain. Work with ergonomics and safety. Decrease machinery influence on environment. Design of machinery with low energy consumption. Quality control certification of machinery. Implementation of scientific results in industry. Information service about new technology in agriculture.

Work accomplished during the last five years:

400 designs released.
91 innovations/patent applications
Received 9 country awards in competitions.
830 publications.
Co-operation with UNIDO.

Fields of activities with potential partners abroad.

Research and development
Technology
Design
Production
Patents
Licence sales
Engineering service
Consulting
Distribution dealer
Marketing
Trade agreements
Supply of machinery and equipment
Test of agricultural tools and machinery
Information exchange with other institutes.

A Law has been passed by Sejm regarding the whole field of science. The Ministry of Industry and Trade has nominated PIMR for its special assignments. A Governmental Committee, KBN, controls the official budget and allocates funds. PIMR is directed by the Scientific Board which consists of 19 persons from PIMR and 5 persons from other organizations like IBMER, university, etc. Ten persons in PIMR have doctor's degrees. which is a good number. Without at least six persons holding degrees at doctor level or higher, no group of scientists can be recognised as an Institute for government funding.

PIMR Organization

I. To the Director of PIMR are subjected directly:

No	Name of Department or position	Symbol
1	Deputy Director for Scientific Affairs	DB
2	Deputy Director for Economics Affairs	DE
3	Personnel Affairs Department	DSP
4	Stand for Cooperation with Abroad	DZ
5	Computer Aiding of Design and Research Works Dept. [Computer Research Centre]	DC
6	Marketing Department	DK

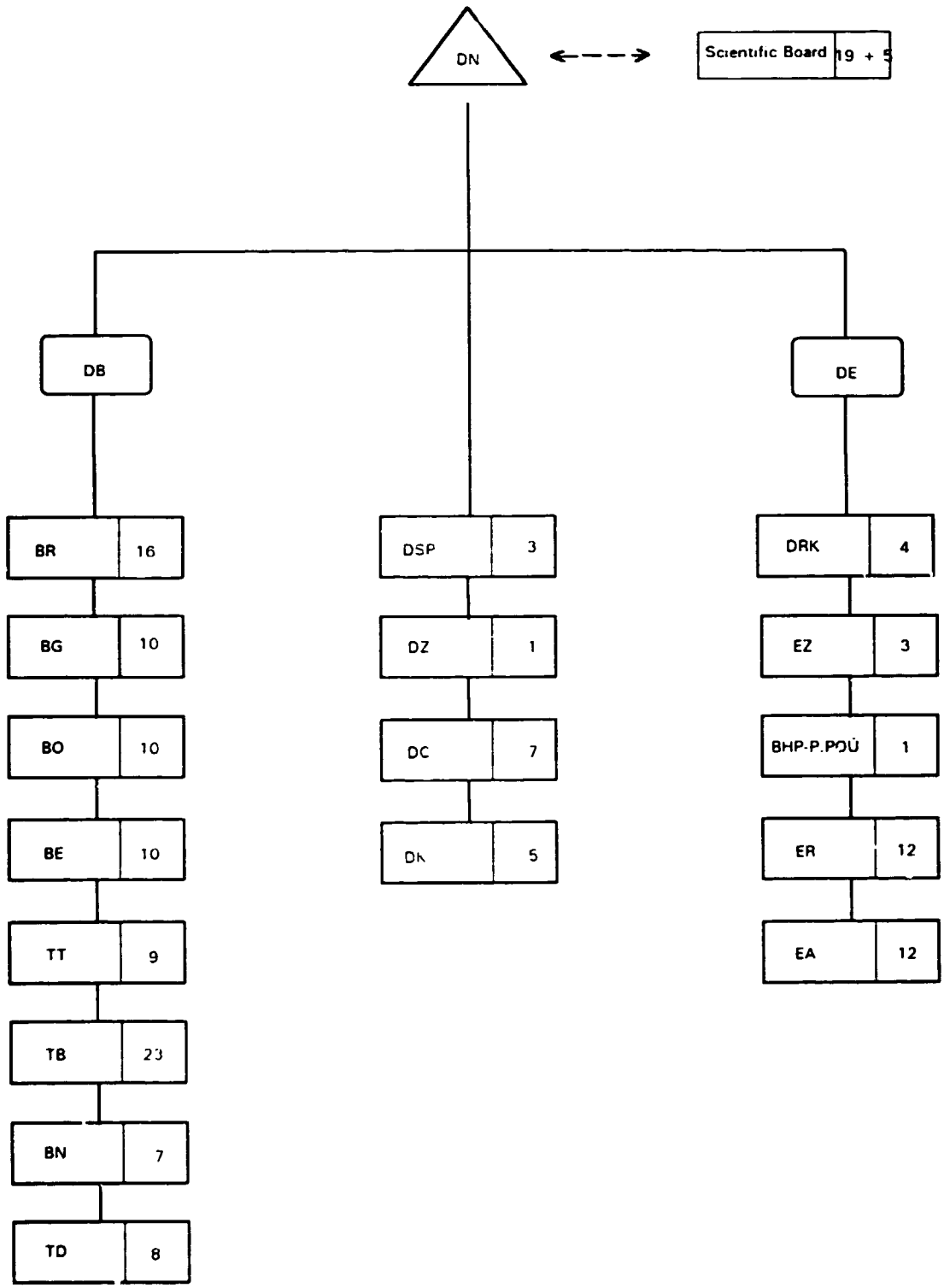
II To the Deputy Director for Scientific Affairs i.e. First Deputy Director are subjected:

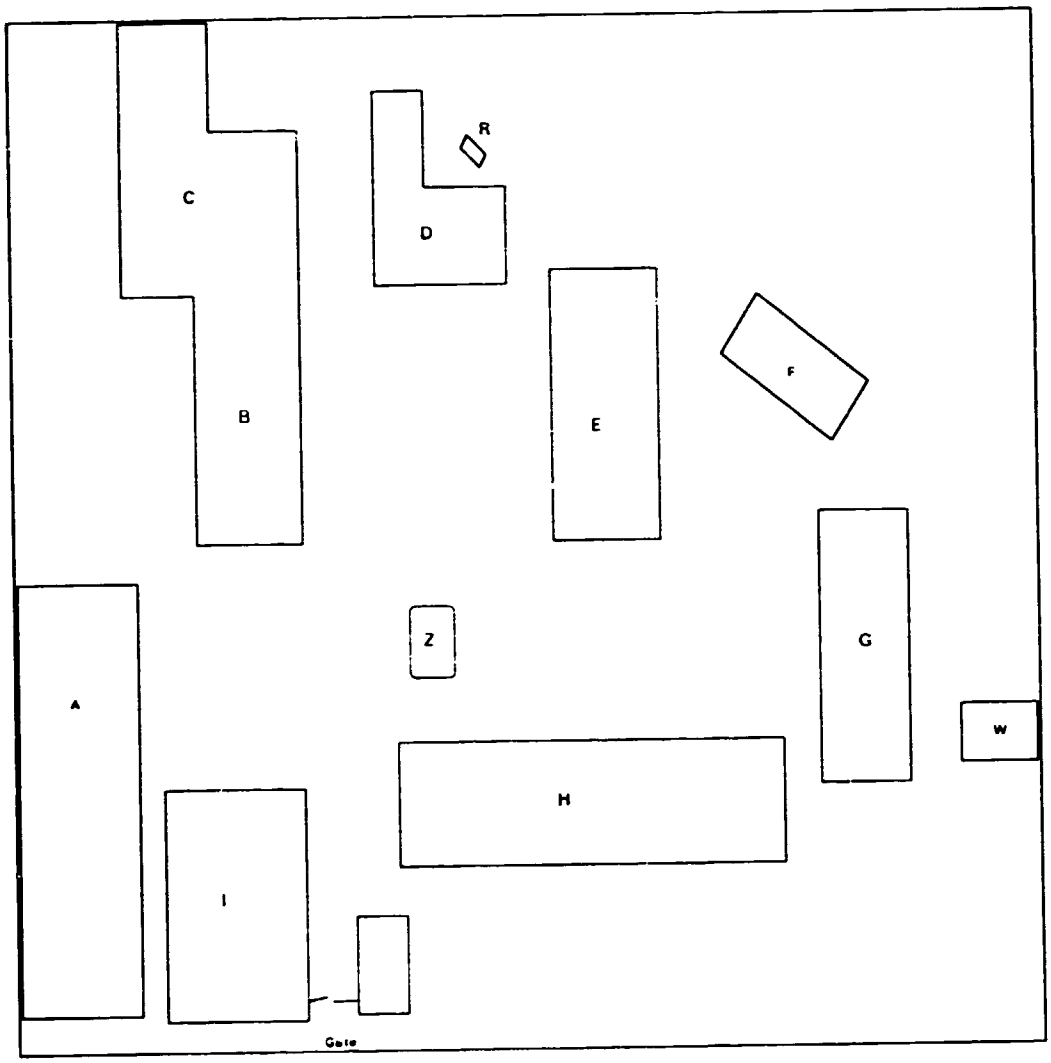
No	Name of Department or position	Symbol
1	Soil Tilling and Crop Harvesting Machines Department	BR
2	Department of Machines for Farm Works and Animals Feeding	BG
3	Department of Machines for Sowing, Fertilizing and Plant Protection	BO
4	Power Engineering and Wheel Transportation Department	BE
5	Production Technology Department	TT
6	Quality Test, Equipment for Testing and Measurements Department	TB
7	Agricultural Engineering Branch Standarization Centre [Standardization Department]	BN
8	Scientific, Technical and Economic Agricultural Engineering Branch Centre [Information Department]	TD

III. To the Deputy Director for Economic Affairs i.e. the Chief Book-Keeper are subjected:

No	Name of Department or position	Symbol
1	Financial and Book-Keeping Department	DRK
2	Employment and Wages Department	EZ
3	Stand for Industrial and Fire Safety	BHP-P.POÚ
4	Maintenance Department	ER
5	Management Department	EA

PIMR Organization Chart - May 1992





PIMR site:

A: DC & PIMR Telephone Central
Leasing to ZUS (Insurance Company)

B: Director PIMR & Deputy Directors, DK, DSP, EZ, DRK, TD with Library and Patents

C: Workshop -ZDKP

D: EA, ER, Stores of PIMR & ZDKP

E: TB, TT

F: Labs of TB & TT

G: Free (prevous BE)

H: BE, BG, BN, BO, BR,

I: Leasing to other

R: ramp (Loading spot)

Z: waterpool

The Scientific Board gives advice and recommendations to the Director of PIMR regarding the different activities which he is free to accept or change at his own discretion. It is only when the Director asks for funds from the Governmental Committee, KBN, that he needs the backing from the Scientific Board. The Director of PIMR is chosen for a period of five years. PIMR is authorized to carry out so called statutory assignment which are related to safety, ergonomics, environment, etc. The Ministry wants to minimize the statutory grants. PIMR can also receive grants from the Governmental Committee in order to support a certain scientific investigation. The grants are given according to a ranking list which technical experts first have revised. Target Grants can also be approved by the Government Committee up to 50 % of the cost of the project. The rest of the budget must be covered by the applicant or be financially backed by a bank. The applicant is usually an industrial enterprise.

Agroma, Poznan.

Agroma was/is the official State distribution channel for Agricultural machinery.
Poznan branch was established 40 yrs ago and now has 10% of the national Agroma turnover.
Poznan is the centre of 5 voivodships(counties) and together with Gorzow to the northwest produces some 40% of Poland's food.
There are 5 main depots and 9 sales points selling wholegoods, spareparts and all farm consumables eg. electric motors, hand tools, welding rods etc.
The turnover in the first 9 months of this year is the same as for all 1990 but there is at least 30% inflation this year. The balance of sales, wholegoods/spares has changed from 60/40 last year to 30/70 this year, so the actual sales of spares has doubled.
Agroma have supplied these spares almost exclusively from their own stocks, and by exchanging with other Agroma depots throughout the country.
Farmers have put off buying new and now refurbish old or buy new at the last minute.
The staff of Agroma is 330 in the group, no staff have left but there have been redeployments eg pre-delivery staff now do commercial automotive repairs.
Agroma do not have any second hand machinery trade.
There are some plans to functionally separate the 5 depots from Poznan but to retain computer links particularly for stores and parts processing.
The Agroma director was dissatisfied with the past performance of Ursus, and identified three causes for concern;
1 The very slow and incomplete investment in the new factory
2 The inflexible nature of the Ursus production process
3 The present market situation.
The Director quoted the difference between the Zetor 7211 and Ursus 4512, both in the 60-65 hp range. The Ursus costs almost 30% more, has a much

less spacious and lower spec cab, and is in very short supply. The much better fuel economy cannot overcome these disadvantages. Ursus is known to have prototypes of much higher powered (>150hp) tractors but after 3 yrs still no production.
The Combine factory are unwilling to appoint dealers unless there are large covered areas for pre-delivery, service, etc.
Agroma Poznan is happy to sell products in all parts of Poland - there do not seem to be any marketing boundaries.

1992 NATIONAL SEMINAR

In order to disseminate the results of the project TF/POL/90/802, Assistance in Upgrading Management and Modernising Engineering of Agricultural Machinery Industry, to the Polish Agricultural Machinery Industry, a National Seminar was held at PIMR on 9 June 1992. The Seminar Programme included presentation of the results of the UNIDO project and also a presentation of Polish Industry Statistics collected by PIMR. An exhibition showing the test facilities of PIMR was a vital part of the Seminar Day. The equipment supplied by the project was demonstrated at the exhibition sites (see equipment report on page 71). About 70 persons attended the Seminar (see list of participants on page 78).

The title of the Seminar was: AGRICULTURAL MACHINERY INDUSTRY TRANSFORMATIONS and the Seminar Programme was as follows:

9.30 Registration
10.15 Prof. K. Mielec: welcoming address: introduction of Prof. B. Wojciechowicz as Chairman.
10.30 A.G. Lundberg: "PIMR - serving the Industry, present and future activities".
11.00 I.M. Urwin: "Agricultural machinery industry - suggestions for modernising management, engineering and marketing techniques".
11.30 Jan Gromadzki: "Agricultural machinery industry - sector analyses".
12.00 Exhibition "Testing equipment" and presentation of the new CAD software (Pro-Engineer Package & ASKA).
12.45 Lunch
13.30 Henryk Wojciechowski: "UNIDO Project No TF/POL/90/802 - study tours, fellowship training and new test equipment and CAD software".
14.00 Discussion: "AGRICULTURAL MACHINERY INDUSTRY TRANSFORMATIONS".
15.30 Conclusions.
16.00 Summary and closing of the Seminar.

Presentation to Seminar by Mr A.G. Lundberg,

PIMR - serving the Industry - present and future activities.

Mr Chairman, Ladies and Gentlemen.

One of the reasons why we meet today is the UNIDO project, Assistance in Upgrading Management and Modernising Engineering of Agricultural Machinery Industry. The title of my presentation is, PIMR - serving the industry - present and future activities, and this is of course what we should concentrate on. But allow me to first say a few words about the UNIDO project. The project has been in operation since last autumn. The whole project period is 12 months. The project consists of three main parts: The Missions, Study Tours and Fellowship Training and an Equipment Component. The project operations started 25 August 1991 which was also the start of the first mission. The mission activities have been carried out by two UNIDO Consultants, Mr Urwin and myself. Mr Urwin is a production specialist while I have been concerned with the product development aspect. The first mission ended 9 October 1991 and the second mission started 22 April this year and will last for two months to 21 June 1992. The Study Tours, the Fellowship Training and the delivery of Equipment have taken place in the meantime. The project has been located here because PIMR has the necessary established liaison services with the industry and facilities and staff to ensure smooth counterpart support. The project is financed by the Government of Japan.

I would like to draw your attention to the fact that UNIDO assistance here is of a catalytic nature. The Project Document, which outlines the activities, expects the following end-of-project situation:

1. A group of engineers and technicians will be trained in the management techniques to modernise production facilities of agricultural machinery factories.

Three Engineers went on fellowship training. We will get a report from that training today.

2. A group of Senior Engineers will be familiarised with technological international trends. A basis will be established to develop inter linkage among university-institution-factory and end user organisations.

Eight Engineers from PIMR and Industry undertook Study Tours in three different groups to different parts of Europe. A summary report from these Study Tours will be presented in the Seminar.

3. Guidelines for long-term programme including investment opportunities will be identified.

The observations made during our visits to factories and various institutions indicate that investment in marketing techniques would be of great benefit to the organisations concerned. We have also noticed that the product range now in production in some factories would need modifications in order to better suit the present market situation. Investment in efficient computerised systems for detailed monitoring of costs of production seem to be a tool which many factories should need. The development of the private sector also requires management training.

This last point will now lead us back to the title of my presentation. How should PIMR serve the industry.

PIMR has in the past played an important role in the product development process of agricultural machinery in Poland. This role has now changed because many industrial enterprises carry out the design and development of their products themselves. The amount of product design and development work had already begun to decrease at the end of the 1970's. PIMR employed almost 700 persons at that time. The workshop alone had 300 persons employed. Now the workshop is closed. The present plan is that only 100 persons would remain on the pay list from the beginning of 1993. We understand that you have been forced to act in a very radical way in reducing the expenditures in PIMR because of the reduction in funds. Although the role of PIMR has changed in this respect and the capacity here reduced accordingly, the fact remains that PIMR has a lot of brain power and physical resources to undertake advanced research work.

As I already mentioned, officials from PIMR and Industry went on Study Tours to different countries in Europe. One of the groups came also to Finland. One observation of the Finland tour was that agricultural engineering institutions are much smaller in Finland than in Poland, the size in Finland being about 50 to 80 persons employed per institution. But we should maybe not make a direct comparison between Finland and Poland. We must remember that Poland is almost ten times bigger than Finland both with regard to population and arable land. If we look at the tractor population, the figure in Poland is five times bigger. These figures indicate that there must be a big scope for agricultural engineering research also, even if the relation is of course not linear.

We are very much talking about changes, but one thing which has not changed is the role of PIMR as the Official Agency for the Ministry of Industry and Trade.

PIMR is authorised to carry out so called statutory assignments which are related to safety, ergonomics, environment, etc. PIMR co-operates with the Polish Standardisation Institute in the field of standardisation. PIMR is a nominated representative for the Registration Office in the field of patents. PIMR is thus an official expert agency for the Ministry of Industry and Trade. This area cannot be commercialised and would therefore require official funding.

In addition to the above-mentioned official duties, work is in progress to introduce PIMR as an agency for quality certification based on ISO and EEC standards. In the design process of machinery, safety and ergonomics is increasingly important. Also ecological aspects in the form of more efficiency and thus lower fuel consumption is an area of great importance. All these aspects should be controlled by an organisation which has the necessary technical competence for such work. This competence is available in PIMR.

The role of PIMR has changed because the industry would like to control its product development activities. It is therefore now less likely that PIMR would be asked to design a whole product or a range of products. But there are many specific tasks which could be carried out here. It is especially undertakings which require special instrumentation where PIMR could be of service. The difference compared with the past would be that PIMR do not carry out the whole process of designing a product but instead provide some expert inputs which the factory in question do not have. We have seen here for example advanced simulation programmes which have been developed in this institution. When you already have this ability I see no end to the possibilities if this line of activity is encouraged. Now I do not talk only about computer programming. A great deal of advanced mechanical engineering work has been accomplished here. PIMR as an industrial institution should thus do research in the field of advanced industrial engineering.

According to the UNIDO Project Document, the Government of Poland attaches a high priority to the modernisation of factories and to introduction of modern management techniques. To achieve this goal an overall training programme is considered to be important. It would also be important to establish and strengthen inter links between individual agricultural machinery manufacturers and technical institutions which then should be used as a tool to build a plan of action for modernisation of industrial activities generally. When we combine these two facts, inter links and training, that leads us to the next block of possible PIMR activities.

We would like to propose that PIMR, among its other activities, would be a training centre for the industry. This means that PIMR would be first of all the organiser of such courses. The courses should then be advertised to the industry and other institutions of interest. The idea is however that all the knowledge does not need to be represented in PIMR. The person who knows

will be the one to teach. He does not need to be a PIMR expert. In some instances the PIMR expert will give the course and in an other cases it might be a specialist from outside. This specialist could be from the industry or from another relevant institution or from abroad. If this lecturer is a well known expert it will certainly attract many participants. By inviting representatives from the industry to a course, this occasion will give opportunities for the exchange of useful information in both directions and in such a way will also function as a marketing exercise. In PIMR you will get more information about what is needed in the industry while the industry will be informed about what you can offer.

In order to explain what I mean with training courses, the following examples might serve as models.

In the Production Technology Department are injection moulding machines for the manufacture of plastics components. I would like to propose that you organise a course in the use of plastics in agricultural machinery. There are a lot of plastics with different properties. A specialist from a producer of plastics is certainly willing to come and explain how to select the right type of material for a certain product. If he at the same time can meet people from several industrial enterprises, I think he is more than willing to come. This sort of course could also touch the design aspect by inviting researchers from other departments in PIMR to come and give a lecture and give their opinion about the design of a certain component under consideration. In such a way technical information would begin to flow between PIMR, industry, suppliers, customers, and so on.

We have visited many factories during our two missions in Poland. When we came here last autumn we saw a very dramatic scene because of all the effects which had been caused by the change in the economic system. Now, during this mission we have seen a somewhat different picture as the re-structuring process has started. It is natural that this process will have a different path depending on the actual situation in the company concerned. A Director who has managed to lead a re-structuring of his company should come to PIMR to give a lecture and tell the participants how to successfully implement a re-structuring process in a company.

In PIMR there is a Computer Research Centre which is equipped to undertake research work in the field of CAD including strength calculations and computer simulation. During our missions we have seen that factories are very keen to bring in more computer power into the factory operations. It is however not so easy for a factory manager to select the right equipment for a specific task, and then to operate it correctly. This department in PIMR could offer its knowledge to the industrial enterprises in the selection of suitable hardware and software and also provide the training component.

During discussions, several times it has been confirmed that pure technical development of the industry is a second priority. What is on the other hand very important is to introduce a management system which is more aware of the need to observe the company as a commercial unit. Management training should therefore be included in a training programme. It is however important to focus this training on specific issues like marketing, cost control, etc.

I have tried here to outline a few possible ways to widen the communication between PIMR, industry and other institutions. The report from this Seminar will be included in our Final Report. We therefore hope that you would actively take part in the discussion so that more ideas may be brought forward for inclusion in our final document. I personally think that UNIDO is glad to lend its support to the very positive development we are witnessing in Poland today.

PIMR, PAST AND FUTURE ACTIVITIES

PIMR, PAST

Agricultural Engineering Research
Official Expert Agency, Standardisation, Patents
Information distribution
Machinery Design, Development and Testing
Prototype manufacture

PIMR FUTURE

Agricultural Engineering Research
Official Expert Agency, Quality, Standards (ISO, EEC), Patents
Information sales
Consultancy service to industry
Training courses in management, engineering and marketing

Presentation to Seminar by Mr I.M. Urwin.

Agricultural Machinery Industry
Suggestions for modernising Management, Engineering and Marketing techniques within the Industry.

Mr Chairman, Ladies and Gentlemen, thank you for your welcome.

I hope you all enjoyed your breakfast this morning, but how many of you gave thought to how it arrived? A key element in the process was the Agricultural Machinery Industry. This Industry is in trouble and without your help, your future breakfasts are at risk.

As my colleague, Mr Lundberg has mentioned in his address, this is the second visit we have made to PIMR in connection with the project, and already things are happening, changes are taking place. The three topics I wish to discuss today are Management, Engineering and Marketing. There is a guiding rule for profitable Industry running through and connecting them which should be in everyone's mind and I introduce it at this early stage:
"DON'T MAKE WHAT YOU CAN'T SELL"

The Agricultural Machinery Industry has not gradually fallen into decline, it has happened quite quickly and has started after the change from a Centrally Planned Economy to a Free Market Economy.
The Economic oil which lubricates your Industry as it lubricates any industry is money. The money is actively pumped round by all parties but briefly the circuit goes via farmers to machinery dealers to machinery manufacturers to raw material suppliers and workers to shopkeepers to food wholesalers to farmers and so on. Money flows in one direction, goods and services flow in the opposite direction. There is no starting point and no finishing point, it is a continuous process. There were leaks, quite big leaks, represented by trading losses, waste, inefficiency,etc. and under the Centrally planned system the Government kept the system "topped - up" as necessary (by subsidies) and regulated the flow by a system of fixed prices at all points in the circuit.
Then came freedom. The Government removed price controls and ended subsidies. The oil continued to leak out, the flow slowed and almost stopped. The machine has almost ground to a halt. The farmers, I suspect are the only element which can survive for any length of time without "oil".
So one problem is to get the engine running again. That I suggest is the task of the Government.

Our task is to ensure that the Agricultural Machinery Industry is ready.

Management, Engineering, Marketing.
If we look at the rule again, we must know what we can sell. That is the first requirement. I think it is worthwhile to emphasise the distinction between Marketing and Merchandising. Marketing is the business of investigating and analysing the customer to find out what he needs, in what quantity, when, what he is willing to pay, what are his performance expectations of those needs, what alternatives exist, and so on. Merchandising is the business of delivering goods and services to meet those needs, the setting up of distribution and service networks, sales promotion and advertising campaigns.
In the "old" system, there seemed to be no definite market research, and no merchandising: in fact it seemed to be a process of "rationing", and the bottleneck was said to be supply of raw materials.
But there were positive activities. PIMR has a history of successfully designed products which the industry has introduced to production. For example, in the last five years PIMR has released over 400 new designs based on both requests from Industry and the outcome of their own initiatives. So by definition there has been some Market Research and analysis.

In today's Competitive environment you cannot expect to maintain your position as Monopolies. The days of one tractor manufacturer, one beet harvester manufacturer, one cattle drinking bowl manufacturer are numbered. Former Industrial Brothers become competitors. To maintain your sales position you must compete with other manufacturers offering similar and (it must be recognised) possibly better products or you will be forced out of business.
There is a Marketing Department here in PIMR which has experience in the preparation of databases and techniques of Market Research This skill will be made available to the Industry through courses, as Mr Lundberg has outlined. However, in the atmosphere of competition which prevails today, commercial confidentiality is vital and it is even more important to guard the information you gather and extract the most from it if you are to maintain your competitive edge.
Fine. So now your Marketing Department has been out working and has presented its report to the Commercial Director and you have a new Business Plan and know what you can and can't sell. Engineering comes next.
I would use the term Engineering here to cover the procedure of generating the documentation to support manufacture, to give all the information necessary to produce the product.
The Product Specification as released by the Commercial Department. The Design drawings from your design office, the Component lists. In cooperation with the design process will be the manufacturing engineers to ensure that the best and most efficient techniques of manufacture are incorporated in the initial design.

The new technologies of CAD, CAE, CAM, together in CIM (Computer Integrated Manufacture) should be critically investigated. Here again the latest resources installed in PIMR under this UNIDO project are available to you and we look forward to PIMR setting up training courses to teach you the benefits, and to sit alongside your designers in the resolution of your manufacturing problems. I don't want to go here into advanced manufacturing techniques, because I know from talking to you that you are well aware of what is available through visits to overseas trade and manufacturing fairs. There are some examples of machining centres in the Industry as well as NC controlled machines.

So we know what we can sell, and how to make it, is it time to "cut metal"? Almost. Let us apply the rule to the smallest elements of the manufacturing process and consider each manufacturing operation as an entity. You perform an operation and "sell" the part to the next operator. If he is not ready for it you can't sell it and have broken the rule. Another way of looking at work in progress is through the concept of "added value". A manufacturer makes a profit because he sells the collection of processed pieces of raw material for more than the total value added to the individual pieces of raw material taken into the plant. He adds value by the utilisation of manpower, processes. energy, etc. The biggest single value component, and the most invisible, is time. Time is money and with today's high interest rates is even more relevant. From the moment you receive the goods, there is a clock ticking away adding value at a fixed rate to the part. As the value increases through subsequent operations, each tick represents a bigger increase.

You must be your own judge of how much raw material you take on site, but, as it is based on supplier history, you are influenced by external circumstances, but you have absolute power over how fast you subsequently add value. The rule must be, don't add value earlier than necessary. Look around your factories. Do you really need all those racks of steel? Why did you make so many pressings? And why did you then leave them to go rusty? Tell your manufacturing managers to review minimum batch quantities downwards. Look at ways of trimming machine reset times. You can no longer afford the luxury of large stocks of work in progress. I know you are going to tell me that yours is a seasonal business and you must work all year producing for a short selling season. Back to merchandising. You should work with banks and finance houses to support a programme of out-of-season delivery at discounted prices to encourage movement of product outside the recognised traditional buying period. Look at the farmer's income pattern and aim to separate him from his cash as soon as possible. Get the farmer or even the dealer to be the machinery stockist.

What practical changes then are necessary in your Industry?.

I see a need for more accurate and timely reporting of manufacturing costs to the manager's desk. In today's environment the manager needs to have instant access to this type of information if he is to react to demand changes. The manufacturing engineers need this cost information to assist the design process.

I see also a need for an information channel from the assembly process back to the Design stage. On our factory visits I watched a worker hammering a component into position. This action was necessary on every machine. Over a number of years more than 80,000 machines had been produced by that factory and all had needed "adjustment". Surely an example of lack of communication between design and manufacture.

I have also observed a lack of in-process documentation, particularly identification tags on work in progress. You are going to move forward. You will be introducing new products, with probably shorter intervals between design changes. Together with the necessary reduction in parts lying about as I mentioned earlier, there will be more opportunity to lose track of new, probably unfamiliar parts. One step forward can so easily become two steps back.

What other opportunities are there for increasing your sales? The traditional solutions are to export, and to diversify your product line. There has been, I know, good trading links in the past with the eastern countries. We visited Rogozno last year and the fall in output was considerable and followed a collapse in the trading links due to lack of a common currency. Here surely is an example of the need for discussion between nations at Ministerial level. But we can't all wait for Ministers, and we have seen examples where individual factories are pursuing their own trade links, using barter etc.

Trade to the west is more difficult because the technological level expected is possibly greater than you can achieve. This requires a great deal of effort to overcome, because I suspect it goes back to a deep seated distrust of authorities. I have been visiting Poland on short missions for many years and always there is this frustration I find with everyday objects which don't quite work, or only just work. Closer examination of the products suggests that they are designed for ease of service and repair. There are however markets where this level of technology at a competitive price will be accepted or tolerated. That is those areas of the world with large populations of Polish emigres, (North America) or countries where high technology products are unacceptable due to unavailable service back-up or even lack of technologically competent operators. This is a form of niche marketing, but may require considerable initial market research and investment to tailor the products to the market place.

Diversification of product is the second method of survival. Some of the manufacturers we looked at last year had tried to move into other product ranges, but without a formalised marketing department it is a formidable task. One manufacturer we looked at had diversified into the manufacture of wheeled domestic Rubbish Bins. One of his regular lines was however for municipal service equipment so perhaps he already had access to that particular market. Another company is making light industrial Equipment and Leisure products. The benefits of the monopoly mentioned earlier are immediately a barrier because the market into which you wish to penetrate is probably already fully supplied.

Another company we saw had set up a small unit within their walls to manufacture Goods Containers. This is probably a nice example of introducing a product which is not normally manufactured in Poland. For many of these avenues it is necessary to introduce something new and unfamiliar although in fairly widespread use elsewhere. Perhaps you could move into Steel scaffolding and motorised dumper trucks, both for the building industry. Other areas to investigate would be based on substitution of materials, eg, steel for wood. There are still many horse-drawn carts on the roads of Poland, and indeed far too many Agricultural tractors are used for the transport of produce from farm to market or Community store. But you may find that in moving off your "home" ground, you are competing with the Armaments Industry, who also surely have excess capacity.

We should look to a higher level of Manufacturing, that of the Industry itself. The units of production are large and monopolistic. Many are also self-sufficient in that all the relevant manufacturing processes are on the one site. While this renders the manufacturer in some way independent it also constrains him to use these facilities to the full and so it inhibits flexibility of design freedom. If peripheral services such as foundries, forges,plating baths, machine tool manufacture were taken away from the core activities, then these cores might become more profitable through changes to product design. For instance, components could be made of self-coloured plastics instead of cast iron or sheet metal weldments to provide greater durability, corrosion resistance, lightness etc. The separated units would have to seek alternative outlets for their products and services, but this is a practical solution which we have seen in progress. Once the principle of separation is established then the factory could be examined function by function for feasibility as stand-alone enterprises. Other areas which are probably suitable are Internal transport maintenance, Works canteen facilities, security services, even heat treatment and gear manufacture.

I see the longer term future of the Industry in encouraging manufacturing skill specialisation rather than single product specialisation. That is, a degree of horizontal integration and a reduction of vertical integration. This will allow those units which have recently upgraded their foundries, for instance, to take on work for other production centres where the foundry is older or environmentally offensive. Similar exercises could be carried out with other manufacturing elements such as gear manufacture. I believe that Brzeg, for instance, have specialised in Chain sprockets and angle drive gearboxes. We are here, of course, looking to future legislation on environmental pollution being enforced.

In the short term the Industry will suffer and shrink but at this moment there does not seem to be the demand for your products so use this breathing space to concentrate your energies to the best effect.

DO WHAT YOU ARE BEST AT DOING.

DON'T MAKE WHAT YOU CAN'T SELL.

DON'T ADD VALUE TO PARTS BEFORE IT'S NECESSARY

Good luck, and thank you for your attention.

Presentation to Seminar by Mr J. Gromadzki.

BRANCH STUDY OF AGRICULTURAL MACHINES INDUSTRY

The aim of this study is complex analysis and evaluation of the present technical, economic, and organisational condition of the agricultural machines industry as well as analysis and evaluation of the quality and modernity of manufactured machines and appliances for agriculture against their sale potentials. It follows that the material to be presented is very broad and consequently difficult to present in a brief summary. That is why only basic results of this study will be presented below.

The institutions co-operating in developing this study were:

- Office for Economic Studies and Consultancy, Warsaw
- AGROMET-PROJEKT, Poznan
- Ministry of Agriculture and Food Economy, Warsaw
- Institute of Construction, Mechanisation, and Electrification, Warsaw

The main source of information about factories was a questionnaire prepared by the team working on this study. Eighteen most important factories manufacturing machines for crop production replied, namely:

1. AGROMET, Agricultural Machinery Factory Brzeg
2. AGROMET, Agricultural Machinery Factory Czarna Bialostocka
3. AGROMET, Agricultural Machinery Factory Darlowo
4. AGROMET-WARFAMA, Agricultural machinery Factory Dobre Miasto
5. AGROMET-UNIA, Agricultural Machinery Factory Grudziadz
6. AGROMET, Forging and Agricultural Machinery Works Jawor
7. AGROMET, Agricultural Machinery Factory Kalisz
8. AGROMET, Agricultural Machinery Factory Kunow
9. AGROMET-MOGILNO, Agricultural Machinery Factory Mogilno
10. AGROMET, Agricultural Machinery Factory Opalenica
11. AGROMET, Harvesting Machinery Factory Plock
12. AGROMET-ROFAMA, Agricultural Machinery Factory Rogozno
13. AGROMET-FAMAROL, Agricultural Machinery Factory Slupsk
14. AGROMET-PIONIER, Machines and Appliances Factory Strzelce Opolskie
15. AGROMET-PILMET, Agricultural Machinery Factory Wroclaw
16. Lublin Agricultural Machinery Factory, Ltd. Lublin
17. SIPMA, Ltd. Lublin
18. Poultry Equipment and Appliances Works Gostyn

The above listed factories constitute 15% of all factories in the agricultural machinery industry but their production covers about 75% of all crop production machines and appliances manufactured.

The basic production yield of machines and appliances for crop production is manufactured in big factories. Of the 18 factories studied with total production room area of 504 000 m^2, 12 have production rooms with area above 20 000 m^2. The remaining ones are small factories with area below 10 000 m^2. Manufacturing stock in the factories is usually universal (33% to 100%). It is dominated by machines considered modern in Poland but significantly worn, usually over 60%.

Management engineering has so far been characterised by:
- overgrown administration/office structure (16% to 23% of personnel)
- maintenance of numerous auxiliary services which under crisis conditions are scarcely used and significantly increase production costs,
- lack of marketing service which is being organised now but lack of qualified specialists makes that task very difficult. Consequently, directly in manufacturing 19.6% to 65.7% of personnel is employed.

The main consumer of this industry's products is Polish agriculture, mostly family farms. The existing and prospective structure of farms in Poland is presented in Diagram 1.

Diagram 1. (to be found in Appendix after page 81)

Changes in the number of farms (thousand)

1-5 ha
5-10 ha
10-50 ha

over 50 ha

(year)

It is expected that the total number of farms will decrease from 2.1 million in 1990 to 1.0 million in 2010 and that buying power be definitely increased due to expected concentration of land and increase in crops.

The present level of labour mechanisation (especially in family farms) is unsatisfactory as compared to West European countries with similar agrarian structure. That is why the potential demand for agricultural appliances determined by the Ministry of Agriculture (present crisis included) will only secure preservation of the present level of labour mechanisation in 1992 -

1995, and it will facilitate increase in mechanisation indices for agriculture to 90% - 95% in 1996 - 2010.

Polish industry of agricultural machinery has basically manufactured a full range of agricultural equipment, necessary for completion of individual agricultural procedures. There have been reservation about limited diversity of product range which sometimes resulted in use of a machine unadjusted to existing conditions. That state of affairs was dependant on political conditions, however. At present there should be no inhibitions to change radically this state of affairs.

Up to now the import of agricultural machines followed from agreements on mutual supplies within CMEA (Council for Mutual Economic Aid) countries. A typical example is that of planters whose sole manufacturer in Eastern Europe was Czechoslovakia. In recent years some small Polish factories have manufactured planters conforming to average European standards and in volumes big enough to satisfy the needs of Polish agriculture. Import then should be treated as enrichment of the range of products offered on the market.

The production yield of agricultural machinery was also satisfying the needs of Polish agriculture. It is true that demand was usually bigger than supply. However, all that was taking place in a centrally planned and operated economy where prices for agricultural products were artificially kept higher than prices of agricultural machinery and where bank interest on investment credits was low.

Export during last few years was 10% of total production volume and did not have much influence on financial balance in agricultural machinery factories.

In 1990, the introduction of a free market economy caused a characteristic economic crisis demonstrating itself in agriculture with surplus production of agricultural goods and set-back in their purchase prices. At the same time prices of power and fuels and of salaries were rapidly increased which caused increase in production costs and in prices of tractors and agricultural machines. All that was accompanied with increase of interest on credits from 4% to over 50%. Consequently the buying power of farmers radically decreased and the sale of agricultural machinery came down. In 1991, the sale of most of the products was only 20% to 40% of the 1989 sales. These trends are presented in Diagrams 2, 3, and 4 below.

Diagram 2.(to be found in Appendix after page 81)
Agricultural machinery sales

(GB milliard; US billion; zl = Polish currency)

Diagram 3.(to be found in Appendix after page 81)

Agricultural machinery sales pattern

Total

Note: the 1989 sales volume equals 100%.

Diagram 4.(to be found in Appendix after page 81)

Employment pattern

Total

Note: the 1989 employment equals 100%
In response to such a rapid decrease in production all factories undertook measures to lower production costs, first of all by reducing personnel. The reduction of personnel was smaller (%) than decrease in sales in the studied period and it caused a significant decrease in labour productivity from 208 mln to 82 mln zl per employee. Detailed data for individual factories are given in Diagram 5.

Diagram 5.(to be found in Appendix after page 81)

Labour productivity

Total

mln zl/1 employee

Further serious reductions in personnel (about 2000 people) are being prepared. They will lead to an increase in the already high unemployment rate (in some local regions it is about 40%).

At present 13 factories have completed restructuring programs. Still their implementation is very difficult mainly because there are no buyers or even lessees of surplus production capacities or non-production capital assets.

All the above listed factors brought about negative balances last year in the factories studied.

The main reason, however, for negative balance is the decrease of production volume to the level below figures profitable for the factories in their present condition.

SUMMARY

Analyses presented in this study entitle us to draw the following conclusions:

1. The structure of farm land area and crop yields are reasons for very low buying power of Polish agriculture.
2. Labour mechanisation level of field work on individual farms is far from being satisfactory.

3. Potential demand for agricultural machinery in majority of assortments corresponds to the 1989 production volume and for harvesters, rotary mowers, and ploughs it corresponds to about 50% of the 1989 sales volume.

4. In Poland until 1989 the profitable relation index of agricultural goods prices to production means prices were being sustained by artificial measures.

5. The actual index of these relations in Poland and in EEC countries is similar.

6. Prices of agricultural machinery in US dollars are 3-14 times lower in Poland when compared to EEC countries.
7. The level of technological advancement of Polish agricultural machinery is lower by 20% -30% compared to machinery offered on EEC markets Improvement in the quality of machinery engineering and manufacturing is being observed.
8. There has been a rapid decrease in sales of agricultural machinery reaching 27% of the 1989 production value.
9. The main reason for decrease in sales value is the reduction in Polish agricultural buying power and, to a limited extent, reduction in export to the former CMEA countries as well as transfer of some equipment from state farms and agricultural co-operatives to individual farmers.

10. The export value of agricultural machinery is about 10% of the total sales value and does not have much impact on the factories' business economics.

11. Factories' personnel costs are too high and have negative impact on the factories' economic performance.

12. Machine stock in factories studied is over 60% worn out. in terms of its expected life by Polish standards.

13. Management engineering in most factories is not adjusted to requirements of a free market economy.

14. The factories studied had losses on turnover in 1991 caused by negative balance figures.

15. Financing of factories' operation is based mainly on credits and liabilities with high interest rates.

16. The factories' solvency is negative.

17. Analysis of economic indices demonstrates that there are serious problems in factories' further operation in their present condition and in the existing economic situation.

PROPOSAL FOR UPGRADING THE AGRICULTURAL INDUSTRY SECTOR

To find out to what extent production costs are influenced by decrease in capital assets, reduction in personnel, and elimination of tax on wages exceeding standard salaries in state institutions, simulation of production costs balance has been performed. The production volume in the simulation has been that of 1991. The results have demonstrated that for the whole sector analysed, the sum of all the above activities does not change the negative balance figures into positive ones. It has been also observed that 50% decrease of capital assets gives only 9% improvement in the balance and that elimination of tax on wages exceeding standard salaries gives only 5% improvement in the balance.

It should be stressed here that even if the demand still present for agricultural machinery is sustained the mechanisation level of production processes in agriculture will be falling even though it is already low compared to West European countries. On the other hand it is possible that in the near future the Polish agricultural machinery industry will collapse completely. Then the situation of Polish agriculture will be still more difficult because it will have to buy imported machinery whose prices are 3 to 14 times higher than those of the corresponding Polish machinery.

Another simulation balance of production costs expected in 1992 has been performed. This time activities outside the agricultural machinery sector have been also taken into consideration. This balance has demonstrated that unless the demand for agricultural machinery increases the negative balance figure of the agricultural machinery sector will increase to 1,800,000,000,000 zl. With an increase in demand for agricultural machinery

to the level expected by the Ministry of Agriculture, the negative balance figure would decrease to 988,000,000,000 zl.
Consequently, regardless the increase in demand the industry needs also other actions. E.g.:

- 50% reduction of interests on overdue liabilities and dues (elimination of payment obstructions) can lower the negative balance figure by 360,000,000,000 zl

- remission of interests on overdue credits and liabilities payable to the state budget will decrease the negative balance figure by 347,000,000,000 zl

- remission of dividends and elimination of tax on wages exceeding standard salaries will improve the negative balance figure only by 5%, i.e. 93,000,000,000 zl. It is the total of all the above mentioned actions which makes the total balance figure in this sector positive, i.e. 100,000,000,000 zl.

Consequently, the authors of this study see the need for two types of activities with mutual feed-back:

(a) inside factories - implementation of the restructuring activities already initiated,

(b) in the sector environment - stimulation of demand for tractors and agricultural machinery.

Increase in demand for machinery could basically be facilitated through increase in the buying power of agriculture resulting from an increase of prices of agricultural goods or through development of preferential credit system supporting purchase of agricultural machinery. The first option cannot be practically implemented because it would have to be based on high protective customs duties/tariffs on agricultural goods, both processed and non-processed. Those tariffs would run counter the principles of opening the borders and of co-operation with the Monetary Fund and with EEC. The second option is already functioning in Poland, i.e. there are preferential credits for purchase of mineral fertilisers and crop protection products.

A proposal for preferential credit system operation for purchase of agricultural machinery and tractors and effects of this proposal implementation are as follows:

The level of demand for agricultural tractors and machinery assumed, secures only sustaining of the existing level of mechanisation.
The value of agricultural machinery sales in the 18 factories studied, under the above assumption and discounted to actual prices would be

3,000,000,000,000 zl. It has been estimated that it would be 75% of sales value in all agricultural machinery sector. With addition of the value of annual tractor sales necessary for agriculture, i.e. 5,000,000,000,000 zl, the total value of agricultural tractors and machinery delivered to the Polish market is 9,000,000,000,000 zl.

Proposed operation of the preferential credit system:

1. The farmer would pay 30% of the purchase price and the remaining 70% plus interest would be payable by him on quarterly instalments during 3 years.

2. The credit would be given to farms with financial feasibility.

3. Variable interest rate would be used amounting to 0.7% of the guarantee's interest rate.

4. Refinancing of the credit by Central Bank would take place by the end of the 1st quarter of the following year.

5. Capability of crediting farmers by Co-operative Banks should be secured in the 2nd and 3rd year of credit operation.

Under the assumption that all agricultural tractors and machinery would be sold within that system bank credit would amount to 3,600,000,000,000 zl. Assuming the accepted above interest rate the credit load on budget would be 1,100,000,000,000 zl in the 2nd year of the credit system operation (9,000,000,000,000 x 0.7 x 17%). Still this load would be in part paid back. Simultaneous actuation of machinery manufacturing at the level determined by demand would cause increase in budget income due to:

- income tax on salaries plus unemployment allowance (2,000 people additionally dismissed)	25,000,000,000 zl
- income tax on sales value paid by the manufacturer or his creditor with 15% profitability	360,000,000,000 zl
- income tax paid by production materials manufacturer and on energy and fuels	100,000,000,000.zl
- income tax on trade	60,000,000,000 zl
- turnover tax on dealer	60,000,000,000 zl
Total:	605,000,000,000 zl

It follows from the above estimate calculation that the real expenditure of the budget on stimulating demand for agricultural tractors and machinery would not exceed 500,000,000 zl. It is important that budget income would precede budget expenditure serving this credit. Independently of the above calculations improvement in economic standing of factories would help privatisation of the factories. Privatisation, in turn, would give additional income to the budget, i.e. ownership transfer charges.

Reduction of further dismissals from work would ease the tensions resulting from increasing unemployment rate.

It should also be expected that this system would accelerate the restructuring process of agriculture whose objective is the increase of the average farm land area. With this system it will be possible to adjust the level of mechanisation of field work to the farm area and its production profile.

Presentation to Seminar by Dr H Wojciechowski

REPORT ON COMPLETED STUDY TOURS, FELLOWSHIP TRAINING AND EQUIPMENT PURCHASED IN THE COURSE OF UNIDO-TF/POL/90/802 PROJECT OPERATION SPONSORED BY THE GOVERNMENT OF JAPAN AND THE AGENCY FOR INDUSTRY DEVELOPMENT, POLAND

The important elements of the UNIDO project, Assistance in Upgrading Management and Modernising Engineering of Agricultural Machinery, were:

- four study tours to selected countries,
- fellowship training of three young engineers,
- purchases for PIMR by UNIDO of
    * test table for spraying machines by HOLDER, Germany
    * computer Laptop T 5200/100 by TOSHIBA, Japan
    * computer program Pro/ENGINEER by Parametric Technology Corporation, USA.

STUDY TOURS

Study tours were joined by engineers from URSUS Tractor Factory, Harvesting Machines Factory, Plock, PILMET Agricultural Machines Factory, Wroclaw, and PIMR, Poznan. There were nine engineers forming four groups. The tour routes covered Finland, Sweden, Denmark, Holland, Germany and Italy. The engineers visited 14 research institutes and university departments of agricultural engineering and 15 factories manufacturing agricultural machines and appliances. The countries and institutions visited are given in Tables 1 and 2 (pages 47 and 48).

The tour programs were focused on trends in the organisation of research and agricultural machinery production and, in particular, on modern methods of scheduling tasks, marketing, management, and advanced technologies used in machine manufacturing. Co-operation between universities, research institutes and manufacturers in upgrading and development of new agricultural engineering and in testing machines against national and international standards and regulations were also studied. The participants analysed organisational structures, research trends and financing as well as all forms of state intervention in the field of agricultural machinery industry.

Table 1

STUDY TOURS

Group		Country	Number of visited	
No.	Participants visited		institutes universities associations	factories
I	3	FINLAND	2	1
		SWEDEN	3	4
II	2	DENMARK	-	1
		HOLLAND	-	1
		GERMANY	-	4
		ITALY	-	1
III	3	GERMANY	5	2
		ITALY	1	1
IV	1	ITALY	3	-
TOTAL	9	TOTAL	14	15

Table 2

INSTITUTIONS VISITED

FINLAND:
- University of Helsinki, Department of Agriculture and Forestry, Viikki
- VAKOLA, State Research Institute of Agricultural and Forestry Engineering, Vihti
- ANTTI-TEOLLISUUS OY, Dryers and Silos Factory, Kanunki.

SWEDEN:
- Swedish Institute of Agricultural Engineering, Uppsala
- University of Sweden, Department of Agricultural Sciences, Uppsala
- State Research Institute of Agricultural Machines and Appliances, Uppsala
- AB AKRON, Agricultural Machines and Appliances Factory, Jarpas
- AB SVEGMA, Agricultural Machinery Factory, Kvanum
- AB VAMO, Agricultural Machinery Factory, Kvanum
- RANA, Factory of Complete Pavillions, Vara

DENMARK:
- HARDI, Factory of Crop Protection Machinery, Taastrup

HOLLAND
- DOUVEN, Agricultural Machinery Factory, Horst

GERMANY
- AMAZONEN-WERKE, Agricultural Machinery Factory, Hasbergen-Gaste
- ACCORD, Agricultural Machinery Factory, Soest
- RAUCH, Agricultural Machinery Factory, Sinzheim
- RAU, Agricultural Machinery Factory, Weilheim/Teck
- Institute of Biosystems Engineering, Braunschweig - Volkenrode
- Institute of Industrial Engineering, Braunschweig - Volkenrode
- Centre of Biological Research for Agriculture and Forestry
- Association of Agricultural Machinery and Tractor Manufacturers (LAV), Frankfurt/M.- Niederrad
- Test Station for Agricultural Machinery (DLG), Gross - Umstadt
- DEUTZ-FAHR, Agricultural Tractors and Machinery Factory. Lauingen
- PASSAU Gmbh, Gear-Transmission Factory, Passau

ITALY
- C.M.S. TURBINE, Factory of Plant Protection Machinery, Lungavilla
- IVECO, Truck Factory, Turin
- IMQ, Italian Institute of Electronic Equipment Attestation, Milan
- University of Milan, Institute of Agricultural Mechanisation, Milan
- 25th ISATA, Jubilee International Symposium on Technology Automation and Automatons, Florence

DESCRIPTION OF RESEARCH CENTRES VISITED

1. In Finland and Sweden, the institutes, together with their local branches, employ 50 to 80 people and at the universities there are only teams of under 20 people researching in agricultural engineering. German institutes and research centres employ 20 to 100 people but frequently only half of them are employed full time. In terms of the number of employees the greatest of the visited institutes was the Italian Institute of Electronic Equipment Attestation (IMQ) with, together with its local branches, employs several hundred people. In all research centres, about 90% of the personnel are scientists and technical assistants. The number of administration and service personnel is kept down due to commissioning of services to various specialised firms, e.g. construction of research sites and models, printing of publications, cleaning and maintenance of buildings, etc.

2. Directors of institutes are elected for a defined period of time by the institute scientific (supervising) board whose members are scientists, representatives of the ministries of agriculture and finance, institutions of higher education, banks, machine manufacturers, and farmers.

3. Research activities of the institutes usually comprise:

- matters in the field defined by governmental bodies
- obligatory testing of machines which follows from national and international regulations and norms
- institute's own research projects on upgrading agricultural engineering
- research works commissioned by industry
- individual doctoral and post-doctoral dissertations

4. Means to finance research works in those institutes are supplied by:

- governmental subsidies; in German institutes they usually cover 85 to 100% of institutes' needs whereas in Finish and Swedish institutes 20 to 50% of the needs

- governmental grants for selected (competition) research projects in Finland and Sweden

- payments by factories for commissioned research works and obligatory testing of machines and appliances; in Germany, the manufacturer covers only 20 to 35% of the cost of the testing, the remaining sum is paid from the state budget

- payments for research works commissioned by agricultural insurance houses, voluntarily set up by farmers; those houses spend on research on

work safety and ergonomics about 20% of their insurance premium receipts supported with governmental subsidies. The selection of research area is performed by the houses' own experts.

- payments for research works commissioned directly by the ministry of agriculture or industry; those research works are usually related to ecology or safety of machine operators
- payments for research works for other industries

- less frequent are receipts from backing foundations; in Finland, Ford Foundation has been supporting agricultural research with limited donations for 50 years.

5. All institutes pursue theoretical and developmental research within a chosen domain. Only some of them are authorised to perform obligatory attestation (conformity certificate tests) of agricultural machines and appliances and issue conformity certificates (national or international norms and standards). Obligatory attestation requirements usually apply to, first of all tractors and driver's cabs in mobile (self-propelled) machines, and to a limited number of agricultural appliances, e.g. crop protection equipment, mowers, heating units, milk cooling units, manual chain saws, hydraulic diggers. Consequently, attestation of most of agricultural appliances is optional and can be performed in any research institution. In Germany, attestation of any agricultural machinery is almost a general standard procedure. Publications on those matters are used in advertising. abe there negative results of the attestation procedure the institutes make them known to the involved manufacturer only.

6. Research in institutes working on agricultural engineering development the focus is on health and life protection and on protection of natural environment. Numerous research works are devoted to on improvement of plant protection appliances, tooling and computerised research sites. Construction and testing of transportable (mobile) sites for testing spraying machines on location, i.e. at farmers', are in progress. State regulations, in particular German ones, are aimed at obligatory testing of all spraying machines used in agriculture every year, securing resetting of hydraulic installations and exchange of worn elements, nozzles in particular.

Research on heat termination of weeds with the application of propane - butane burners mounted on an extension arm adjoined to a tractor.

As far as field machines are concerned great attention is paid to reduction of soil packing. Research on upgrading mineral fertiliser distributors and manure spreaders is being continued and focuses on uniformity of distribution

/spread. The participants of the tours observed well designed and programmed research sites serving that purpose.

In the Swedish Institute of Agricultural Engineering, the group of Polish engineers was presented with results of testing newly patented manure spreader whose speed of the floor conveyor belt is flexible and adjusts to the actual thickness of the manure layer pressing against the spreading drum. That design significantly improves linear uniformity of manure spread, which so far has rarely been analysed.

As far as mechanisation of animal production is concerned most frequent is research on improving climate in stock breeding buildings and on fodder preservation (testing of various polypropylene films for hay-silage ballots wrapping). There is also research on optimisation of feed preparation and feed serving appliances with automatic identification of individual animals

Some institutes carry research on recoverable plant fuel, for agricultural purposes. In Finland, for example, it is on timber fish-plates burning in drying stoves whereas German Institute of Biosystems Engineering has been working on use of plant oil (e.g. rape oil) in fuel engines for 10 years already. The mixes elaborated there are fully ecologically safe.

DESCRIPTION OF FACTORIES VISITED

The routes of study tours included visits to 14 factories manufacturing agricultural machines, appliances, and tractors. The size and product range of those factories were diversified. There were WAMO, in Sweden, with 30 people personnel manufacturing machines for cropping and dung tank-trailers, HARDI, in Denmark, with over 1000 people personnel manufacturing plant protection equipment, and DEUTZ-FAHR, in Germany, manufacturing agricultural tractors and machines and IVECO, Turin, Italy, manufacturing trucks and various transmission gears.
Some of the visited factories were part of greater industrial associations, e.g. the RAU Group comprises 20 organisational units with factories located among other places in Germany, USA, Italy, Nigeria and in Poland (at Przytoczna).

GENERAL OBSERVATIONS

Marketing department plays an important role in every visited factory. In bigger factories, within their marketing units tasks are divided according to areas of operation ,e.g. Eastern, English speaking, French speaking, African area. Specialists employed in those units have high qualifications, and are responsible for all trade in their respective areas, and have good knowledge of the factory products (design, manufacturing and operation/use of the product included) as well as of competitive products.

In all factories due attention is paid to advertising. In addition to leaflets there are permanent displays of factory products, usually in nicely designed interiors. Viewing/video rooms, with good equipment, are generally there and are found to be useful in dealers' training, not to mention other uses of their facilities.

Factories are supplied with information of farmers' needs through their networks of dealers, frequently sole trade representatives for a given area. The dealers, among others, have supplied factories with information that in Germany combine-harvesters are bought by those who service farmers and that in Italy harvesters are usually bought by groups of farmers.

The needs of agricultural machine markets are satisfied and, consequently, volumes of products manufactured in factories have decreased. Sometimes it results in reductions of the number of working days or cuts in working places.

More and more frequently dealers are ordering products shortly before a sale season which causes problems in factories, especially in those which do not manufacture various products but have one production profile. In factories which were supplying the former Soviet Union market there are also economic problems, e.g. in Finnish factory ANTTI which manufactures drying units and corn stores. In this case the factory was given 50% long-term state credit for production of 20 drying units for Estonia and Karelia, i.e. for support of its sale markets.
In Finland, export is encouraged by means of tax reductions. In Sweden, the companies with greatest export growth can apply for the King's Award.

Everywhere efforts are being put into quality improvements and decrease in production costs.

A significant number of factories carries research /development works in their own laboratories which frequently are better equipped than state institutes. Those laboratories are not only used for developing factories' own constructions /designs but also for analysing competitors' engineering. HARDI, Denmark, can serve as an example here. In its 1989 large area building in Taastrup near Copenhagen, the factory developed its own, very interesting, research laboratory. There spraying machines are tested and analysed, i.e. research on cover degree on plants sprayed, cross distribution of liquids with application of automatic test tables, etc., supported with the newest engineering, e.g. microcomputers, lasers, optoelectronics is carried there.

Another interesting problem was that of production quality improvement, its design and scheduling. In DEUTZ-FAHR, Germany, the following design of developments has been scheduled: 5% improvement in marketing, 20% in

design/engineering, 30% in manufacturing, 45% in co-operation, control and transportation. In 1991, this company allocated 25% of its revenues to development and new production and in 1992 the sum was increased to 50% of revenues.

As far as manufacturing is concerned the quality of products is being improved by application of robots in processing, trimming and welding of elements. Even in small factories of about 100 people personnel there are being used. ANTTI, Finland, AKRON and SWEGMA, Sweden, manufacturing drying units and mechanised segregated stores for corn serve as examples. In recent years they purchased numerically controlled and operated machines for cutting and shaping steel sheets. The quality of those factories' products is also high due to a number of elements being made of tinned sheet and attention paid to quality of anti corrosion coatings.

Among factories manufacturing equipment for plant protection, RAU and HARDI factories have outstanding engineering. Majority of plant protection equipment manufacturers has machinery similar to that in PILMET, Wroclaw, Poland. The machinery used is also alike as far as plastics processing is concerned.

Generally speaking, the organisation of the visited factories differs from that of Polish factories of agricultural machines. Generally, in the visited factories there are no departments/divisions manufacturing tools and repairing tool machines. There are also no big internal management or transportation departments/units. The factories use services provided by firms specialising in the respective activities. There are also no factory teams/units taking care of construction and administration of factory owned apartments /fiats, nursery schools or vacation facilities. The factories concentrate in their activities on manufacturing, development and sale of selected agricultural machines and even there they do not attempt at manufacturing all elements for production of machines. Specialised co-operation is noticeable in every field.
Space in production rooms and in other buildings is fully utilised. Actually, there are no one level store houses instead there are high storage facilities with trays/pallets on racks. Both semi-finished products and finished products as well as metallurgical goods are treated with care.

Manufacturing departments/units often give the impression of few people working there. Being on duty at the gate-house is usually complemented with doing some office work. During the day the so called industry guards cannot be observed.

At present the greatest worry of such organised factories is the sale of products. To ensure the growth of sales, the factories undertake many

activities, e.g. they offer their customers many versions and variants of their products whose users' features are usually not very different but their differ in appearance, look attractive and have good anti corrosion coatings. To ease the operation and safety of machines and decrease potential ecological hazards, upgrading of machines by means of implementation of various electronic systems is wide-spread. For instance, spraying machines operated fully from the tractor driver's cab are becoming standard.

In Germany, works leading to standardisation of electronic systems produced so far are in progress. A new association of a number of manufacturers of various types of agricultural machines has been founded to develop universal electronic systems working with the so called board computer operating any type of machine.

CONCLUSIONS

The main difference between the factories presented above and Polish industry of agricultural engineering machines is that in organisation and management of production as well as in marketing, in its wide sense, which is developing in Polish factories much too slowly.

As far as design and technologies of agricultural machines manufacturing are concerned there are smaller differences which can be decreased with widening the range of co-operation with other, both Polish and foreign, industries. In discussions and talks which took place in the course of the tours, industrial co-operation possibilities were frequently of mutual interest. It is possible, for instance, that PILMET, Agricultural Machines Factory, Wroclaw, will enter a co-operation and have export possibilities due to preliminary talks then.In coming years, Polish manufacturers of agricultural machines will not be able, for economic reasons, to gather in their laboratories the newest research/testing equipment and advanced computer aided design programs.
Consequently, it should be a prior · that PIMR, Industrial Institute of Agricultural Engineering, be able to update and supplement its design/research engineering and be able to carry research and development works jointly with factories.

FELLOWSHIP TRAINING

Mr.Piotr Bialek studied computer simulation modelling of semiactive dynamics of driver's seat mounting at the Technical University in Delft, Holland. The objective of the modelling was the possible improvement of the driver's comfort. The problem studied is one of the problems currently researched on in Delft.

The analysed model had an electromagnetic clutch which acted as a non-linear semiactive damper in the mounting complex. In computer modelling bond graphs method was used and for simulation a new version of TUTSIM, simulation computer program. Mr.Bialek's experience gathered in the fellowship training is closely related to modelling and analysis of agricultural machine units dynamics studied in PIMR to meet the needs of the industry.

Mr Piotr Mejs and Mr.Zdzislaw Nowaczewski were granted fellowship training at the Westfalen Technical School of Higher Education in Aachen. They are studying there in the Institute of Power Transmission and Hydraulic and Pneumatic Steering. The object of their training is the study of digital simulation of mathematical models of power transmissions and hydraulic steering, namely:

- automatic generation of mathematical models based on library of elements
- digital simulation of models
- optimisation of power transmission parameters on the basis of digital simulation of mathematical models
- measuring of actual material systems to verify mathematical models and digital simulation results.

RESEARCH EQUIPMENT AND COMPUTER TECHNIQUES

Within UNIDO TF/POL/90/82 project the following purchases were delivered to the Industrial Institute of Agricultural Machinery:

1. Test table DOSITEST, type DOT-125 (testing site for surface cover uniformity of liquid sprayed through nozzles mounted on the arm of the spraying machine). The test table was bought in HOLDER, Germany. The parameters of the table conform to BBA (Biological Union Institute of Agriculture and Forestry, Germany) No G/1030 norms.

The test table consists of multisection frame on which profiled forms of steel sheet are placed. They form gutters from which the sprayed liquid (through nozzles on the arm of the spraying machine) flows to measuring containers. The containers have scales for liquid volume reading and they have critical values clearly marked for immediate visual evaluation of sprayed liquid

distribution uniformity on the test table area. The construction of the table (separate units) makes its transportation easy.

TECHNICAL DATA

Operational width	12.5 m
Length	1.5 m
Capacity of a measuring container	0.5 dm

DOSITEST test table is a part of a control set for testing plant protection machines. The other parts have not been purchased due to a lack of financial means.

The whole control set consists of the table, MANOTEST (appliance for testing manometers used in spraying machines), and DOSI-SET (appliance for determining nozzle performance).

The complete control set is designed for:

- testing spraying machine elements such as manometer, pomp, nozzles and fittings (valves, filters, hoses)
- determining the degree of element wear and need for replacement, on the basis of the obtained testing results.

The construction of the test table as well as of the remaining parts of the control set makes their transportation and assembly easy, be it in a village or commune it will serve as a temporary testing station. There the spraying machines can be tested against efficiency norms and for their potential usability as well as evaluated in terms of ecological safety.

2. To increase the measuring and simulation potentials of computer aided research and engineering systems, LAP-TOP computer T 5200/100 by TOSHIBA, Japan, was purchased. Some digital-analogue software for direct processing and conversion of measured parameters developed in PIMR has already been installed and tested on this computer. Its relatively big RAM of 4MB and hard disk capacity of 100 MB allow for conducting measurements with high speed of data collection in relatively long time spans. For instance, when one channel is used and 1000 samples are collected within a second the run can be monitored for about 300 seconds.

PIMR plans to develop further its measuring - simulation system as far as digital simulation is concerned. Its computer team researches on the possibility of automatic generation of differential equations which make the object's model. The team also works on developing a new subsystem for machine models simulation based on digital-analogue conversion.

TOSHIBA computer with a digital-analogue converter (on RTI 815 card installed) and amplifiers system could be used for steering operations in e.g. chassis test house with electrohydraulic drive. Steering the test house parameters, defined by an appropriate set, will ensure simulation of real life conditions on a research/testing site.

TOSHIBA computer with its program-equipment package making digital-analogue conversion, digital simulation of mathematical models, and steering/operation of machine models possible, is a tool of great research potentials.

3. To support PIMR's potentials of computer aided design of agricultural machines, a new generation software Pro/ENGINEER System by Parametric Technology Corporation, USA, was also purchased. It has been installed on VAX 3100 computer graphic station in PIMR. It is CAD/CAM system based on the assumption that a complex or machine which are being modelled will undergo constant changes and modifications from the very moment when its design starts till it is finally manufactured. In CAD systems used so far a modification of the existing model is a complex, costly and time consuming process. System Pro/ENGINEER solves these problems through application of fully parametric, spatial model and use of technical data base for its construction. It results in having the actual data regardless of whether one works on the design concept or observes the three dimensional model or introduces changes to two dimensional drawings.

The basic advantages of Pro/ENGINEER system are the potentials to:

- develop designs of complexes/units from two dimensional draft schemes on the basis of which individual elements /details are then dimensioned and assembled into units,

- automatic exchange of parts between units,

- generation of element drawings from a formerly designed unit and preparation of elements blue prints/design documentation,

- automatic generation of spare parts lists in axonometric system,

- generation of manufacturing process engineering and making data bases for numerically controlled tool machines,

- automatic preparation of either volume or thin-walled models for durability tests/analysis with application of the finished element method for standard software packs.

- making models of steel sheets and their automatic unrolling into flat elements,

- making surfaces and bodies defined with function,

- smooth turning and enlarging of both shadowed and so called wire model images,

- making mirror reflexes, sending and exchanging information written in various standards and set formats, sending models and drawings to other coupled programs and possibility of using the system in networks.

The presented program is a tool that multiplies effectiveness of both designing and engineering not to mention comfort improvement of engineer's work.

Conclusions from Seminar

The presentations from Messrs A.G. Lundberg, I.M. Urwin, J. Gromadzki and H. Wojciechowski as well as contributions from the floor led to the following conclusions:-

1)PIMR should fulfil a role as an R&D Institute supporting the Agricultural Machinery Industry especially in the areas of developing new techniques, predicting trends, accreditation as well as being a Technical and Marketing consultant.

2)Changes in the Polish Economy, including the Agricultural machinery industry and Agriculture itself are showing new areas for future PIMR help to the industry, especially:

- Research work and analysis of published texts
- Mandatory tasks for the Ministry of Industry and Trade
- Research into Quality Testing, (Certification)
- Specialised tasks, detail research needing specialised research facilities (Material analysis, calculations etc).
- Providing specialised instruction for Industrial Managers in Marketing Techniques
- Consulting and arranging lectures on the subject of Computer Software
- Providing lectures on Management
- Providing lectures on topics of manufacturing cost analysis and influences on on-going production.

3)PIMR should assist the individual factories to form a combined independent pressure group

4)Marketing activities should be intensified with the aim of finding new export markets (countries with similar technological levels)

5)As a result of the reduced buying power in the agricultural sector, and the economic recession, sales of agricultural machinery have rapidly declined. To regenerate demand, we should seek long term actions:

- through restructuring of factories to achieve minimum manufacturing cost
- through government intervention in reducing interest rates on agricultural machinery purchases on credit

6)Conclusion of Study Tours.

a)The basic difference between Polish factories and those visited by the study tours is mainly in the areas of organisation and production management as well as the wide range of marketing techniques.

b)In our opinion the development of these marketing techniques is too slow in Poland.

c)As a result of the increased co-operation between Polish Industry and neighbouring countries, we notice less difference in design and manufacturing techniques. During the visits we gave several lectures where we expressed interest in co-operation between our Industries and the foreign industries visited - for example - there is an opportunity for co-operation and export from PILMET - Wroclaw.

d)In today's economic environment there is no possibility for every factory to invest in data measuring equipment and research equipment with the most advanced CAD software. Therefr e as an alternative, we must make every effort to ensure that PIMR is equipped progressively with more design and development resources to enable PIMR to co-operate with Polish factories in scientific research tasks.

7)Because of the strategic importance of tne Polish food economy we need government assistance to avoid the collapse of the main group of Agricultural Machinery manufacturers

8)Members attending the Seminar place a high value on the work of the UNIDO office in Vienna and of the experts on the Polish Machinery Industry and PIMR during the term of the project TF/POL/90/802, financed by the Government of Japan.

9)Members of the Seminar consider that all parts of the UNIDO project have been carried out in accordance with the original proposals.

10)Members of the Seminar emphasise the importance of the Agricultural Machinery Industry to the country's economy. The concern of the Polish Government should be to protect and develope the Industry.

Seminar Discussion

The combine factory in Plock has co-operated with PIMR in the development and design of combine harvesters. The factory now do all the design of new machines themselves, but would welcome consultancy service from PIMR on specific problems, training, quality standards and even design. The combine factory finds it really difficult to survive in the present economic climate. The sales have dropped to 7 % of 1989 turn-over. Of the present turn-over 50 % is used for tax payment and the rest for bank charges. It is necessary to come together and find common solutions to the financial crisis facing the industry.

IBMER is also present in Poznan and is building a hotel and exhibition centre in order to promote training of farmers. The old economic system has collapsed in Poland and the new system is already in operation. It can be said that Poland understands the meaning of a free market. The situation is much worse in Russia. The Polish farm machinery industry could help Russia but Polish machines are too expensive on the Russian market. A conference was held in Budapest in order to form a system to assist Russia as the situation there otherwise could lead to dangerous social tension. In France, farmers have formed machine circles in order to reduce cost. The Government gives tax relief for this activity. The same system could be used in Poland. Many companies in Poland have tried to find ways to operate in a more flexible way. It is important that the customer, the farmer, can come as he is and talk directly to the supplier of machinery. It is important to build an atmosphere of confidence between suppliers and customers. Marketing is

very important but some companies are already trying to reduce cost of marketing. Formal training in marketing techniques is important. There are opportunities in the Eastern market and there are also signs that companies in Russia are trying to enter the Polish market.

With reference to the manufacturing presentation, surely the problem of assembly-by-hammer is one of Quality Control.

Reducing the quantity of Raw Materials on site is desirable but the problem is that the Steel Mills only deliver in such large quantities.

It is very important that the finance system and the tax system in Poland are stabilised, then the industry will find its place. The Agricultural Machinery Industry in Poland must continue to exist.

PIMR must continue to serve the Agricultural Machinery Industry in Poland. When creating the new functions of PIMR, the target must be to improve the inter-action between the industry and the market place through a greater use and understanding of marketing techniques.

Reply from Consultants

We have heard a number of interesting points raised as a result of our presentations. We would like to reply to them, and also to enlarge on some items of our individual presentations.
Money is a vital ingredient for your recovery, although now in short supply. However, there is a way forward, but it requires everyone to pull together. As indicated in the presentation, the economic oil which keeps the machine running has drained away through all the holes which were in fact the cash losses incurred by all sectors. Before you put any new oil (money) in, you should plug the leaks. Some of the ways to do that were in my presentation, (Don't add value too soon etc) other ways can be found from text books. That is what you should be doing in this breathing space. The "oil" should be provided from government controlled sources (tax reforms as outlined by Mr Gromadzki) or overseas agencies and injected into the system where it will do the most good to the most people. We feel that this money should be used to generate customers who will be ordering equipment for years to come.
We mentioned the establishment of PIMR as a training centre.
An aspect of production management is the control of movement of component parts. As the number and variety of final product increases, and the volume of work in progress reduces, the physical monitoring of parts progress becomes progressively more complicated. It is also more critical because the shorter time cycle increases the risk of production stoppage due to parts not being available.

This manufacturing philosophy, which in its ultimate form is "just-in-time", can only be built on a careful appraisal of factory and supplier performance and the upgrading of all operations to a zero-defect condition.
Courses on these topics should be part of the PIMR syllabus.
The structural designs created by finite element analysis packages in CAD, such as those in PIMR's Pro-ENGINEER, cannot be fully utilised in manufacturing if there is wide variation in the factory processes. This is particularly relevant in the case of welded assemblies.
To get consistency of welded assemblies some form of automatic control of the welding process is necessary. In addition, automatic welding. with or without robot aid, needs much finer accuracy of detail parts than manual welding where the operator can vary his performance to include gap-filling to compensate for variation in details. Although systems are developed for weld quality recognition and automatic compensation, the primary need is for accuracy of detail preparation and part location.
Here are subjects where the advanced computer knowledge of PIMR can be combined with the external know-how of process suppliers to provide courses of major benefit to the Industry.
There is some basic re-education necessary in the Industry. It is all too common to hear that "It's only going to a farmer, he doesn't need any better" when poor manufacturing quality is pointed out. Not so. It (the product) is actually going to a CUSTOMER. Who in turn will give you MONEY. We have heard today that the Industry needs MONEY. Maybe, but much more valuable would be customers. If money is to be directed towards the Industry it should be channelled through the customers. That means that the Industry would not only receive money but also orders and could therefore function as a manufacturer.
Reference was made from the floor to the instance of "hammering" together parts and that the solution was not communication but Quality Control. I beg to differ. In the particular instance, a standard proprietary component was taken from the automotive industry and applied to agriculture. In its original use it was bolted to the end face of a machined casting. In agriculture it was bolted between jaws. The width dimension was not important for the automotive application because one side was in "fresh air" and so was given a wide tolerance. This however was overlooked or ignored during the agricultural designing and the result is that it was being hammered into place. There seemed to be no formal communication channel back from the assembly workplace to the drawing board. Quality Control appeared content that the part was actually there and in any case, "it's only going to a farmer". Quality Control Inspectors, incidentally, do not improve the quality of anything. At best they prevent defective components from passing further through the manufacturing system. The aim of Quality personnel should be to prevent defective parts being produced and as such Quality should play an active part in the design process. Another course for PIMR to offer.

CONCLUSIONS AND RECOMMENDATIONS

Consultancy Service

PIMR has in the past played an important role in the product development process of agricultural machinery in Poland. This role has now changed because many industrial enterprises carry out the design and development of their products themselves. The amount of product design and development work had already begun to decrease at the end of the 1970's. PIMR employed almost 700 persons at that time. The workshop alone had 300 persons employed. Now the workshop is closed. The present plan is that only 100 persons would remain on the pay list from the beginning of 1993. This radical reduction of employees has been necessary because of budget constraints. But research capacity is still available in PIMR and must now be advertised to potential enterprises and institutions. The service to Industry should be in a co-operative style with engineers and technologists from factory departments sharing time and facilities with PIMR scientists. PIMR input will be computer facilities and know-how. Industry input will be manufacturing know-how and the bulk of the cost of the exercise. Both sides will benefit. PIMR will learn more of the manufacturing constraints and will be funded. Industry will receive the most effective solutions to their problems An outline of the research activity together with a cost estimate must be prepared and accepted by the customer before the work can start. The research has in this respect been commercialised. But there are aspects in the field of agricultural engineering which would need support. Basic research in the fields of safety and environmental aspects are difficult to justify from a totally commercial point of view.

PIMR as the Official Expert Agency

PIMR co-operates with the Polish Standardisation Institute in the field of standardisation. PIMR is a nominated representative for the Registration Office in the field of patents. PIMR is thus an official expert agency for the Ministry of Industry and Trade. This area cannot be commercialised and would therefore require official funding.

In addition to the above-mentioned official duties, work is in progress to introduce PIMR as an agency for quality certification based on ISO and EEC standards. In the design process of machinery, safety and ergonomics is increasingly important. Also ecological aspects in the form of more efficiency and thus lower fuel consumption is an area of great importance. All these aspects should be controlled by an organisation which has the necessary technical competence for such work. This competence is available in PIMR.

Information sales.

Because all PIMR activities in the past were financed by the Government, the technical information made available to the industry was given free of charge. In the new system PIMR should charge for all services, including the provision of technical information to the factories.

Training Courses in Management, Engineering and Marketing

According to the UNIDO Project Document, the Government of Poland attaches a high priority to the modernisation of factories and to introduction of modern management techniques. It would also be important to establish and strengthen inter links between individual agricultural machinery manufacturers and technical institutions which then should be used as a tool to build a plan of action for modernisation of industrial activities generally. The medium for connecting individual enterprises through the system of inter links is PIMR. To achieve this goal an overall training programme is considered to be important.

PIMR should therefore among its other activities, be a training centre for the industry. The training courses should be commercially organised as one way of financing PIMR.

PIMR should set up an Education Department with the objective of organising courses for the industry. This department should review all possible educational resources in PIMR and externally. General Industry Statistics which have been collected, could be used as a strategic tool in the formulation of Education Programmes. The Education Department should then set a tentative Course Programme.

By inviting representatives from the industry to a course, the occasion will give opportunities for the exchange of useful information in both directions and in such a way will also function as a marketing exercise.

Examples of Training Courses

There is a need for a Total Quality approach to manufacturing. The design process does not start and end at any point. Every department must be involved (Engineering, Manufacturing, Marketing, Quality, Purchasing, etc.) and the design passed around, modified, compromised, optimised, until the best solution is reached. This approach can be the subject of a course.

In the Production Technology Department are injection moulding machines for the manufacture of plastics components. A course in the use of plastics in agricultural machinery could be organised in this department. There are a lot of plastics with different properties. A specialist from a producer of plastics

is certainly willing to come and explain how to select the right type of material for a certain product. If he at the same time can meet people from several industrial enterprises, he is certainly willing to come. In the same course it is also possible to discuss tool specifications, and maybe PIMR would even get an order to manufacture a mould tool, or maybe to produce a number of plastics components with this tool. This sort of course could also touch the design aspect by inviting researchers from other departments in PIMR to come and give a lecture and give their opinion about the design of a certain component under conside ion. In such a way technical information would begin to flow between PIMR, industry, suppliers, customers, and so on.

The re-structuring process has now started in the industry. It is natural that this process will have a different path depending on the actual situation in the company concerned. A Director who has managed to lead a re-structuring of his company should come to PIMR to give a lecture and tell the participants how to successfully implement a re-structuring process in a company. The re-structuring process certainly includes a lot of different details to consider. Expert advice is therefore a necessity for most companies.

In PIMR there is a Computer Research Centre which is equipped to undertake research work in the field of CAD including strength calculations and computer simulation. During our missions we have seen that factories are very keen to bring in more computer power into the factory operations. This department in PIMR could offer its knowledge to the industrial enterprises in the selection of suitable hardware and software and also provide the training component. The latest expansion, under this project, is the inclusion of a new CAD programme, PRO/ENGINEER, which combined with existing simulation programmes will improve the capability of this department.

During discussions, several times it has been confirmed that pure technical development of the industry is a second priority. What is on the other hand very important is to introduce a management system which is more aware of the need to observe the company as a commercial unit. Management training should therefore be included in a training programme. It is however important to focus this training on specific issues like marketing, cost control, etc.

ANNEXES

STUDY TOUR REPORTS

GROUP I PARTICIPANTS:
dr inz Grzegorz Blazynski, PIMR, Poznan
mgr inz Jerzy Matusz, FMR PILMET, Wroclaw

DURATION: 25 March to 1 April 1992

COUNTRIES VISITED: Holland, Denmark, FRG, Italy

FIELD OF STUDY: Agricultural Machinery Manufacturing of Spraying and Fertilizing Machines

FACTORIES VISITED:
1. DOUVEN machinefabriek gebr douven bv, Horst, Holland
2. HARDI INTERNATIONAL A/S, Taastrup, Denmark
3. AMAZONEN-VERKE H. DREYER GmbH & Co KG, Hasbergen-Gaste, FRG
4. ACCORD Landmaschinen H. Weiste & Co GmbH, Soest, FRG
5. RAUCH Landmaschinenfabrik GmbH, Sinzheim, FRG
6. RAU Maschinenfabrik GmbH, Weilheim/Teck, FRG
7. C.M.S. TURBINE S.r.l., Lungavilla, Italy

The main observation from this study tour was that the companies visited concentrate on management, marketing and service. The conclusion for Poland would then be that improved technology is a second priority, while management training becomes very important.

The participants had also a chance to discuss possibilities for co-operation between Polish and foreign companies.

HARDI for example had an advanced teaching system for education of dealers and users. The teaching system could very well be transferred to Poland. HARDI could come to PIMR and arrange courses.

GROUP II PARTICIPANTS
dr inz Konrad Guzek, PIMR, Poznan
mgr inz Tadeusz Babinski, FMR Plock
mgr inz Pawel Baczynski, ZM Ursus

DURATION: 25 March to 8 April 1992

COUNTRIES VISITED: Germany and Italy

FIELD OF STUDY: Agricultural Machinery Manufacturing Industry, R&D and manufacturing techniques

FACTORIES VISITED:
1. Institut fuer Biosystemtechnik, 3300 Braunschweig, Volkenrode
2. Institut fuer Betriebstechnik, 3300 Braunschweig, Volkenrode
3. Biologische Bundesanstalt fuer Land- und Forstwirtschaft
4. Landmaschinen Ackerschlepper Vereinigung /LAV/ Frankfurt/M
5. DLG, 6114 Gross-Umstadt
6. Deutz-Fahr Erntesysteme Gmbh, 8882 Leuingen
7. Zahnradfabrik Passau Gmbh, 8390 Passau 1
8. Iveco SpA, 10156 Torino TO
9. Instituto Italiano del Marchio di Qualita, IMQ, Milano

The participants received a great volume of information and were very well received in all institutions. They also made personal friends. They noticed that the officials were adequately qualified for their jobs. All institutions visited offered co-operation. It was very useful for the participants to see all the test stands used in the test of machinery. They were also able to take photographs. They noticed that knowledge of EEC standards will help when Polish companies try to enter the EEC export market. All the information received during the study tour will be useful when PIMR continues the preparation of the quality book. In that respect PIMR will apply for the right to act as a central office of quality control in co-operation with EEC.

They noticed that the IMQ institute in Italy and the institute at Braunschweig in Germany had the right to check and stop inferior products entering the market. In that respect it was noticed that Germany is introducing a rule that all products imported must be stamped after 1 January 1993.

It was noticed that the institutes generally are modest in size. The institutes employ at most about 100 persons. Very few of them work in administration. On the other hand they have well qualified operators and well educated engineering staff. They emphasise flexibility and adequate skill for each operation. In order to minimise the cost of personnel they hire people for certain jobs when needed. Institutes in Germany have been able to invoice about 20 % of their costs. The rest is covered by official funding.

GROUP III PARTICIPANTS
D Sc Adam Dubowski, PIMR, Poznan
D Sc Stanislaw Bugajski, PIMR, Poznan
D Sc Henryk Woiciechowski, PIMR, Poznan

DURATION: 9 to 20 March 1992

COUNTRIES VISITED: Finland and Sweden

FIELD OF STUDY: Agricultural Machinery Manufacturing Industry R&D, manufacturing and marketing techniques.

The study tour to Finland and Sweden included visits both to official institutions and universities and to manufacturers of agricultural machinery. The participants were able to compare the situation abroad with the conditions prevailing in Poland and in such a way collect ideas in order to find appropriate solutions suited to the Polish situation.

The Agricultural Machinery Market is decreasing in Poland. Under the previous system, PIMR was obliged to test examples of all machinery sold in Poland, and the funding for this activity was from Central Government. Now this funding has been withdrawn and the machinery manufacturers are not prepared to pay for the tests. Testing therefore appears not to be a mandatory requirement. Even the Government has reduced funds allocated for R&D. PIMR and similar institutions must now look for alternative research. The research projects must now be carried out faster and also the quality of the research must be improved. Introduction of PIMR as an accreditation laboratory based on ISO and EEC standards is under preparation. It is important to improve the safety aspect when designing new implements. The driver should be protected from vibrations and noise. The environmental aspect is also becoming more important.

The funds allocated for research in Finland and Sweden is 2 - 3 % of the GNP. In Poland the corresponding figure is 0.4 %. Test institutes in Finland and Sweden are getting 20 - 50 % of their budget from official sources. The rest of the income comes from research projects. The institutes get orders from the industry to carry out certain research projects. The inter-links between the test institutions, universities and manufacturers are close although all are independent. The test institutions carry out different types of tests. Some types of new machines have to be tested for official approval based on Government rule. The manufacturer has to pay for this service according to a officially set price. The manufacturer can also order a confidential development test from a test institution and pay for the service according to a mutually agreed price.

INSTITUTES AND UNIVERSITIES

The units in test institutions are generally small. They employ between 50 to 80 persons all departments included. Similar units within universities are even smaller. In order to save costs, the departments share the secretarial services and cleaning.

Vakola has about 50 persons employed. 20 persons are involved in research work and there is a team of 10 persons carrying out quality tests on equipment. Each person in the test team is expert on a certain type of machine. Precision test of sprayers can be undertaken. Sprayers carrying up to 48 nozzles can be tested even in a wind tunnel. Research on new techniques for plant protection is carried out including employment of laser technology for automatic study of spray patterns. Experiments to use fire in plant protection in order to kill the weeds by heat is also studied, but the economic side of this technology is not yet clarified. The Director of the institution is appointed by the president and two deputy directors by the Government. A Board of seven directors choose the personnel. Very few persons are engaged in administration. All researchers write their reports on computers. One person specialised in publishing work, arranges the lay-out. The report in then printed.

INDUSTRY

Manufacturers concentrate on the manufacture of the products. Maintenance, repair facilities, transport etc. are all independent undertakings. Factories are building new business plans and try to cut costs as much as possible. The marketing personnel know the products very well. The factories have exhibition rooms with the products displayed, brochures and video demonstration programmes. The factories also arrange training programmes for farmers and dealers. Design departments are co-operating with scientists in order to incorporate new findings into their range of products. Sometimes manufacturers have their products officially tested as a method of advertising the machines in order to improve their position on the market. Manufacturers are generally close to the customers, the farmers. Even some of the workers in the factories are farmers themselves. Robots are used in the production to produce better quality.

The general observation is that many ideas seen in the industrial enterprises during the study tour could be implemented in Poland. It is not always necessary to look for new technology. The factories should be made aware of the cost of production, and the marketing aspect should be strengthened in Polish companies. The study tour members were also introduced to technologies which are not yet appropriate for Poland. Plastic sacks for storing bales for animal fodder as ensilage was considered to be too expensive.

FELLOWSHIP REPORTS

FIRST GROUP:
Piotr Bialek, M Sc, PIMR, Poznan

DURATION: 9 March to 3 April 1992

TRAINING INSTITUTION:
Delft University of Technology
Faculty of Mechanical Engineering and Marine Technology
Vehicle Research Laboratory
Mekelweg 2, 2628 CD Delft, the Nederlands

FIELD OF STUDY:
Application of computer simulation in designing and testing of agricultural machines

DESCRIPTION.
The project was a part of the total programme of the Vehicle Research Lab of Delft University. It comprised modelling and testing the dynamic performance of a semi-active suspension system of the driver's seat of a tractor or other agricultural machine. The seat was mounted conventionally on a spring but the damping element was an electromagnetic clutch acting as a sky-hook controlled semi-active damper.The Bond graph method of modelling and the new version of the TUTSIM simulation program as a tool of computer simulation were used.

BENEFITS.

The knowledge and experience gained during the fellowship will be very useful in future work in PIMR concerning the analysis of the dynamic behaviour of agricultural machinery. The solution to problems overcome during the modelling and testing of seat suspension systems can be used for improving the dynamic performance and comfort of agricultural machines. The Bond graph method is used in PIMR for the analysis of dynamic behaviour and energy consumption of parts and assemblies of agricultural machines. For these investigations the ways of modelling the connections between mechanical and electrical domains as learned in Delft (model of electromechanical clutch used in mechanical suspension system) will be most useful. During the training a new version of the computer simulation system - TUTSIM - was used and found to be very useful in Bond graph modelling. PIMR's own computer simulation tools will be developed along these lines.

SECOND GROUP:
Piotr Mejs, M Sc, PIMR, Poznan
Zdzislaw Nowaczewski, M Sc, PIMR, Poznan

DURATION: 24 May to 23 June 1992

TRAINING INSTITUTION:
Institut fuer Hydraulische und Pneumatische Antriebe und Steuerungen
RWTH Aachen, Steinbachstrasse Bloch 53b, D-5100 Aachen

FIELD OF STUDY:
Computer simulation in the field of agricultural machinery research

The reports will be submitted at a later stage.

EQUIPMENT REPORTS

Pro/ENGINEER

As an ongoing improvement to the Computer facilities in PIMR, the CAD and Experimental Department has, through the UNIDO project taken delivery of a Pro/ENGINEER software package.

Pro/ENGINEER is the heart of a family of associated modules produced by the Parametric Technology Corporation in USA. There are some 16 or so modules in the family and PIMR have chosen 8 to remain within the budget limits. The software is a CAD facility which has a much wider scope than the existing ASKA software. However the ASKA system has the ability to perform stress and other mathematical calculations and will work alongside Pro/ENGINEER but the transfer of data between the two is manual. When funds allow, Pro/MESH will be obtained which will allow fuli interchange at the push of a button.

In addition to Pro/MESH, Pro/DETAIL and Pro/DRAFT are necessary for full utilisation of the system.

initial training and familiarising as well as actually installing the software was done with the assistance of a colleagues from Gliwice University, who in turn, had learned to use the package elsewhere.

The computer specialists in the department are following a course of self-tuition with the package. They are already familiar with the ASKA system which they have used for a number of projects so transferring to Pro/Engineer is more a process of conversion than ab initio training.

The next step must be to "sell" themselves to the Industry as a Design advice service. This exposure to Industry and the new atmosphere of competition will sharpen their appreciation of the commercial nature of their department and the need for swift actions. The Project Seminar in June 1992 will provide a window of opportunity to display the system and its capabilities to the Industry.

Toshiba Laptop Computer.

The program system SPS designed and developed in the Department of Power in the Industrial Institute of Agricultural Engineering is a complex toolbox for measurements and digital simulation.

The SPS system can be used in any type of PC under DOS operating system. Up to this time the system has been developed and used on a Desktop permanent computer installation and has not been able to operate in its most effective manner.

SPS is most flexible when used in conjunction with a Laptop computer. As part of the fixed equipment which UNIDO have purchased for PIMR under this project, the Department of Power uses the Toshiba T5200/100 with 32 bit processor, 4MB RAM and 100MB hard disk is used. An analogue-to-digital 12-bit converter card type RTI 815 manufactured by Analog Devices is installed in the standard IBM slot.

SPS consists of two main elements. The first is the measurement subsytem SSP. This subsystem is especially prepared for measurements of mechanical values such as force, torque, pressure etc., but can also be used in other applications. The RTI 815 card in the laptop converts analogue signals to digital ones.

The SSP subsystem can be used with all types of transducers, sensors and amplifiers giving analogue output signals in the ranges -10v to +10v or 0mA to 20mA. Signals from digital transducers or outputs can be received and transmitted through the serial port RS232 of the laptop computer. This part of SSP is prepared for high accuracy slip measurement of tractor wheels in real time.

The SSP can be connected to up to 16 independent analogue transducers. Each channel may be separately programmed for gain, scale and zero values. As a result, values can easily be obtained in absolute units.

The maximum speed of transmission is limited to 20,000 samples per second, and the maximum time of transmission (test duration) is limited by the capacity of the computer memory.

The tools programs which are included in the SSP subsystem give it the elements of an expert system. All the information and parameters which are being used in the current experiment may be stored in the computer's memory. In addition, when transducers, sensors or amplifiers, previously used elsewhere, are first used with SSP, the required operating parameters and calibrations can be taken from disk storage. This is an SSP self-teaching process.

The SSP system can process signals from non-linear transducers in real time. The non-linear characteristics of such transducers are stored in the computer memory. During measurement, input signals from these transducers are transformed and after interpolation, the corrected value is obtained.

All measured values are related to time or other parameters in the recorded memory, for example: flow rate with pressure drop, displacement with time etc.

Results of measurements may be stored in the computer memory, as a disk file or may be displayed on a computer screen.A drawing package is incorporated in the system for graphic presentation of results.

The second subsystem of SPS is the SCE digital simulation program. The SSC subsystem contains procedures and subroutines for preparing and resolving mathematical models of physical systems.

Mathematical models consist of first order differential equations. The equations are resolved by the Runge-Kutha method. Results are stored in memory in the same way as the measurement program. There are some tools programs in SSC that make preparation of the simulation experiments easier. The SSC system is still under developement. In the Department of Power subroutines have been prepared for the automatic generation of mathematic models. These procedures assemble models from library components.

The portability of the Toshiba laptop has allowed the SPS system to be used in many new and different applications. In the field it has been set up in the Mobile laboratory car. SPS acquired data from transducers installed in a trailer undercarriage when strength testing of the wheel frame was carried out, In the Laboratory, SPS was connected to the hydraulic test bench and measured static and dynamic characteristics of hydraulic components.

Because of the simple assembly and programming, SPS can be connected directly to a test or measurement system. In a dynamic behaviour test of automatic position control of a tractor hydraulic lift system it was connected to the electronic position control system.

In desk usage it has been applied to the digital simulation of a hydraulic torque converter.

With amplifiers and three orthogonal accelerometers SPS has been used in the design process of dampers for a steering mechanism. SPS measured vibrations in the steering wheel of a prototype tractor. Data

processed by Fourier transform was analysed in the frequency domain according to Polish National Standards requirements.

The SPS system can be applied to many different tasks. Thanks to pull down menus and tool programs it is easy to set up and use. The real versatility of the SPS system is beginning to be recognised with the valuable addition of the portable laptop computer.

Dositest Sprayer test equipment

The Dositest equipment was ordered from Gebr Holder in Germany. It consists of a 12.5 metre continuous width of longitudinal troughs each 1 metre long and at 10cm pitch.It is intended to be assembled and a crop sprayer positioned directly above . The sprayer is operated and the spray is collected in the series of longitudinal troughs leading to 125 individual calibrated collecting bottles. The sprayer is operated and the output is collected simultaneously in the bottles for a fixed period of time. The bottle contents can be measured and the spray pattern and quantity applied can be calculated.

PIMR believe that the legal requirement of regular certification of pesticide sprayers which applies to certain overseas countries will or should apply in Poland and are preparing to formulate some guidelines. For this reason a reliable and effective sprayer performance measurer is required. The Dositest fulfils this function.

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1992 NATIONAL SEMINAR

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30	Jozef	Portala	Zakæady Produkcyjne Sprzetu i Urzadzen Drobiarskich	Gostyn
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10	Konrad	Guzek	Kierownik Z-du TB
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APPENDIX

Presentation by Mr J. Gromadzki

Original Polish version

including diagrams.

PRZEMYSŁOWY
INSTYTUT MASZYN ROLNICZYCH
POZNAŃ

Tutuł pracy : **Studium sektorowe przemysłu maszyn rolniczych**

(Referat)

Autor : **mgr inż. Jan Gromadzki**

Poznań, maj 1992 r.

Celem studium jest kompleksowa analiza i ocena aktualnego stanu technicznego, ekonomicznego i organizacyjnego branży maszyn rolniczych, oraz analiza i ocena jakości i nowoczesności produkoanych maszyn i urządzeń rolniczych, na tle możliwości ich sprzedaży. Jest to więc, jak widać z przedstawionego celu, bardzo obszerny materiał i trudny do zaprezentowania w krótkim referacie. Dlatego ograniczę się do zapoznania Państwa z podstawowymi wynikami tego studium.

Na wstępie chciałbym poinformować, że jednostkami współpracującymi przy opracowaniu studium były:

-.Biuro Studiów i Doradztwa Gospodarczego w Warszawie,

- AGROMET-PROJEKT" w Poznaniu,

- Ministerstwo Rolnictwa i Gospodarki Zywnosciowej w Warszawie,

- Instytut Budownictwa, Mechanizacji i Elektryfikacji w Warszawie

Głównym źródłem informacji o przedsiębiorstwach była ankieta opracowana przez zespół realizujący,którą objęto 18 kluczowych fabryk wytwarzających maszyny do produkcji roślinnej, a mianowicie;

1. AGROMET Fabryka Maszyn Rolniczych	Brzeg
2. AGROMET Fabryka Maszyn Rolniczych	Czarna Białostocka
3. AGROMET Fabryka Maszyn Rolniczych	Darłowo
4. AGROMET-WARFAMA Fabryka Maszyn Rolniczych	Dobre Miasto
5. AGROMET-UNIA Fabryka Maszyn Rolniczych	Grudziądz
6. AGROMET Zakłady Kuzinnicze i Maszyn Rolniczych	Jawor
7. AGROMET Fabryka Maszyn Rolniczych	Kalisz
8. AGROMET Fabryka Maszyn Rolniczych	Kunów
9. AGROMET-MOGILNO Fabryka Maszyn Rolniczych	Mogilno
10. AGROMET Fabryka Maszyn Rolniczych	Opalenica
11. AGROMET Fabryka Maszyn Żniwnych	Płock
12. AGROMET-ROFAMA Fabryka Maszyn Rolniczych	Rogoźno
13. AGROMET-FAMAROL Fabryka Maszyn Rolniczych	Słupsk
14. AGROMET-PIONIER Fabryka Maszyn i Urządzeń	Strzelce Opolskie
15. AGROMET-PILMET Fabryka Maszyn Rolniczych	Wrocław
16.Lubelska Fabryka Maszyn Rolniczych S.a	Lublin
17. Spółka Akcyjna SIPMA	Lublin
18. Zakład Produkcji Sprzętu i Urządzeń Drobiarskich	Gostyń

Przedsiębiorstwa te stanowią 15 % liczby fabryk z branży, lecz ich produkcja obejmuje około 75 %całego asortymentu maszyn i urządzeń do produkcji roślinnej.

Podstawowa produkcja maszyn i urządzeń rolniczych do produkcji roślinnej pochodzi z dużych przedsiębiorstw. Z analizowanych 18 fabryk o łącznej powierzchni wydziałów produkcyjnych 504 tys. m2, aż 12 posiada powyżej 20 tys. m2 takiej powierzchni. Reszta to fabryki małe o powierzchni poniżej 10 tys. m2. Wyposażenie technologiczne fabryk jest w większości uniwersalne (od 33 % do 100 %). Dominuje w nich park maszynowy uznawany za nowoczesny w warunkach krajowych, lecz o znacznym zużyciu technicznym, przeważnie powyżej 60 %.

Organizacja zarządzania cechowała się dotychczas:

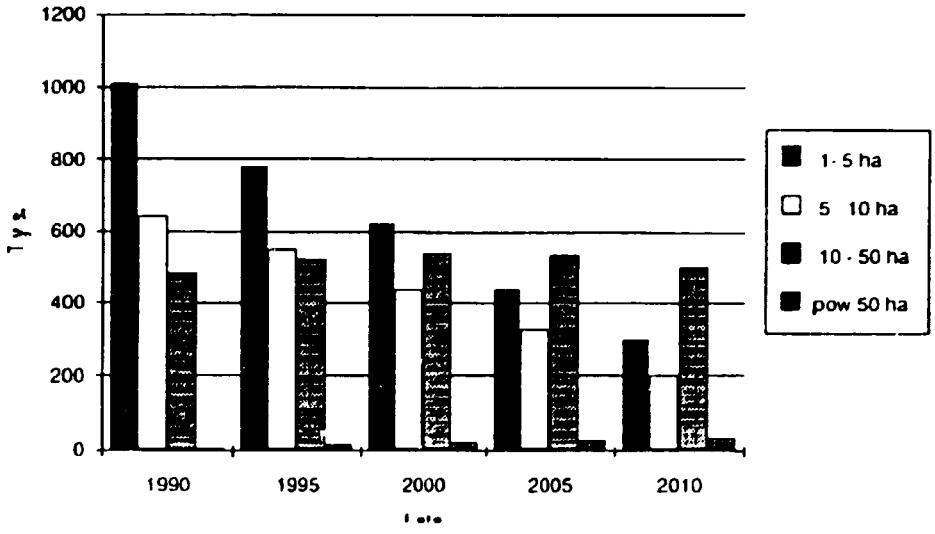
- nadmiernie rozbudowaną strukturą administracyjno-biurową (16 % do 23 % ogółu zatrudnionych),
- utrzymywaniem licznych służb pomocniczych, które w warunkach kryzysowych jako mało wykorzystane bardzo obciążają koszty produkcji,
- brakiem służb marketingowych, które są dopiero na etapie tworzenia, a brak wykwalifikowanej kadry utrudnia organizowanie tych służb.

W związku z tym w bezpośredniej produkcji zatrudnionych jest od 19,6 % do 65,7 % załogi.

Podstawowym odbiorcą produktów tego przemysłu jest polskie rolnictwo, a w większości rodzinne gospodarstwa chłopskie. Dotychczasowa i przewidywana struktura gospodarstw w Polsce przedstawia się następująco:

Wykres 1.

Zmiany w liczbie gospodarstw rolnych



Przewiduje się, że globalna liczba gospodarstw zmniejszy się z 2,1 mln w 1990 r. do 1 mln w 2010 r., lecz z pewnością wzrośnie ich siła nabywcza na skutek przewidywanej koncentracji ziemi i wzrostu plonów.

Obecny stan zmechanizowania prac (szczególnie w gospodarstwach rodzinnych) jest niezadowalający w porównaniu z krajami Europy Zachodniej o zbliżonej strukturze agrarnej. Dlatego potencjalne zapotrzebowanie na sprzęt rolniczy, określone przez resort rolnictwa, (z

uwzględnieniem obecnego kryzysu), w latach 1992 - 1995 zabezpiecza tylko utrzymanie obecnego stanu zmechanizowania, a w latach 1996 - 2010 umożliwia wzrost wskaźników zmechanizowania prac w rolnictwie do poziomu 90 - 95 %.

Krajowy przemysł maszyn rolniczych w zasadzie produkował pełen asortyment sprzętu rolniczego, niezbędnego do wykonania poszczególnych procesów agrotetechnicznych w rolnictwie. Zastrzeżenie budziła jedynie mała różnorodność asortymentowa, co powodowało niekiedy niedopasowanie maszyny do istniejących warunków. Stan ten dyktowany był jednak warunkami politycznymi. Nic nie stoi obecnie na przeszkodzie, aby stan ten radykalnie zmienić.

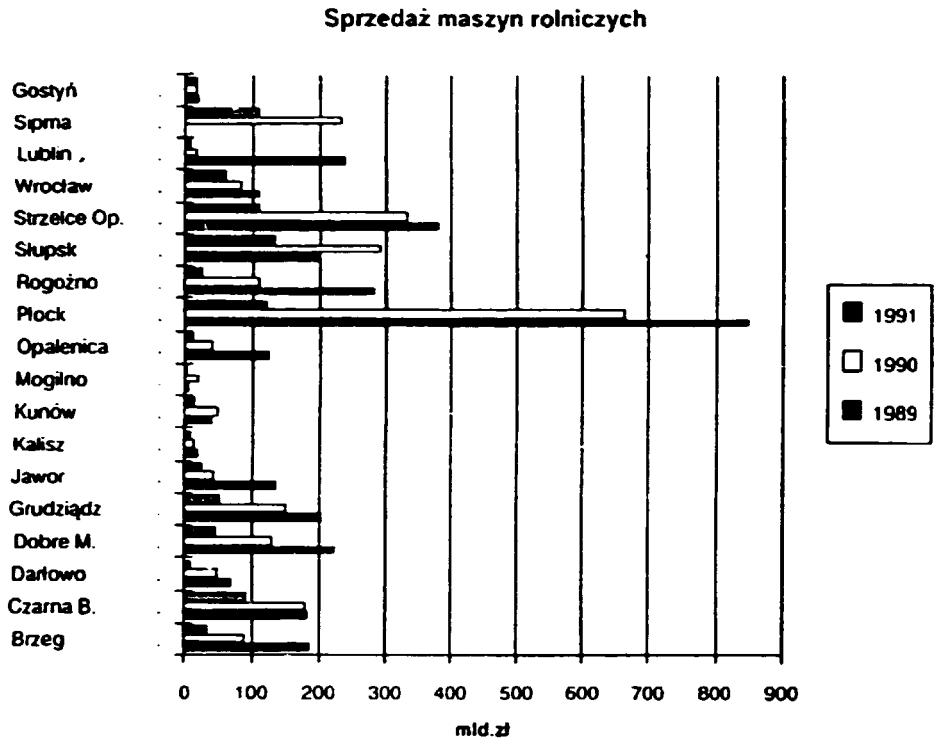
Dotychczasowy import maszyn rolniczych wynikał z umów o wzajemnych dostawach w ramach RWPG. Typowym przykładem są sadzarki, których wyłącznym producentem była Czechosłowacja. W ostatnich latach kilka niewielkich zakładów w Polsce produkowało sadzarki o średnim poziomie europejskim i w wystarczającej ilości dla pokrycia potrzeb polskiego rolnictwa. Tak więc import należy traktować jako wzbogacenie asortymentu.

Również ilościowa produkcja maszyn rolniczych w dużym stopniu zaspakajała potrzeby polskiego rolnictwa. Wprawdzie z reguły popyt przewyższał podaż. Odbywało się to jednak w warunkach gospodarki centralnie sterowanej, przy sztucznie utrzymywanym wyższym tempie wzrostu cen płodów rolnych niż cen maszyn rolniczych i przy niskim oprocentowaniu kredytów inwestycyjnych.

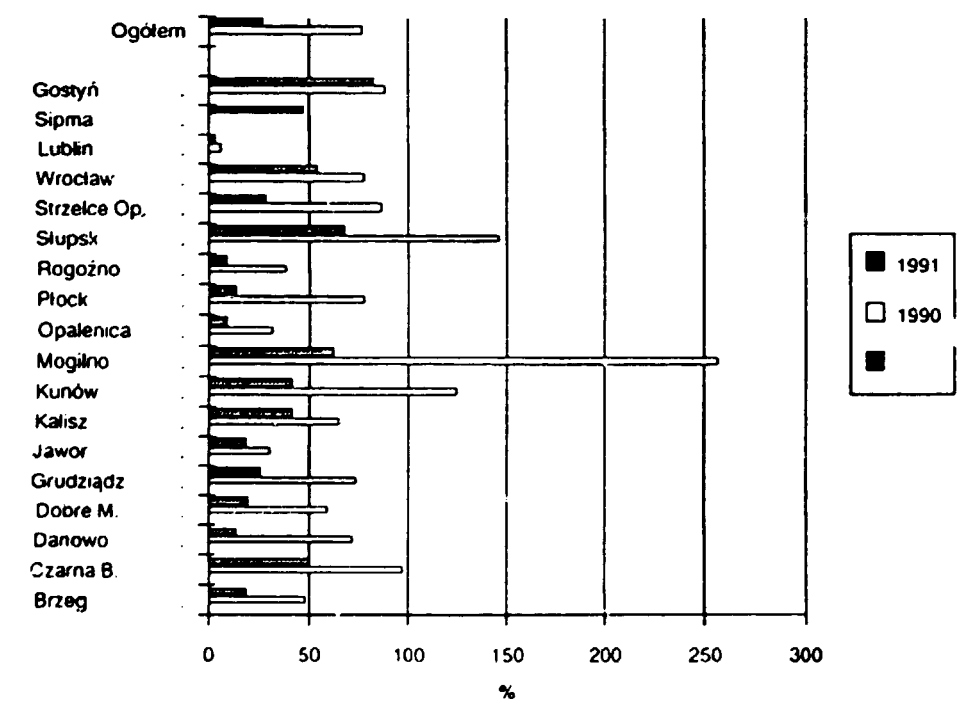
Eksport w ostatnich latach kształtował się na poziomie 10 % całej produkcji i nie miał większego wpływu na wyniki finansowe fabryk maszyn rolniczych.

W 1990 roku urynkowienie gospodarki w Polsce wywołało typowy kryzys ekonomiczny, objawiający się w rolnictwie nadprodukcją płodów rolnych i zahamowaniem wzrostu cen skupu. W tym czasie gwałtowne podniesienie cen nośników energii i płac spowodowało wzrost kosztów produkcji i cen ciągników i maszyn rolniczych. Towarzyszył temu wzrost oprocentowania z 4 % do ponad 50 %. Spadła więc radykalnie siła nabywcza rolników i załamała się sprzedaż maszyn rolniczych. Sprzedaż większości asortymentów w roku 1991 stanowiła zaledwie od 20 % do 40 % sprzedaży z roku 1989. Tendencje te ilustrują poniższe wykresy.

Wykres 2.

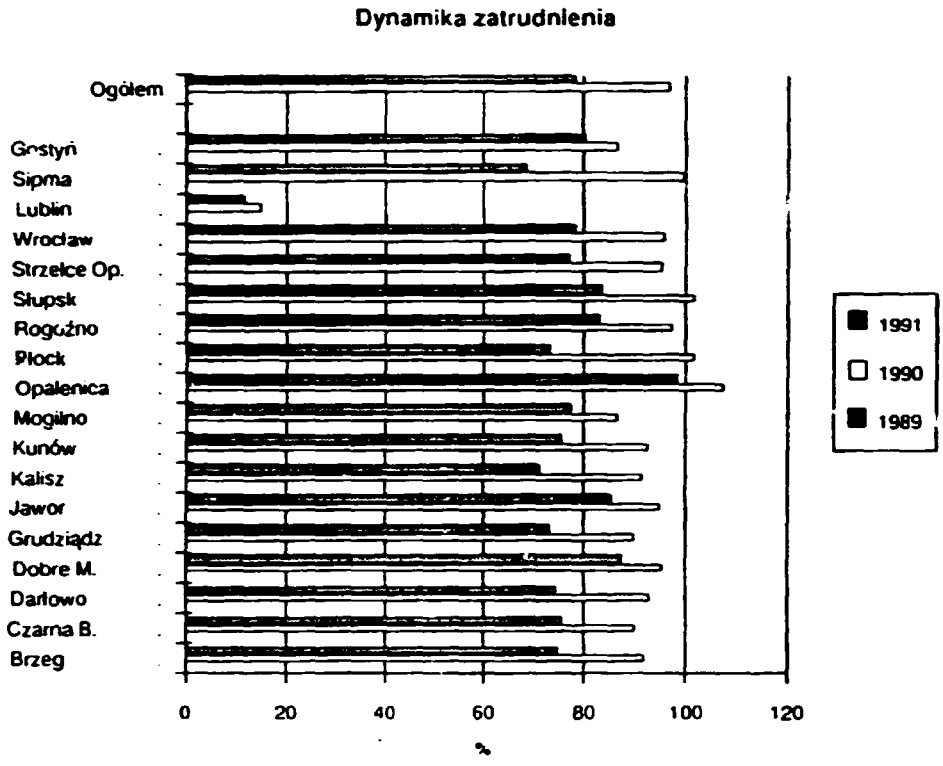


Wykres 3.



Uwaga : Wielkość sprzedaży w 1989 roku równa jest 100 %

Wykres 4.



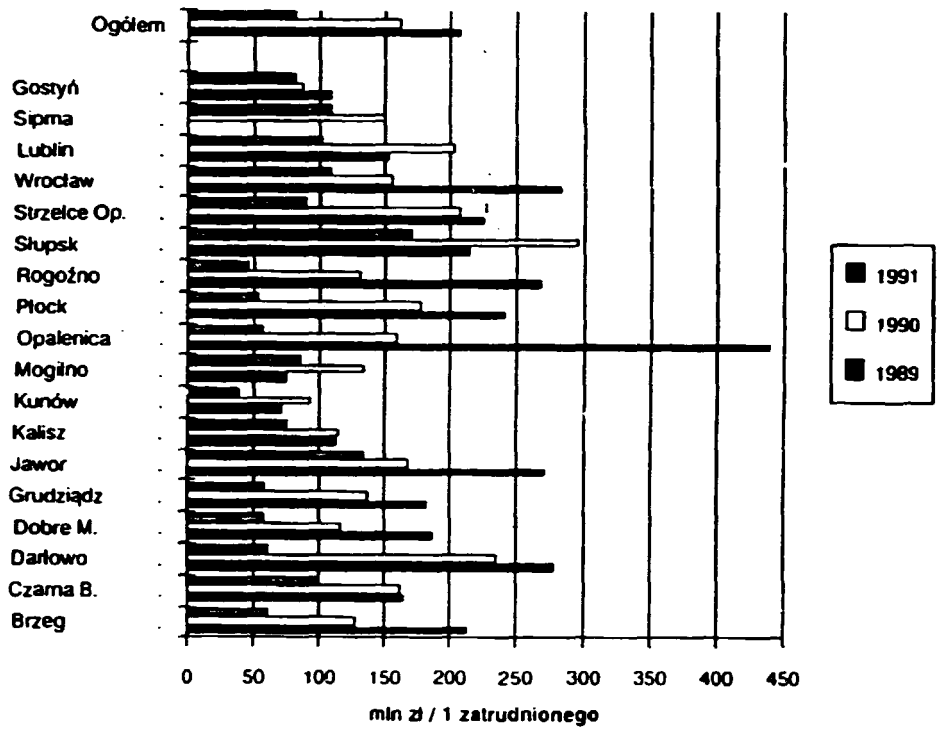
Uwaga : Zatrudnienie w 1989 r. równa się 100 %

W odpowiedzi na tak gwałtowny spadek produkcji wszystkie przedsiębiorstwa podjęły próby obniżania kosztów produkcji, w pierwszej kolejności przez redukcję zatrudnienia

Jednak procentowo mniejsza redukcja liczby zatrudnionych w stosunku do spadku sprzedaży w analizowanym okresie, spowodowała istotne zmniejszenie wydajności pracy z 208 mln zł do 82 mln zł na jednego zatrudnionego. Szczegółowe dane w poszczególnych fabrykach przedstawia poniższy wykres.

Wykres 5.

Wydajność pracy



Przygotowywane jest dalsze poważne zmniejszenie liczebności załóg (około 2 tys. osób), które doprowadzi do powiększenia już i tak niemałego bezrobocia (w niektórych mikroregionach, osiągającego 40 %).

Aktualnie 13 przedsiębiorstw posiada już gotowe programy restrukturyzacyjne. Jednak realizacja ich napotyka na duże trudności, głównie z braku nabywców, a nawet dzierżawców zbędnych mocy produkcyjnych lub środków trwałych nieprodukcyjnych.

Wszystkie powyżej wymienione czynniki spowodowały, że analizowane przedsiębiorstwa uzyskały w ostatnim roku ujemne wyniki finansowe.

Podstawową przyczyną zaistnienia ujemnego wyniku finansowego jest jednak spadek ilości produkcji poniżej granicy wielkości, opłacalnej dla warunków panujących w przedsiębiorstwach.

Podsumowanie

Przedstawiona w niniejszym studium analiza upoważnia do wysunięcia następujących wniosków:

1. Struktura obszarowa gospodarstw oraz uzyskiwane plony powodują, że siła nabywcza krajowego rolnictwa jest bardzo niska.
2. Poziom zmechanizowania prac polowych w gospodarstwach indywidualnych jest daleki od zadowalającego.
3. Potencjalne zapotrzebowanie na maszyny rolnicze w większości asortymentów

odpowiada produkcji z 1989 roku, jedynie w zakresie kombajnów, kosiarek rotacyjnych oraz pługów jest na poziomie około połowy wielkości sprzedaży z 1989 roku.

4. W Polsce do roku 1989 sztucznie utrzymywano korzystny wskaźnik relacji cen płodów rolnych do cen środków produkcji.
5. Obecny wskaźnik tych relacji dla Polski i państw EWG jest zbliżony.
6. Ceny maszyn rolniczych w dolarach w Polsce są 3-14 razy niższe niż w państwach EWG.
7. Poziom konstrukcji krajowych maszyn rolniczych jest niższy w odniesieniu do oferowanych na rynkach EWG.o 20 - 30 %. Obserwuje się poprawę jakości wytwarzania maszyn.
8. Nastąpił gwałtowny spadek sprzedaży maszyn rolniczych do poziomu 27 % wartości produkcji z 1989 roku.
9. Główną przyczyną obniżenia wartości sprzedaży jest zmniejszenie siły nabywczej krajowego rolnictwa oraz w niewielkim zakresie ograniczenie eksportu do państw byłego RWPG, a także przejęcie części sprzętu przez rolników indywidualnych od przedsiębiorstw państwowych i spółdzielczych
10. Wartość eksportu maszyn rolniczych kształtuje się na poziomie 10 % sprzedaży ogółem i nie ma istotnego znaczenia dla ekonomiki funkcjonowania przedsiębiorstw.
11. Obciążenie przedsiębiorstw kosztami osobowymi jest zbyt wysokie i niekorzystnie wpływa na ich efektywność ekonomiczną.
12. Park maszynowy przedsiębiorstw objętych studium jest technicznie zużyty w ponad 60 %. W zakresie nowoczesności reprezentuje poziom krajowy.
13. Stan organizacji zarządzania w większości przedsiębiorstw jest nieprzystosowany do wymogów gospodarki rynkowej.
14. Przedsiębiorstwa objęte studium w roku 1991 osiągnęły ujemne wskaźniki rentowności, spowodowane ujemnym wynikiem finansowym.
15. Finansowanie działalności przedsiębiorstw odbywa się głównie za pomocą kredytów i zobowiązań przy ich wysokim oprocentowaniu.
16. Przedsiębiorstwa nie posiadają zdolności płatniczej.
17. Z analizy wskaźników ekonomicznych wynika, że występują duże trudności w dalszym funkcjonowaniu przedsiębiorstw w ich aktualnym stanie i w istniejących warunkach gospodarczych.

Propozycja sanacji sektora

Dla zorientowania się w jakim stopniu na koszty produkcji wpływa zmniejszenie majątku, redukcja zatrudnienia i likwidacja PPWW, przeprowadzono symulację rachunku kosztów produkcji, przy zachowaniu wielkości produkcji z 1991 roku. Stwierdzono, że suma tych zadziałań nie zmieniła wyniku finansowego całego sektora z ujemnego na dodatni. Zauważono również,że redukcja o 50 % majątku trwałego powoduje poprawę wyniku finansowego zaledwie o 9 %, a likwidacja popiwku tylko o 5 %.

Podkreślić przy tym należy, że utrzymując nadal aktualny popyt na maszyny rolnicze, zmniejszać się będzie istniejący obecnie i tak już niski w porównaniu z krajami Europy Zachodniej, poziom zmechanizowania procesów produkcyjnych w rolnictwie. Z drugiej strony doprowadzić może już wkrótce do całkowitego upadku krajowego przemysłu maszyn rolniczych. Wówczas to sytuacja rolnictwa stanie się jeszcze trudniejsza, ponieważ zmuszone ono będzie do kupowania importowanych maszyn, których ceny są od 3 do 14 razy wyższe od odpowiednich cen maszyn produkcji krajowej.

Przeprowadzono także drugi symulowany rachunek kosztów produkcji, przewidywanych w 1992 roku z uwzględnieniem zadziałań także poza sektorem braży maszyn rolniczych. W rachunku tym ustalono, że gdyby nie wzrósł popyt na maszyny rolnicze wówczas ujemny wynik finansowy sektora powiększyłby się do 1,8 bln zł. Dopiero przy wzroście popytu na maszyny rolnicze do poziomu przewidywanego przez resort rolnictwa potencjalnego zapotrzebowania, ujemny wynik finansowy obniżyłby się do 988 mld zł. Tak więc niezależnie od wzrostu popytu potrzebne są także inne zadziałania. I tak np.;

- obniżenie o 50 % obciążeń z tytułu odsetek od przeterminowanych zobowiązań i należności (likwidacja zatorów płatniczych) - może obniżyć ujemny wynik finansowy o 360 mld zł.

- umożenie przedsiębiorstwom odsetek od przeterminowanych kredytów i zobowiązań wobec budżetu, zmniejszy ujemny wynik finansowy o 347 mld zł,

- umożenie dywidendy i likwidacja PPWW - poprawi wynik finansowy zledwie o 5 %,czyli o 93 mld zł.

Dopiero sumaryczny efekt wszystkich wymienionych wyżej zadziałań doprowadza do tego, iż ogólny wynik finansowy sektora jest dodatni wyraża się kwotą około 100 mld zł.

Tak więc autorzy studium widzą konieczność dwutorowych wzajemnie sprzężonych działań :

a) wewnątrz przedsiębiorstw - realizowanie rozpoczętych już działań restrukturyzacyjnych,

b) w zewnętrznym otoczeniu sektora - pobudzenie popytu na ciągniki i maszyny rolnicze.

Zwiększenie popytu na maszyny zasadniczo mogłoby zostać wykonane poprzez podniesienie zdolności nabywczej rolnictwa, powstałej na skutek wzrostu cen zbytu płodów rolnych, lub poprzez stworzenie systemu preferencyjnego kredytu przeznaczonego na zakup maszyn rolniczych. Pierwsza z tych koncepcji jest praktycznie nie wykonalna, gdyż musiałaby być oparta o wysokie cła zaporowe na płody rolne zarówno przetworzone jak i nie przetworzone, co przeczyłoby zasadom otwarcia granic i współpracy z Międzynarodowym Funduszem Walutowym oraz Europejską Wspólnotą Gospodarczą. Druga już funkcjonuje w naszej gospodarce w zakresie kredytu preferencyjnego na zakup nawozów mineralnych i środków ochrony roślin.

Propozycja funkcjonowania kredytu preferencyjnego na zakup maszyn i ciągników rolniczych, z określeniem skutków jej wprowadzenia przedstawia się następująco.

Popyt na ciągniki i maszyny rolnicze przyjęto na poziomie zapewniającym jedynie utrzymanie istniejącego poziomu zmechanizowania.

Wartość sprzedaży maszyn rolniczych w 18 fabrykach poddanych analizie sektorowej przy przyjęciu powyższego założenia w przeliczeniu na ceny bieżące wynosiłaby 3 bln zł. Szacuje się, że stanowi to 75% wartości sprzedaży maszyn rolniczych w całym sektorze. Dodając do tego wartość

niezbędnych dla rolnictwa rocznych dostaw ciągników o wartości 5 bln zł, uzyskujemy ogólną wartość dostaw ciągników i maszyn rolniczych na rynek krajowy w wysokości 9 bln zł.

Proponowane założenia funkcjonowania systemu kredytu preferencyjnego.

1. Rolnik wpłacałby 30% ceny zakupu maszyny, a pozostałe 70% wraz z odsetkami spłacałby w kwartalnych ratach przez okres 3 lat.
2. Kredyt otrzymują gospodarstwa rolne posiadające zdolność kredytową.
3. Zastosowana zostanie zmienna stopa oprocentowania wynosząca 0,7 stopy kredytu refinansowego.
4. Refinansowanie kredytu przez Bank Centralny następowałoby do końca I kwartału roku następnego.
5. Należy utrzymać zdolność obsługi kredytowej rolników przez Banki Spółdzielcze w drugim i trzecim roku funkcjonowania kredytu.

Zakładając, że wszystkie ciągniki i maszyny rolnicze sprzedawane byłyby w tym systemie wielkość kredytu bankowego wynosiłaby 3,6 bln zł. Przyjmując założoną wielkość oprocentowania, obciążenie budżetu z tytułu udzielonych kredytów wynosiłoby w II roku funkcjonowania systemu 1,1 bln zł (9 bln x 0,7 x 17%). Obciążenie to byłoby jednak częściowo zwrotne. Uruchomienie bowiem produkcji na poziomie określonym w zapotrzebowaniu spowodowałoby wzrost wpływów do budżetu z tytułu:

- podatku dochodowego od pracowników powiększonego o zasiłek dla bezrobotnych (2 tys. dodatkowo zwolnionych) - 25 mld zł
- podatku dochodowego od wartości sprzedaży, liczonego dla producenta maszyny lub jego wierzyciela przy rentowności 15% (9bln - 3 bln = 6 bln x 15% x 0,4) - 360 mld zł
- podatku dochodowego od wytwórcy materiałów i nośników energii (6 bln x 50% x 0,4) - 100 mld zł
- podatku dochodowego od handlu (6 bln x 0,5 x 5% x 0,4) - 60 mld zł
- podatku obrotowego od działalności handlowej (6 bln x 1%) - 60 mld zł

Razem: - 605 mld zł

Z przedstawionego szacunkowego wyliczenia wynika, że faktyczny wydatek budżetu na pobudzenie popytu na maszyny i ciągniki rolnicze nie przekroczyłoby 0,5 bln zł. Ważnym jest, że wpływy do budżetu wyprzedzałyby wydatkowane na ten cel fundusze. Niezależnie od wyżej przedstawionych wyliczeń poprawa sytuacji ekonomicznej fabryk ułatwiłaby ich prywatyzację. Spowodowałoby to dodatkowe wpływy do budżetu z tytułu przekształceń własnościowych.

Ograniczenie dalszych zwolnień pracowników spowodowałoby łagodzenie napięć, wywołanych wzrastającym poziomem bezrobocia.