アルゼンティン共和国
チーム派遣協力「産業機械における設計・製造能力近代化」
終了時評価報告書

平成10年4月
(1998年4月)

国際協力事業団
派遣事業部

平成10年4月

アルゼンティン共和国
チーム派遣協力「産業機械における設計・製造能力近代化」
終了時評価報告書

平成10年4月
(1998年4月)

国際協力事業団
派遣事業部

序　文

アルゼンティンは、産業の近代化と競争力強化を最大課題としています。国立工業技術院材料度量衡研究センター（ＣＩＭＭ）は、同国工業の中心地域であるコルドバにおいて周辺中小企業（自動車、産業機械等）を指導すべく、ＣＩＭＭ自身の技術レベル向上が急務となっていました。

このような状況のなか国際協力事業団は、平成６年より長期専門家の派遣、単独機材の供与を行い、さらに、平成７年３月１０日に署名されたミニッツに基づいて、同年５月１日からチーム派遣協力「産業機械における設計・製造能力近代化」を行ってきました。

このたび、本協力終了を平成１０年４月に控えて、当初計画に照らし、協力の活動実績、技術移転状況などに関する終了時の総合評価を実施し、協力終了後の対応について関係者と協議するため、終了時評価調査団を派遣しました。

評価調査団は、協力が問題なく進捗し、目標としていたＣＩＭＭの技術レベルの向上に寄与し、十分な成果をあげたと判断し、一連の調査結果を合同評価報告書に取りまとめ、署名しました。

本報告書は、同調査団の調査・協議の内容および評価の結果を取りまとめたものです。

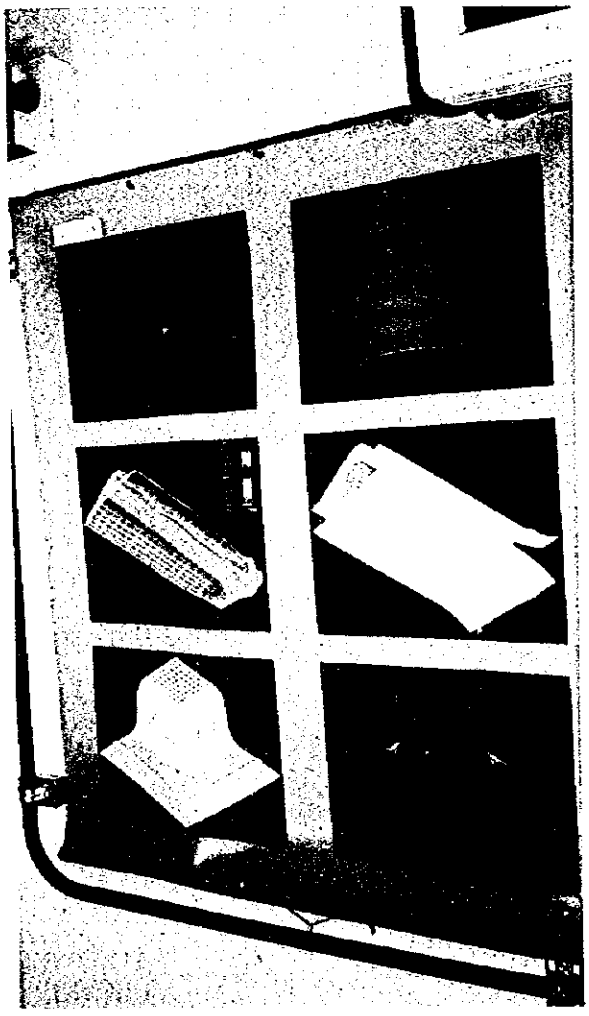
最後に、本調査団の派遣に際し、ご協力とご支援をいただいた内外の関係者の皆様に、心から御礼を申し上げます。

平成１０年４月

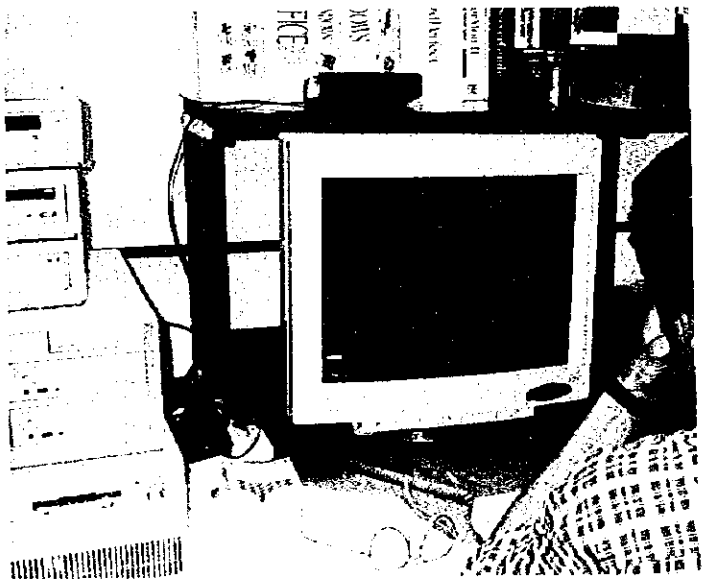
国際協力事業団

理事　佐藤　清

▲ INTI-CIMM



▲ABAQUSでの作図例

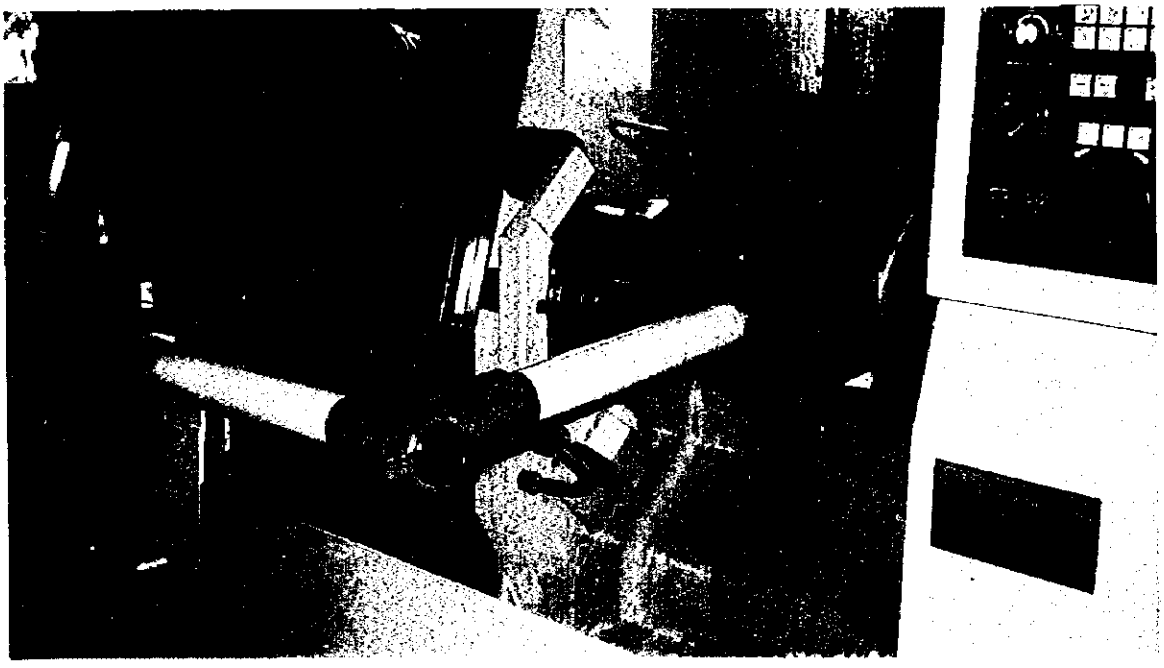


▲ワークステーション

▲協議風景

▲報告書署名式

NC旋盤と
ワーク搬送供給装置
（プロトタイプ機）



目　　次

第１章　終了時評価調査団の派遣

1-1　調査団派遣の経緯と目的

１９９４年から始まった個別専門家派遣・単独機材供与、さらに１９９５年５月からチーム派遣協力へと発展した本件協力は、１９９８年４月末に終了する予定である。

このためＪＩＣＡは、これまで実施してきた協力の実績を把握・整理し、それを評価することにより、今後の協力のあり方や実施方法改善に資することを目的として、１９９８年２月２２日より終了時評価調査団を派遣した。

評価結果については先方実施機関と合意にいたり、１９９８年３月３日に合同評価報告書に署名を交わした。

1-2　調査団の構成

団長・総括	合田ノゾム	国際協力事業団国際協力専門員
分析評価	加藤　三郎	株式会社リョーイン販売促進部長（国内支援委員）
技術協力	久保　英士	国際協力事業団派遣事業部派遣第二課

アルゼンティン側(国立工業技術院材料度量衡研究センター：ＣＩＭＭ)対応メンバー

Elvio Jose Lenta	Director
Ing. Jose Jorge Alvarez	Head of Machinery and Equipment Division
Ing. Roberto Luis Munoz	Head of Electonics Section

1-3　調査日程

２月２２日	日本発
２３日	ブエノスアイレス着　ＪＩＣＡアルゼンティン事務所打合せ
２４日	ブエノスアイレス→コルドバ
２５日	ＣＩＭＭ表敬、全体的打合せ（調査の主旨、報告書等成果品、スケジュールなどの説明）、ＣＩＭＭ内見学、概要説明
２６日	近在の中小企業訪問、評価協議
２７日	評価協議
３月　２日	近在の中小企業訪問、評価協議、まとめ
３日	署名、ＣＩＭＭによるプロトタイプ発表会
４日	コルドバ→ブエノスアイレス、ＩＮＴＩ・在アルゼンティン日本大使館・ＪＩＣＡアルゼンティン事務所へ報告
５日	ブエノスアイレス発
６日	ニューヨーク着
７日	ニューヨーク発
８日	日本着

1-4　主要面談者

（1）　アルゼンティン側

（ＣＩＭＭ）

Alfredo Angel Cordoba	Gerente de Cooperacion economica e Institucional

（在コルドバ中小企業）

tifec　s.a.e.c.　yf.	ギア製造
Ｆ．Ａ．Ｅ．Ｓ．Ａ．	板金、バネ製造
(Fabrica Argentina de Elasticos S.A.I.C)	
ＴＥＣＭＥ　Ｓ．Ａ．	医療機器

（2）　日本側

（在アルゼンティン日本大使館）

吉村　佳人　　参事官

（ＪＩＣＡアルゼンティン事務所）

大沢　尚正　　事務所長

野末　雅彦　　次長

中川　幾博　　担当所員

（ＪＩＣＡ派遣長期専門家）

松崎　義博　　専門家

1-5　終了時評価の方法

調査団は、松崎専門家の協力を得つつ、ＣＩＭＭ協力先企業を訪問するなど協力の成果を確認するとともに、評価５項目（目標達成度、効果、実施の効率性、計画の妥当性、自立発展性）の観点を踏まえてＣＩＭＭとの間で合同評価を実施した。

調査結果は合同評価報告書として取りまとめて互いに確認し合い、調査団長とＣＩＭＭ所長との間で署名・交換した。

評価実施に際しては、以下の点に特に留意した。

（1）　チーム派遣協力以前の個別専門家派遣、単独機材供与の実績も踏まえて、これまでの協力全般を評価した。

（2）　協力開始後、いっそう包括的な「チーム派遣協力」の折衝が行われ、協議結果のミニッツが１９９５年３月１０日に合意されていたので、今回の評価は、主としてこのミニッツに基づいて行った。

（3）　チーム派遣協力の主な活動項目のひとつであった「ワーク搬送供給装置のプロトタイプ機（以下、プロトタイプ機）開発」は、これまでの協力で移転された個々の技術を集大成する形で実施されたものである。したがって、評価対象として「プロトタイプ機開発」に、特に重点を置いた。

第２章　評価調査要約

調査団は、これまでの協力の実績を把握・整理し、ＣＩＭＭ関連企業訪問調査・ＣＩＭＭ組織状況の確認を行い、ＣＩＭＭと合同でそれらを評価し、合同評価報告書を取りまとめた。この作業により、アルゼンティン側・日本側双方の関係者のなかで本協力の骨子と意義についての理解がいっそう深まったものと考えられる。

調査終了後に、ＣＩＭＭは近隣企業などを招いてプロトタイプ機の発表会を開催した。

調査活動の概要は以下のとおりである。

（１）　これまでの協力の活動実績把握

これまでの協力の経緯を含め、チーム派遣協力事前調査協議において合意されたミニッツを主な基準として、諸活動の実績・成果について互いに確認した。

その結果、プロトタイプ機の開発を中心に、各項目が順調に実施され、成果をあげたことが確認された。

（２）　ＣＩＭＭ内視察、ＣＩＭＭ概要把握

ＣＩＭＭ内の機材の利用状況などを確認し、カウンターパートからのヒアリング、組織・体制概要把握を行った。

供与された機材は良好な状態で活用・維持管理されていた。日本で研修を受けたカウンターパートは定着しており、日本で受けた研修の成果・今後の課題を確認した。また、組織・体制・予算状況・活動内容などについて、ＬＥＮＴＡ所長からかなり詳細な説明を受けた。（資料２「ＣＩＭＭ概要説明資料」参照）。

（３）　関連企業訪問

技術支援などの面でＣＩＭＭとのコンタクトが強い近隣中小企業を訪問した。中小企業からのＣＩＭＭへの期待は高まっており、その一方でさらなる要望などのあることが確認できた。また、実際にＣＩＭＭの協力が企業で活用され、協力の成果が広く影響を与えていることが確認された。

（４）　合同評価報告書の取りまとめ

以上の結果をもとに、双方の協議を経て合同評価報告書を作成し、署名を取り交わした。

協議においては、実績・成果の確認がなされ、それをもとに協力の効率性・目標達成度・インパクト・計画の妥当性・自立発展性を評価し、評価結果は満足できるものであった。

特に、組織・体制・財務などの面でも、今後のＣＩＭＭの活動の継続・発展の見通しが大きいことが感じられた。

調査団は、今後のＣＩＭＭの活動に資すると考えられる提言を行い、一方、ＣＩＭＭからは、今後も日本との関係を維持したい旨の要望が出された。

第３章　協力実施の経緯および概要

3-1　要請の背景と内容

ＣＩＭＭはこれまでにも、「機械部品の設計」・「エレクトロニクス回路の設計」・「ＰＬＣによる自動化」など多くの分野で、アルゼンティン工業界への支援を行ってきた。一方、近年の経済面での国際化の進展やメルコスールのスタートなどによりアルゼンティンの産業界はいっそうの競争力強化を迫られることになった。

このためＣＩＭＭは、自身の産業界支援能力を高めるため日本政府に対して機械設計・製造の分野での技術協力を要請してきた。これを受けてＪＩＣＡは、１９９４年から個別専門家派遣および単独機材供与を行い、さらに１９９５年５月１日から３年間のチーム派遣協力を行ってきた。

この協力全体の活動実績概要を付表１に示す。

3-2　協力実施の経過

協力実施の経緯表を付表２に示す。

第４章　計画達成度

4-1　投入

（１）　日本側インプット

①　調査団と専門家の派遣

調査団と専門家の派遣実績については資料１「合同評価報告書」のAnnex3、Annex4参照。

２名の長期専門家、１２名の短期専門家、３回の調査団を派遣した。

②　研修員受入

研修員受入実績については資料１「合同評価報告書」のAnnex5参照。

計６名の研修員受入を実施した。

③　機材供与

供与機材一覧表については資料１「合同評価報告書」のAnnex6参照。

④　経費負担実績

日本側が供与機材、現地業務費として負担した経費実績については資料１「合同評価報告書」のAnnex7参照。

（２）　アルゼンティン側インプット

①　要員配置

ＩＮＴＩ、ＣＩＭＭの組織図、カウンターパートスタッフの配置状況については資料１「合同評価報告書」のAnnex8、Annex9参照。

②　機材購入

ＣＩＭＭが準備・購入した機材リストについては資料１「合同評価報告書」のAnnex10参照。

③　経費負担実績

アルゼンティン側が人件費、機材購入、インフラなどの整備、消耗品費として負担した経費実績については資料１「合同評価報告書」のAnnex11参照。

4-2　成果

技術移転成果の要約（詳細は資料１「合同評価報告書のAnnex12、Annex13参照）を以下に示す。

さらに、個々の技術移転にとどまらず運営面・技術面・組織面などを含めて、スケジュール管理・フォロー方法など日本で実施されている総合的開発手法を理解できたという成果がアルゼンティン側より特に強調された。

（1） 設計技術

設計理論、コスト・性能等の最適化技術、機械部品の公差、トライボロジーなどについて理解した。また、ＪＩＣＡから供与された構造解析ソフトウェア「ＡＢＡＱＵＳ」を用いて、非線形構造解析技術を習得した。

自動車ブレーキディスクの動的解析および大型塗装ロボット開発事例の講義、プロトタイプ機開発などを通じ、ＣＩＭＭの設計における総合的な力量が向上した。

（2） 製造技術

機械加工のための工具の評価、ＮＣ工作機械による機械加工、ＣＡＤ/ＣＡＭ技術、製造管理技術、品質保証技術などが技術移転された。

ＪＩＣＡから供与されたＮＣ工作機械の操作、これを用いた機械加工技術が完全に習得された。

（3） オートメーション技術

電子回路設計、信頼性技術、最新素子ＤＳＰ、人工呼吸装置のマイクロコンピュータ回路などについての知識を得た。

特に、ＪＩＣＡから供与されたソフトウェア「ＯｒＣＡＤ」を用いて、回路設計・レイアウト設計の技術を習得し、中小企業への支援に活用している。

そのほか「ＰＬＤコンパイラ」・「デジタルオシロスコープ」などの供与機材の操作技術を習得した。

（4） プロトタイプ機の開発

ＣＩＭＭは、上述諸技術を総合的に適用し、事情の許す範囲で最大限の精力を傾けてＮＣ工作機械用ワーク搬送供給装置のプロトタイプ機を開発した（詳細については、資料１「合同評価報告書」Annex13を参照）。

開発は、若干の予定スケジュールからの遅れがあったものの、その完成は非常に満足のいく成果であると評価できた。また、その開発過程において、フォローミーティングの設置、およびフォローミーティングによる開発の工程管理を経験し、また苦しい状況にあった予算・人員を工夫しつつプロトタイプ機を完成させたことは、ＣＩＭＭにとって機械開発における重要な経験を積んだといえる。

4-3 当初計画の変更

当初計画からの変更点については資料１「合同評価報告書」のAnnex14参照。

ＣＩＭＭ側の追加要望、日本側の専門家リクルートの難航などによる計画の変更はあったが、協力の進捗、目標達成に大きく影響を及ぼすことはなかった。

第５章　評価結果

5-1　効率性

ＮＣ工作機械、ＣＡＴＩＡなどの新鋭機器およびソフトウェアの供与により、最新技術の移転がより効果的になされた。

当初はＣＩＭＭ側の要望の不明瞭さなどにより、専門家のリクルート、研修員受入などに困難をきたすこともあったが、ＣＩＭＭ、ＪＩＣＡ双方間のより緊密な協議などにより改善が図られ、専門家派遣、研修員受入が十分に実施されるに至った。

ただし、ＣＩＭＭ側のカウンターパートスタッフの配置がさらに十分になされていれば、技術移転はより効果的になされたと思われる。

5-2　目標達成度

機械設計、製造、オートメーションの中核となる技術項目について、基礎技術および応用技術が十分にＣＩＭＭに移転され、その実践としてＮＣ工作機械用ワーク搬送供給装置のプロトタイプ機が開発された。

一方で、研究センターであるＣＩＭＭには、企業と違って生産ラインなどを実際に有しているわけではないため、設計・製造技術における実践的な経験を十分に蓄積できたとはいえず、その点では技術移転に限界があった。

5-3　インパクト

上述のとおり、最新の機器と技術を得たＣＩＭＭは、機械設計・製造の分野での中小企業への指導能力がより向上したのに加え、中小企業を対象に実施したセミナー開催、技術的な指導などを通じて企業との交流がいっそう深まり、企業からの要望なども増加している。

5-4　計画の妥当性

協力開始後、自動車産業をはじめとしたアルゼンティン産業界での当分野の技術力向上への要望は増大しており、企業からＣＩＭＭへの依頼件数の増加をみても、当協力の計画・実施は妥当なものであったと考えられる。

5-5　自立発展性

（１）　組織的自立発展性

アルゼンティン政府は産業の発展を促進しており、ＩＮＴＩの予算および新規採用

人員もこれまでより増加している。また、政府は、ＣＩＭＭをＣＥＭＣＯＲ-ＣＩＭＭに名称変更して新組織として承認した。

新組織となったＣＩＭＭは、理事長としてコルドバ商工会議所から人材を迎え入れており、政策面も含めて産業界とのつながりはより深いものになると思われる。

また、ＣＩＭＭへの企業からの依頼件数は増加傾向（３年前に比べ約１．５倍）にあり、その収入がＣＩＭＭの予算の財源の多くを占めるようになってきている。ＣＩＭＭは、予算の５０％を独立採算とすることを目標に掲げているが、この目標達成も近いと思われる（現在３５％）。

このように、ＣＩＭＭの今後の組織的自立発展は大いに期待できる。

（２） 中小企業支援政策

かつては材料診断・機器調整といった企業からの依頼が大半であったが、近年は技術支援や新製品開発への助言などの依頼が増加している。

ＣＩＭＭは、企業の製品および生産の向上を促進させるべく企業支援政策の拡大・継続を企図しているほか、企業の開発コストを一部負担する活動も新たに展開している。

また、品質管理分野での中小企業支援強化のために、ＣＩＭＭ自身がＩＳＯ9000などの取得をめざしている。

（３） 機器の活用

ＪＩＣＡの供与した機材は、十分に活用され、非常によく維持管理されており、今後も同機材の活用が期待できる。

多くの機器が１０年以上の使用に十分耐える性能を有しており、ＣＩＭＭにはスペアパーツが準備されている。また、当該機器メーカーの大半がアルゼンティンに代理店を有し、アフターサービスなどが容易に受けられる。さらに、ＣＩＭＭのスタッフは、日本での研修などにより機器の維持管理方法を習得しており、チェックリストを設けて系統的に維持管理している。いくつかのソフトウェアはすでに更新されているなど、修理費・更新費の予算措置がなされている。

第６章　評価結果総括

6-1　総括

（１）　本協力は目的を達した

以下の事情から、本協力は十分に目的を達したと判断できる。

①　周辺企業からの信頼が高まり、支援依頼などのコンタクトが質量ともに増大した。

②　個々の移転技術を統合した形で、「ＮＣ工作機械用ワーク搬送供給装置」のプロトタイプが実際に開発された。

③　供与された最新鋭機材が、十分に活用・維持されている。

（２）　成果をあげた主な要因

①　派遣専門家の活動および関係日本側機関の協力が大きかったことはもちろんであるが、ＣＩＭＭ側の責任者をはじめとする関係者の真摯で謙虚な取り組み姿勢が大きく影響した。

②　このような協力分野では、多岐にわたる最新鋭機材の供与が非常に役立った。

（３）　今後のＣＩＭＭのいっそうの発展が期待できる。

①　中小企業支援についてＣＩＭＭ自身がしっかりしたスタンスを持って進めており、前述のように成果が出はじめている。

②　アルゼンティン政府は産業育成面での重要性を認識しており、超緊縮財政を強いられているなかでも、この分野への予算配分上の配慮が具体化されつつある。

③　若手スタッフの定着が不十分な点は、ＣＩＭＭにとって依然として最重要課題のひとつであるが、上述政府予算面の措置などにより徐々に改善される可能性がある。

（４）　その他

今回の評価とは別に、国内関係機関の強い支援は非常に大きな力となった。しかし、このような技術分野での専門家リクルートなどにおいては、今後いっそう困難が増すであろう。

6-2　ＣＩＭＭの将来の発展に関して

（１）　ＣＩＭＭへの提言

本協力を終了するにあたり、今後のＣＩＭＭのいっそうの発展を希望する観点から、調査団はＣＩＭＭに対して以下の５点について提言した。詳細は資料１「合同評価報告書」の本文第６章を参照。

①　ＣＩＭＭの弱点である実経験不足の解決手段として、「優れた製品実機」の分解・分析・再組立を行う。

② 製造管理の分野では、ＣＩＭＭのような研究機関が「製造管理全般」に熟達することは困難であり、むしろその一要素である「品質管理」に絞ってＣＩＭＭ自身がこれを習熟し、中小企業を支援する。

③ エレクトロニクスの分野では、いっそう幅広く経験を蓄積する。

④ 本協力中に開発した「ＮＣ工作機械用ワーク搬送供給装置のプロトタイプ」を、さらに検討・改良して実用化する。

⑤ 本協力での供与機材を、適切なやり方による外部への開放なども含めて、最大限に活用する。

（２） 今後のＣＩＭＭと日本とのコンタクトについて

本協力によってＣＩＭＭの力量は大きく前進したところであり、今後ＣＩＭＭは、独自の努力により不断の技術進歩の成果を取り入れて、アルゼンティンの産業発展に貢献していくことをめざしている。

そしてこれを効果的にかつ確実に進めるために、本協力終了後も日本との技術面でのつながりを維持していくことをＣＩＭＭは希望している。

調査団としては、ＣＩＭＭのこの希望を極めて意義深いものと考えており、いわゆるＯＤＡの枠を超えて、技術交流・情報交換などに関する日本側の窓口を設定することを提言する。

6-3 ＪＩＣＡの今後の技術協力活動へ向けた提言

（１） 相手側の取り組み姿勢の予測

相手側の取り組み姿勢は協力の成否を直接的に左右する重要事項であるが、これは相手側実施機関責任者および中核的人物の属人的資質・人格などに負う面が大きく、これをあらかじめ見通すことはけっして容易なことではない。

本件の場合は、この点でも恵まれていたともいえるが、案件形成段階でＪＩＣＡ現地事務所が比較的系統的に相手側実施機関責任者と接触して、相手側実施機関責任者の強い責任感や優れた人格を感じ取っていたようである。

他の案件形成においても、この面でのＪＩＣＡ現地事務所の能力および任務は重要であろう。

（２） 系統的で実行力ある国内支援体制の構築

本件の場合、有力な組織と技術者を擁した国内支援体制を持つことができ、協力実施上非常に有益であった。

系統的で実行力ある国内支援体制を構築するためには、文字どおり「力量を持ち、かつ、系統的に精力を傾けることができる人物」をＪＩＣＡ内外から選び、支援体制

の中核として配置することが重要ポイントのひとつであろう。

（3） 供与機材仕様化に際しての入念な調査と検討

本協力の初期段階における機材供与に際して、現地の諸環境との不整合などを生じた例が散見された（詳細を付表３に示す）。

もちろんこれらは、現地搬入後の措置などにより是正されたが、仕様検討の段階でいっそう入念な作業を行うことが、今後の教訓となった。

付表1　活動実績概要

			1993	1994	1995	1996	1997	1998
基本事項			▲協力開始 ▲専門家派遣開始	▲機材供与開始 ▲「チーム派遣協力」合意	▲「チーム派遣協力」開始 「チーム派遣協力」	▲「チーム派遣協力」巡回指導		▲協力終了 ▲合同評価
専門家派遣	長期専門家	機械設計				河名専門家		
		機械製造				松崎専門家		
	短期専門家	機械設計		今津専門家		今津専門家	稲田専門家	村上専門家 村上専門家
		機械製造						陸田専門家
		コンピューター・ソフト・プログラム				合田専門家	中村専門家	
		オートメイション					中村専門家	中村専門家
		製造管理					陸田専門家	
		トライボロジー		中山専門家				
JICA からの主要供与機材				▲NC旋盤 マシニング センター NC 放電加工機 CAD/CAM system		▲構造解析ソフト (ABAQUS) 一次分	▲3次元CADソフト (CATIA)	▲PLC software ▲構造解析ソフト (ABAQUS) 二次分
アルゼンティン側カウンタパートの日本での研修		Design & Manufacturing of M/C				Mr.ALVAREZ		
		Machinery engineering					Mr.MAZZUCCO	
		Electronic engineering						Mrs.BRAMBILLA
		Computer software						Mr.MUNOZ
		Automation techniques				Mr.MELO		
		Computer software (CATIA)						Mr.ALVAREZ
その他								

付表2　経緯表

年	月	活動
1991	12	・「工業技術開発行政」天野JICA長期専門家が、コルドバを訪問し、INTI/CIMMと将来の技術協力について協議するとともにコルドバ周辺企業の技術レベル等を視察する。
1992	9	・CIMM所長（LENTA氏）が日本の技術などを視察に訪日する。 ・天野専門家がCIMMにて将来の協力に関する事前打ち合わせを行う。専門家派遣、研修員受入、機材供与からなる協力の目的が固まる
	12	・CIMM建屋を改築する（3700㎡、実験室、図書館、講堂等からなる）。
1993	6	・単独機材供与が要請される。 ・個別専門家の派遣が要請される。 長期専門家－機械設計・製造技術 短期専門家－設計技術・磨耗工学技術
1994	3	・松崎長期専門家（製造技術）が着任する。
	5	・業務実施計画書が松崎専門家よりCIMMに提出される。 ・供与機材据えつけのための設備の準備が始まる。
	10	・「機械設計」今津短期専門家が赴任する。
	11	・「摩擦工学」中山短期専門家が赴任する。 ・単独供与機材の一部（CNC旋盤、マシニングセンター、計測器類）が到着する。 ・チーム派遣協力の新規要請が提出される。
	12	・マシニングセンターとCNC旋盤の据えつけが完了する。
1995	1	・単独供与機材の残り機材（ワイヤーカット放電加工機、トランス、CAD/CAMシステム、電気計測器類）が到着し、完納となる。
	3	・チーム派遣協力事前調査団が来亜し、INTI及びCIMMと協議を行う。 調査団：天野団長、他 JICAアルゼンティン事務所：長野次長、他 INTI/CIMM：Lenta所長、他 ・チーム派遣協力が承認され、ミニッツが署名・交換される。 JICA：福田省三アルゼンティン事務所長 INTI：Silvia PORTNOY INTI総裁 ・単独機材供与式
	4	・単独供与機材の据えつけ指導に森精機の清居氏が派遣される。
	5	・チーム派遣協力「産業機械における設計・製造能力近代化」が5月1日より開始される。 ・松崎個別派遣専門家がチーム派遣専門家に切り替わる。
	6	・単独供与機材の据えつけ指導にファナックの川角氏が派遣される。 ・「機械設計技術」河名長期専門家が着任する。
	8	・チーム派遣協力実施計画書が提出される。 ・カウンターパートJorge ALVAREZ氏の本邦研修が始まる。 （機械設計・製造技術　4カ月間）
1996	2	・カウンターパートJorge MELO氏の本邦研修が始まる。 （オートメーション技術　2カ月間） ・ABAQUSソフトウエア（一次分）が供与される。
	3	・「機械設計」今津短期専門家が派遣される。 ・ワークステーション、NC工作用工具類が供与される。
	4	・「コンピューターソフトウエア」合田短期専門家が派遣され、今後の協力の進め方等を協議する。
	5	・プロトタイプ機開発に関する打ち合わせが開始される。
	6	・福田JICAアルゼンティン事務所長がCIMMを訪問する。

付表2（つづき）

1996	8	・プロトタイプ機開発に関する打ち合わせを実施し、詳細、特性、設計、ワーキンググループを決定する。開発機種を「ワイヤー定長巻き取り装置」を選定する。 ・チーム派遣協力業務報告書第1号がJICAに提出される。
	9	・カウンターパートCarlos MAZZUCCO氏の本邦研修が始まる。 （治工具設計・NC工作機械・工作技術　3カ月間）
	10	・「機械設計」稲田短期専門家が派遣される。 ・「コンピューターソフトウェア」中村短期専門家が派遣される。 ・「製造技術」陸田短期専門家が派遣される。
	11	・コンピューター機器の一部が供与される。
	12	・CATIAソフトウェアが供与される。
1997	1	・オシロスコープ、ACカリブレーションが供与される。
	3	・カウンターパートNancy BRAMBILLA女史の本邦研修が始まる。 （コンピューターソフト技術　2カ月間） ・チーム派遣協力業務報告書第2号がJICAに提出される。 ・プロトタイプ機に関する打ち合わせを実施し、「NC旋盤用ワーク搬送供給装置」に開発機種を変更する。J. ALVAREZ氏を責任者とし、97年3月から11月を開発日程とし、フォローミーティングを毎週実施することを決定した。
	5	・「機械設計」村上短期専門家が派遣される。 ・「コンピューターソフトウェア」中村短期専門家が派遣される。 ・OrCADソフトが供与される。
	6	・河名長期専門が帰任する。
	8	・カウンターパートRoberto MUNOZ氏の本邦研修が始まる。 （コンピューターソフト技術　4カ月間）
	10	・「オートメーション」中村短期専門家が派遣される。 ・「製造技術」陸田短期専門家が派遣される。 ・CIMMがCEMCOR-CIMMに改編される。
	11	・「機械設計」村上専門家が派遣される。プロトタイプ機のテスト、評価を実施する。 ・ABAQUSソフトウエア（二次分）が供与される。 ・PLDコンパイラが供与される。 ・ツールプリセッターが供与される。 ・BASTIAS氏によるABAQUSソフトの研修が実施される。 ・大沢JICAアルゼンティン事務所長がCEMCOR-CIMMを訪問し、チーム派遣協力の進捗状況、プロトタイプ機、供与機材の活用状況等を視察する。
1998	1	・グラフィックターミナルが供与される。
	2	・2月25日から3月3日の予定で終了時評価調査団が来訪する。
	3	・合同評価報告書が承認され、署名・交換される。 日本側：合田ノゾム調査団長 アルゼンティン側：Elvio LENTA CEMCOR-CIMM所長 ・プロトタイプ機発表会、機材供与式 ・カウンターパートJorge ALVAREZ氏の本邦研修が始まる。 （3次元CAD-CATIA　1カ月間）
	4	・本件協力終了。 ・松崎専門家帰任。

付表３　供与機材にかかわる不具合事項

No.	不具合現象	対応処置	対策
1	機材電圧の相異。 亜国３８０ｖ３相に対し、 日本２２０ｖ３相で入荷した。	トランスを追加手配した。 (予算追加及び納期遅れ3ヶ月)	相手国の事情調査を密に行う。
2	機材の仕様書が使用側に無い。 （ＪＩＣＡ事務所にも無い）		機材発注時点で使用側に 送付する。
3	ＮＣ旋盤のメモリー少ないため 都度機上プログラムを要する。 尚、Handy Scaleの使用も不可		使用者側と機械仕様の打合せを 密にして対処する。
4	ワイヤーカット放電加工機の ワイヤー径が亜国標準と相異。 （亜国は2.5mm、日本は2.0mm）	亜国標準の2.5mm用のガイドを 追加手配した。 (予算追加及び納期遅れ1ヶ月)	相手国の事情調査を密に行う。
5	機械基礎図が使用者側に無い （機械到着３ヶ前には必要）	急遽メーカーより取り寄せた。	機械仕様書又は取扱 事前に送付しておく。
6	Vibration Moniterの使用適用 が使用者側と合致していない。 （C／Pも知っていなかった）	機材が入荷したが大型測定用で 適用出来ない。－－－保留中	機械仕様書又は取扱説明書を 事前に送付しておく。
7	プロファイラーのサポートスタ ンドが無いので使用困難。	使用者側で製作した。	使用者側と機械仕様の打合せ を密にする。
8	マシニングセンターのテーブル 溝用Ｔナットが寸法違いが入荷。 (小型用でＴ溝にフィットしない)	使用者側で製作した。	機械のメーカー検査を行い 確認する。
9	コンピュータ付属のプリンター の取扱い説明書が和文しか無い。	専門家が翻訳し使用可とした。	機材発注時にメーカに少なくとも 英文の説明書を作成させる。
10	CAD/CAM装置のメモリカードの 不良のため作動しない。	何度かメモリーの交換をしたが ダメであった。 使用者側でメモリー購入した。	機械のメーカー検査を行い 確認する。
11			

資　　料

JOINT EVALUATION REPORT

ON

THE TECHNICAL COOPERATION

FOR

THE UPDATING OF TECHNOLOGY IN DESIGN AND MANUFACTURING FOR INDUSTRIAL MACHINES IN THE ARGENTINE REPUBLIC

MARCH 3, 1998

CORDOBA, ARGENTINA

Mutually attested and submitted

to all concerned

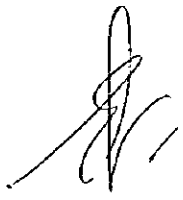
MARCH 3, 1998

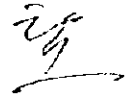
CORDOBA , ARGENTINA

Mr. Nozomu Goda
Leader
Evaluation Study Team
Japan International Cooperation Agency
Japan

Mr. Elvio José Lenta
Director
CEMCOR- CIMM
Argentine Republic

CONTENTS





LIST OF ANNEXES

Notes on the Report (Glossary)

CEMCOR-CIMM	Centro Regional CORDOBA
CIMM	Centro de Investigacion de Materiales y Metrologia
INTI	Instituto Nacional de Tecnologia Industrial
JICA	Japan Internatinal Cooperation Agency
NC	Numerical Control
CAD/CAM	Computerized Aided Design / Computerized Aided Manufacturing
DSP	Digital Signal Proccesor
ABAQUS	Software Finite elements analysis
CATIA	Three Dimensional CAD
ISO	International Standard Organization
C/P	Counter Part
AC	Alternating Current
PLD	Programmable Logic Device
FMS	Flexible Manufacturing System
OJT	On the Job Training
EWS	Engineering Work Station
EDA	Electronic Design Automation
PVD	Physical Vapour Deposition
Or-CAD	Electronic Design CAD

1. INTRODUCTION

1-1 The Japanese Evaluation Team

The Government of Japan through JICA has provided INTI/CIMM with technical cooperation since 1993. After that, both JICA and CIMM agreed to implement a MINI-PROJECT type technical cooperation with a cooperation period of three years from May 1, 1995, and signed the Minutes of Meeting on March 10, 1995. Overall cooperation from 1993 to 1998 is hereinafter referred to as "the Cooperation".

As the Cooperation period is to end on April 31, 1998, an evaluation study team headed by Mr. Nozomu GODA(hereinafter referred to as "the Team") was dispatched by JICA to CIMM in order to conduct an evaluation jointly with CIMM.

The joint evaluation was conducted from February 23 to March 5, 1998, and the result of the evaluation activities are summarized in this report.

1-2 Purpose of the Evaluation

(1) To review and record the process of the'Cooperation.
(2) To evaluate the degree of target achievement and sustainability of the Cooperation.

1-3 Schedule of the Japanese Evaluation Team

(Date)	(Schedule)
February 23	Arrival in Buenos Aires from Tokyo - via U.S.A.
	Visit to and meeting with JICA office
February 24	Departure from Buenos Aires and arrival in Cordoba
February 25	Courtesy visit to CIMM and visit CIMM laboratories
February 26	Visit small and medium companies
	Discussion with CIMM
February 27	Discussion with CIMM
March 2	Visit small and medium companies
	Discussion with CIMM and final adjustment
March 3	Signing of the Joint Evaluation Report
	Presentation of the Prototype by CIMM
March 4	Departure from Cordoba and arrival in Buenos Aires
	Report to INTI
March 5	Report to the Embassy of Japan and JICA office
	Leave Buenos Aires for Tokyo - via U.S.A.

1-4 Attendance

<1>Japanese Side

Mr. Nozomu GODA	Leader
Mr. Saburo KATO	Evaluation and Analysis
Mr. Eiji KUBO	Evaluation of the Technical Cooperation

<2>Argentine Side

Mr. Elvio José LENTA	Director of CEMCOR- CIMM
Mr. José Jorge ALVAREZ	Head of Machinery and Equipment Division
Mr. Roberto Luis MUÑOZ	Head of Electronics Section

2. METHODOLOGY OF EVALUATION

(1) To evaluate for the whole period of the Cooperation, not only for the period of the MINI-PROJECT.

(2) To evaluate mainly based on the Minutes of Meeting that was signed on March 10, 1995 for the MINI-PROJECT.

(3) "Development of the Prototype" was one of the major activities of the MINI-PROJECT, because, within the process of "Development of the Prototype", Argentine counterparts were expected to consolidate all that had been obtained in the various stages of the Cooperation.
Therefore, the process of "Development of the Prototype" was properly focused for the evaluation.

3. BACKGROUND AND SUMMARY OF THE PROJECT

3-1 Brief Background of the Cooperation

CIMM, centered in the Argentine industry area, has assisted many industries for design of mechanical parts and assemblies, electronic design, special equipment and devices, automation through microprocessors and PLC's and prototype construction.

In accordance with economy globalization and MERCOSUR starting, Argentine industries have needed to improve their competitiveness. So, to meet these needs, CIMM wanted to develop its ability to assist the machinery industries by improving its technologies in the
machinery and components design, and manufacturing fields.

Then, CIMM requested the Government of Japan to give technical cooperation in this field. In response to the request, JICA started to provide equipment in 1993, and to dispatch Japanese experts in 1994.

In addition, the MINI-PROJECT started on May 1, 1995.

Annex 1 and Annex 2 give an overview of the above.

3-2 Chronological Review of the Cooperation

Chronological Review of the Cooperation is as shown in Annex 2.

3-3 Objectives of the Cooperation

(1) To increase CIMM's own capability in designing and manufacturing machinery and components.

(2) Consequently to increase CIMM's capability in giving technical assistance service to machinery and component industries.

4. RESULTS OF EVALUATION

4-1 Input to the Cooperation

<1>Input by the Japanese Side

(1) Dispatch of Japanese Experts and Survey Teams
JICA has dispatched two (2) long-term experts and twelve (12) short-term experts, and also sent two (2) survey teams and one (1) mission for the Cooperation, as shown in Annex 3 and Annex 4, respectively.

(2) Acceptance of the Argentine Counterpart Personnel for Training in Japan
JICA has accepted six (6) Argentine counterpart personnel for their training in Japan as shown in Annex 5.

(3) Provision of Machinery and Equipment
The machinery, equipment and materials have been provided by the Japanese government through JICA as shown in Annex 6.

(4) Expenses of the Japanese Side
The total outlay of the Cooperation by the Japanese side so far can be summarized as shown in Annex 7.

<2>Input by the Argentine Side

(1) Allocation of Argentine Counterparts and Administrative Personnel
The Argentine side has allocated the personnel as shown in Annex 8 and Annex 9.

(2) Purchase of Machinery and Equipment
Machinery and equipment have been purchased by the Argentine side as shown in Annex 10.

(3) Expenses of the Argentine Side
The total outlay of the Cooperation by the Argentine side so far can be summarized as shown in Annex 11.

4-2 Output from the Cooperation

Details of output from the Cooperation are shown in Annex 12. Besides the specific technical aspects that follow, a very important output is the acquisition of knowledge about the Japanese development procedures, including management, technical and organizational aspects.

<1>Mechanical Design

(1) CIMM obtained knowledge about the theory of design, optimization of cost and performance, fitting tolerance of components and tribology. Besides, CIMM mastered the technique of nonlinear structure analysis by means of ABAQUS.

(2) CIMM obtained the knowledge of analysis of automobile disk brakes and development of heavy type painting robots.
The overall capability of CIMM in machine designing was improved through obtaining the above-mentioned knowledge and developing a Prototype.

<2>Manufacturing Processes and Techniques

(1) CIMM obtained the following techniques
* Machining by means of NC machinery
* CAD/CAM
* Management of manufacturing

* Quality assurance

(2) CIMM mastered operation and programming of NC machinery provided by JICA.

<3>Industrial Automation

(1) CIMM obtained techniques about the following
* Design of electronic circuits
* Reliability for design and manufacturing
* New elements like DSP
* Application of micro-computer circuits for control of breathing equipment

(2) CIMM obtained design techniques for electronic circuits and patterns, by means of OrCADsoftware provided by JICA.

(3) CIMM mastered the operation of such equipment provided by JICA as the PLD compiler and digital oscilloscope.

<4>Development of the Prototype

CIMM developed a Prototype, consolidating the above-mentioned techniques and concentrating on it as much as possible.
The process of development of the Prototype is shown in Annex 13.

4-3 Modifications of the Original Plan of the MINI-PROJECT

Details of Modifications of the original plan of the MINI-PROJECT are shown in Annex 14.

5. EVALUATION SUMMARY

5-1 Efficiency

(1) JICA provided the newest model of equipment, like the NC lathe, Machining center and NC electric discharge machine, and full scale software of "ABAQUS", "CATIA" and "OrCAD".
This enabled both CIMM counterparts and Japanese experts to achieve technology transfer of up-to-date techniques.

(2) At the beginning, there were difficulties in recruiting short-term experts and in arranging C/P training in Japan, because JICA could not understand CIMM's specific requirements for those. After that, through the continuous efforts among both sides to improve the situation, dispatch of short-term experts and C/P training in Japan have become well managed to the satisfaction of sides.

(3) As for the allocation of CIMM's counterparts, key-persons were properly assigned and competent enough, however, a few more persons should have been allocated for a more effective technical transfer.

5-2 Achievement of the Cooperation Target

(1) In all the technical fields of Mechanical Design, Manufacturing Processes & Industrial Automation, fundamental technology & application techniques were introduced to CIMM's counterparts with complete satisfaction.

(2) Those techniques were practiced in the process of Development of the Prototype.

(3) On the other hand, owing to the feature of CIMM as a research institute, CIMM's staff didn't have enough experience to design & manufacture machinery practically. Because of this, technical transfer was limited more or less.

5-3 Impact of the Cooperation

(1) Now that CIMM has been equipped with new model machines and techniques, it has become more reliable in the field of machinery design and manufacturing for small and medium size companies in Argentina.

(2) As an activity of the Project, CIMM held seminars on Industrial Management and visited small and medium size companies to consult them, consequently CIMM has become better known in the industry

5-4 Adequacy of Planning the Cooperation

In the period of time after the start of the Project, industries like the car industry have been expanded and there has been a sharp increase in demand for technology in Argentina. The above situation shows that the Cooperation was planned and carried out in a proper way.

5-5 Sustainability

After the end of the Cooperation, the achievement of the Cooperation will be developed further by CIMM. The followings give the ground for that.

(1) Organizational prospect of CIMM
The Argentine government is now encouraging the development of industry. Consequently the budget of INTI for the year 1998 was increased compared with that of 1997, and the incorporation of 100 young and competent engineers was

approved. Besides this, the National Government during 1997 consolidated the development of CIMM legalizing the new structure of the Center, which in the future will operate under the name CEMCOR- CIMM.
Under the new structure, the Chamber of Industry of Cordoba has been incorporated as a promotive partner of the Center, and a representative of this chamber has been designated president of the directive committee of CIMM. In this way, industry participates strongly in the decisions about the Center's policy.
During the last years CIMM has been steadily increasing its incomes from the assistance to industries, assuring in this way its financial basis. The goal of the 50% of self-finance is expected to be reached in a few years.

(2) The policy of assistance to the small and medium size companies
In the past, most of the demands of this companies were the field of standard tests and equipment calibrations. But in the recent years the demands of technical assistance and new products development were greatly increased. The policy of the Center is to continue the expansion of this kind of services, encouraging the companies to improve their products and processes. For this purpose CIMM is using the method of the "risk-sharing", supporting half of the developing cost of unsuccessful developments.
CIMM is aiming to get ISO 9000 and guide ISO 25 in particular, in order to offer companies a better service.

(3)Handling the equipment
The equipment provided by JICA has been utilized very much so far and is expected to be utilized more and maintained well as the following show.
* Most of the equipment are highly efficient and will withstand more than ten years using.
* CIMM stocks many spare parts of the equipment.
* Most of makers of the equipment have agencies in Argentine and that enables CIMM to make contact with them easily.
* The staffs of CIMM have mastered the maintenance techniques in the counterpart training in Japan and they have maintained the equipment systematically by using the check list and so on.
* CIMM has budgeted for repair and renewal of the equipment. Some softwares have already been updated.

6. TOWARDS THE FURTHER DEVELOPMENT OF CIMM

6-1 Recommendations to CIMM by the Japanese Evaluation Team

(1) To analyze an excellent industrial machine by taking it apart.

Design technique accumulates in designers themselves through experience of failure and success, so CIMM takes much time to update design technique.

We want to recommend to CIMM the following.

CIMM should analyze an excellent industrial machine by taking it apart, sketching, making the part and assembly drawings, assembling again all the parts like the original figure and then operating it.

This is an excellent shortcut for teaching engineers in design, machining, and assembling.

(2) To master "Quality Control" to assist small & medium size companies.

Overall "Manufacturing Management Techniques" are difficult for CIMM to learn perfectly, because CIMM doesn't practically manufacture industrial products. On the other hand, "Quality Control and ISO 9000", those are a part of "Manufacturing Management Techniques", can be learned in the Institute.

Therefore, it is of much significance for CIMM to master them and assist small & medium size companies in the field of "Quality Control" together with machine techniques.

(3) To experience a variety of techniques in the electronic field.

It is necessary for CIMM to experience continuously for the future a variety of techniques in the electronics field by some means or other.

(4) To put the Prototype, which was developed in the Cooperation, to practical use.

If small & medium size companies need to equip their factories with manipulator, CIMM will have a great chance to put the Prototype to practical use in the following way.

CIMM may only redesign it in accordance to their requirements, inspect its function & quality and supply a suitable manipulator to the user.
As for manufacturing and assembling, CIMM may leave it to a reliable company.

Thus CIMM is expected to accumulate experience and upgrade its level of developing industrial machines.

(5) To make the most of provided equipment.

If CIMM allows outside companies to use the equipment for a reasonable charge, that will be of great assistance not only to those companies in technical terms, but also to CIMM financially.

6-2 Relationship in the future

CEMCOR-CIMM expressed its will to continue its relation with Japan, in order to be able to improve in the future the acquired technological level, to follow the evolution of the world's technology.

Annex 1 Overall Activities of the Cooperation

			1993	1994	1995	1996	1997	1998
Fundamental Items			▲Start of the Project	▲Start of dispatch of Japanese experts	▲Agreement on MINI-PROJECT / ▲Start of MINI-PROJECT	▲Consultation about further promotion of MINI-PROJECT		▲Joint evaluation of the Project / ▲End of the Project
					MINI-PROJECT			
Dispatch of Japanese experts	Long-term experts	Machinery design				Mr. KAWANA		
		Manufacturing process				Mr. MATSUZAKI		
	Short-term experts	Machinery design			Mr. IMAZU	Mr. IMAZU / Mr. INADA	Mr. MURAKAMI	
		Manufacturing process					Mr. MUTSUDA	
		Computer soft program				Mr. ODA / Mr. NAKAMURA		
		Automation techniques					Mr. NAKAMURA	
		Production system				Mr. MUTSUDA		
		Tribology			Mr. NAKAYAMA			
Major equipments provided by JICA				▲NC-lathe, ▲Machining center, ▲NC electric discharge machine, ▲CAD/CAM system	▲ABAQUS (1-st batch)	▲CATIA	▲PLC software	▲ABAQUS (2-nd batch)
Argentine counterparts' training in Japan		Design & Manufacturing of M/C			Mr. ALVAREZ			
		Machinery engineering				Mr. MAZZUCCO		
		Electronic engineering					Mrs. BRAMBILLA	
		Computer software						Mr. MUNOZ
		Automation techniques				Mr. MELO		
		Computer software (CATIA)						Mr. ALVAREZ
Others								

CHRONOLOGICAL REVIEW OF THE COOPERATION

Year	Month	Activities
1991	12	• JICA Expert, Mr. Amano sent to INTI/CIMM (Córdoba) to develop a meeting about future Technical Cooperation with this Institution. A series of visit to companies located in Córdoba area are carried out to take a first impression about technological level and manufacturing techniques of them.
1992	9	• INTI/CIMM Director, Mr. Lenta visited Japan to study technological advances in that country. • Mr. Amano visited INTI/CIMM. Preliminary meeting about future technical cooperation. Main objectives of the Cooperation were established, consisting on Dispatch of Japanese Experts, acceptance of counterparts for training in Japan and Provision of machinery and equipment.
	12	• Inaugurated INTI/CIMM's new building, with 3700 m², composed of auditorium, laboratories, library, offices and fabrication shop.
1993	6	• Is required the provision of machinery and equipment. • Is required the dispatch of long term and short term experts. Long term: Machinery Design and Manufacturing. Short term: Machinery Design and Tribology.
1994	3	• Sent Mr. Matsuzaki, JICA Expert in Manufacturing Techniques whose main activities will be advice and guidance of counterparts on the related areas.
	5	• Technical Cooperation Program presented by Mr. Matsuzaki. • Started building facilities to install machine tools.
	10	• Arrived Mr. Imazu, Expert in Mechanical Design.
	11	• Arrived Mr. Nakayama, Expert in Tribology. • Received at INTI/CIMM the first part of the equipment provision scheme: CNC Lathe, Machining Centre and testing and metrology equipment. • Mr. Matsuzaki asks JICA to start Mini-Project Plan.
	12	• Installation of Machining Centre and CNC Lathe.
1995	1	• Arrived machine tool and other equipment: Wire cut machine, transformers, electrical measurement equipment and CAD/CAM System. These equipments complete the provision scheme.
	3	• Arrived to INTI/CIMM the JICA Preliminary Survey Team. Mission Japanese side: Mr. AMANO and others. JICA side: Mr. NAGANO and others. INTI/CIMM side: Mr. LENTA and others. • Approved Mini-Project Plan and signed Minutes about Technical Cooperation Japanese side: Mr. Shozo FUKUDA - JICA representative in Argentina. Argentine side: Mrs. Silvia PORTNOY - INTI President. • Ceremony of equipment donation.
	4	• Arrived Mr. Kiyoi, from MORI SEIKI for installation, setting up and test runs of machine tools.
	5	• On May 1st. started Mini-Project "Technical Cooperation for Updating of Technology in Design and Manufacturing for Industrial Machines". • Mr. Matsuzaki is appointed leader of the Project.
	6	• Arrived Mr. Kawasumi for installation of software FANUC FAPT, test runs and training of mechanical design and manufacturing personnel.
	7	• Arrived Mr. Kawana, long term expert in Mechanical Design. Period: 2 years.

1995	8	• Mr. Matsuzaki sent to JICA the Working Plan for the Mini-Project. • Sent counterpart Mr. Jorge Alvarez for training in Japan. Subject area: Mechanical Design and Manufacturing Techniques. Period: 4 months.
1996	2	• Sent counterpart Mr. Jorge Melo for training in Japan. Subject area: Automation. Period: 2 months. • Received 1st. part of ABAQUS Software.
	3	• Arrived Mr. Imazu, short term expert in Mechanical Design. • Received Workstation IBM 43 P and tools for CNC machine tools.
	4	• Arrived Mr. Goda , short term expert in Computer Software for advice and guidance on software selection and general guidance on the Project Plan.
	5	• Meeting between JICA Experts and counterparts about Prototype definition.
	6	• Visited INTI/CIMM Mr. Fukuda, JICA Representative in Argentina.
	8	• Meeting between JICA Experts and counterparts about Prototype. Definition of details, characteristics, specifications and working group. Equipment selected: wire measuring machine. • Sent to JICA Report N°1 of Mini-Project.
	9	• Sent counterpart Mr. Carlos Mazzucco for training in Japan. Subject area: Operation and maintenance of CNC Machine Tools. Period: 3 months.
	10	• Arrived Mr. Inada, short term expert in Machinery Design. • Arrived Mr. Nakamura, short term expert in Computer software for electronic design. • Arrived Mr. Mutsuda, short term expert in Production Systems for Small and Middle Sized Companies.
	11	• Received 1st. part of computer equipment.
	12	• Received CATIA Software.
1997	1	• Received Osciloscope and AC calibration equipment.
	3	• Sent counterpart Mr. Nancy Brambilla for training in Japan. Subject area: Automation and Artificial vision. Period: 2 months. • Sent to JICA Report N°2 of Mini-Project. • Meeting between JICA Experts and counterparts about Prototype. Decided to change the prototype for a loading and unloading machine for CNC lathes. Mr. J. Alvarez responsible for the Project. Schedule: 3/97 to 11/97. Will be a follow-up meeting weekly.
	5	• Arrived Mr. Murakami, short term expert in Machinery Design to asist counterparts in prototype design. • Arrived Mr. Nakamura, short term expert in Computer software for electronic design. • Received OrCAD electronic design software.(Japan)
	6	• Return to Japan Mr. Kawana, long term expert in mechanical design, after finishing counterparts training in Machinery Design.
	8	• Sent counterpart Mr. Roberto Muñoz for training in Japan. Subject area: Electronic Engineering. Period: 4 months.
	10	• Arrived Mr. Nakamura, short term expert in Automation. • Arrived Mr. Mutsuda, short term expert in Production Systems for Small and Middle Sized Companies (2nd. part) • Changed name of CIMM by CEMCOR-CIMM (Centro Multipropósito Córdoba)

1997	11	• Arrived Mr. Murakami, short term expert in Mechanical Design for evaluation tests of prototype. Carried out verification tests and overall evaluation. • Received 2nd. part of ABAQUS Software. • Received PLD Compiler Software. • Received Tool Pre-setter. (Japan) • Training on ABAQUS Software carried out by Expert Dr. Bastias. (2 weeks). • Visited CEMCOR-CIMM Mr. Oosawa, JICA Representative in Argentina, analyzing Project advance, prototype construction and utilization of machinery and equipment.
1998	1	• Received Graphic Terminal.
	2	• Arrived Project evaluation mission. Meetings fron 98/2/25 to 98/3/3.
	3	• Aproved Mini-Project Plan and Joint Evaluation Report on the Technical Cooperation. Japanese side: Mr. Nozomu Goda (Mission Leader) Argentine side: Mr. Elvio Lenta (Director of CEMCOR-CIMM) • Ceremony for donation of equipment. • Sent counterpart Mr. Jorge Alvarez for training in Japan. Subject area: 3 Dimensional CAD (CATIA). Period: 1,5 month.
	4	• Finished Mini-Project. • Return to Japan Mr. Matsuzaki, long term Expert.

Annex 3

Dispatch of Japanese Teams

(1) Preliminary Survey Team

March 4, 1995 - March 17, 1995

Hiroshi Amano	Leader
Masahiro Kurita	Cooperation Planning
Shigeru Kawana	Machinery Design
Saburo Kato	Manufacturing Process
Takako Kobayashi	Project Management

(2) Equipment Installation and Operation Guidance Mission

April 8, 1995 - April 28, 1995	Masanori Kiyoi
June 10, 1995 - June 26, 1995	Masashi Kawasumi

(3) Evaluation Team

February 22, 1998 - March 8, 1998

Nozomu Goda	Leader
Saburo Kato	Evaluation and Analysis
Eiji Kubo	Evaluation on Technical Cooperation

Dispatch of Japanese Experts

A. Long-Term Experts

Yoshihiro Matsuzaki	Manufacturing Process	Mar. 16, 1994 - Apr. 30, 1998
Shigeru Kawana	Machinery Design	Jun. 28, 1995 - Jun. 27, 1997

B. Short-Term Experts

Sukeharu Imazu	Mechanical Design	Oct. 3, 1994 - Dec. 3, 1994
Keiji Nakayama	Tribology	Nov. 6, 1994 - Nov. 26, 1994
Sukeharu Imazu	Mechanical Design	Mar. 18, 1996 - May 17, 1996
Nozomu Goda	Computer Soft Program	Apr. 8, 1996 - Apr. 27, 1996
Takusuke Nakamura	Computer Soft Program	Oct. 10, 1996 - Nov. 8, 1996
Akira Mutsuda	Production System	Oct. 10, 1996 - Dec. 9, 1996
Shigetada Inada	Mechanical Design	Oct. 10, 1996 - Dec. 15, 1996
Takusuke Nakamura	Automation Techniques	May 12, 1997 - July 11, 1997
Akira Murakami	Mechanical Design	May 12, 1997 - July 11, 1997
Akira Mutsuda	Manufacturing Process	Sep. 29, 1997 - Nov. 28, 1997
Takusuke Nakamura	Automation Techniques	Oct. 23, 1997 - Dec. 22, 1997
Akira Murakami	Mechanical Design	Nov. 17, 1997 - Dec. 14, 1997

Counterpart Personnel Trained in Japan

Counterpart	Field	Term	Training Institutions
José Jorge ALVAREZ	Design & Manufacture of M/C	Aug. 21. '95 - Nov. 27 '95	M. H. I., Ltd. M. E. L. HIROTEC Co.
Jorge Alberto MELO	Automation Techniques	Feb. 26. '96 - Apr. 12. '96	M. H. I., Ltd. M. E. L. FANUC Ltd.
Carlos Alberto MAZZUCCO	Machinery Engineering	Oct. 7. '96 - Dec. 17. '96	M. H. I., Ltd. Mori Seiki Co., Ltd. FANUC Ltd.
Nancy Leonor BRAMBILLA	Electronic Engineering	Feb. 25 '97 - May. 16. '97	Tokyo Institute of Technology
Roberto Luis MUÑOZ	Computer Software	Aug. 11. '97 - Oct. 28. '97	FANUC Ltd. M. H. I., Ltd. M. E. L.
José Jorge ALVAREZ	Mechanical Design	Mar. 5. '98 - Apr. 11. '98	IBM Japan, Ltd.

* M. H. I., Ltd.: Mitsubishi Heavy Industries, Ltd.

M. E. L. : Mechanical Engineering Laboratory, Agency of Industrial Science & Technology

Annex-6 List of Equipments Provided by JICA

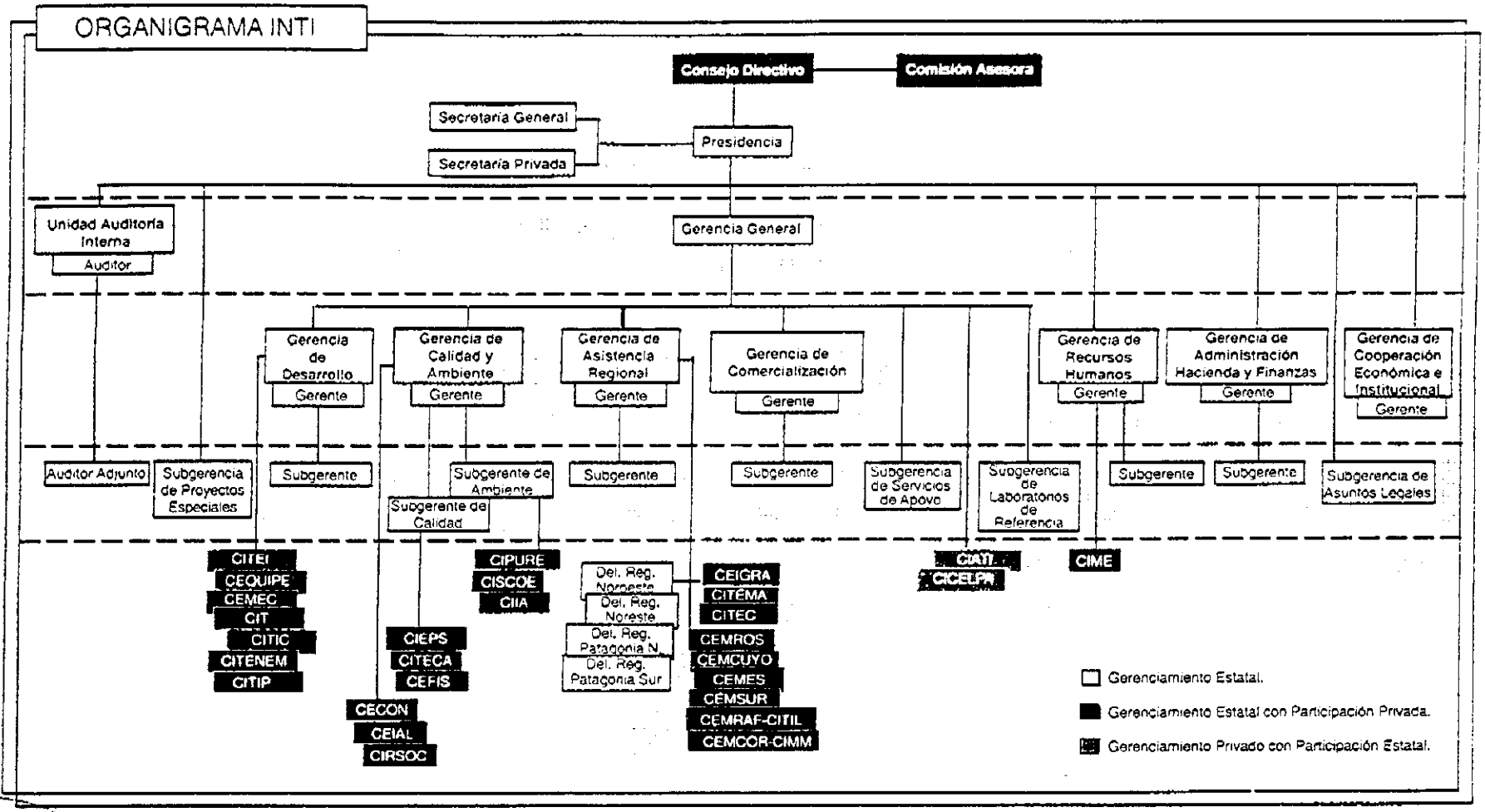
Time		Provided		Name of Equipments	Maker	Type	Price(US$)	Quantity	Remarks	CIMM Code No.
Year	Mon.	Arg.	Jap.							
1994	4		○	Personal Computer	IBM	BJ-550	4,745	1 set	For writting reports	15-00599
	4		○	8mm video camera	FUJI	FH-125sw	3,890	1 set	For investigating company	15-00600
	5	○		Copying machine	RICOH	FT4220		1set		15-00601
	11	○		Tools	various	various	479	various		—
	11		○	Personal Computer	COMPAC	4/66		1 set	For Design auto-CAD	15-00268
	11		○	Machining Center	MORI-SEIKI	MV-408	155,420	1	For Machinning parts	15-00263
	11		○	Tools for above	NIKKEN	various	7,090	1 set	Ditto	—
	11		○	CNC Lathe	MORI-SEIKI	SL-25B/500	128,360	1	Ditto	15-00264
	11		○	Tools for above	NIKKEN	various	5,455	1 set	Ditto	—
	11		○	NC Elec. Discharge mach.	SODIC	A350	227,170	1	Ditto	15-00261
	11		○	Tools for above	SODIC	various	9,100	1 set	Ditto	—
	11		○	CAD/CAM system	IBM	PS/2-77	75,845	1 set	For Design analizing	15-00273
	11		○	Round tester	MITUTOYO	RA-122	20,660	1	For Mesurement parts(round)	15-00266
	11		○	Roughness tester	MITUTOYO	301	3,870	1	Ditto(roughness)	15-00265
	11		○	Profile measuring	MITUTOYO	CP-200	17,020	1	Ditto(profile)	15-00267
1995	1		○	vibration monitor	SINKAWA	various	78,655	1 set	Ditto(vibration)	15-00262
	4	○		Tools	various	various	1,565	various		—
	4	○		Technical books	various	various	370	various		—
	7		○	Personal Computer	IBM	BJ-555	6,480	1 set	For Design for siequenser	15-00602
	7		○	JIS books(english)	JIS	various	1,175	7books		—
	8	○		Printer board			487	1 set		—
	9	○		Furniture	—	—	1,155	1 set		—
	10	○		Tools		various	2,818	various		—
	12	○		Memory			730	1 set		—
	12	○		Uninterrupted power syst.	LUNAR	1200TA	880	1 set	Uninterrupted power system	15-00566
1996	1	○		Personal Computer	EPSON	PC2500	2,300	1 set		15-00572
	1	○		Personal Computer	EPSON	PC2500	2,300	1 set	For programming for CAD/CAM	15-00556
	1	○		Color printer	EPSON	PRO	400	1		15-00571
	3	○		ABAQUS soft(first)	IBM		80,585	1 set	For Design analizing 3 dimen.	—
	3	○		Tools for NC machine	ISCAR	various	10,850	various	Ditto	—
	3	○		Work Station	IBM	43P	32,440	1 set	Ditto	15-00567

Time		Provided		Name of Equi.	Maker	Type	Price(US$)	Quantity	Remarks	CIMM Code No.
Year	Mon.	Arg.	Jap.							
	3	○		Tools	various	various	743	various		−
	3	○		Furniture	−	−	691	1 set		−
	5	○		Technical books	−	−	227	1 set		−
	6	○		Color printer	Hew. Pakard	HP680C	340	1		15-00605
	10	○		Tools	various	various	892	various		−
	11	○		Personal Computer	Beltron		5.110	2set	For Design circuit	15-00603·6
	12	○		CATIA software	IBM	various	39.000	1 set	For Design analizing 3 dimen.	−
1997	1	○		Osciloscope	Yokogawa	DL4100	14.800	1 set	For Cheking electric aparatus	15-00489
	1	○		AC Calibration	Navetec	9100	16.620	1 set	For Cheking electric aparatus	15-00488
	2	○		Camera	CANON	EO-5500	999	1 set		15-00558
	2	○		Scanner	Hew. Pakard	4p	800	1		15-00565
	3	○		Tools for NC machine	NIKKEN	various	1.010	various		−
1997	5		○	Circuit board pro. soft	OrCAD	LAYOUT	3.500	1 set	For Design electronics	−
	5		○	Draft board pro. soft	OrCAD	CAPTUR	3.000	1 set	Ditto	−
	5		○	Analog simulation soft	Intusoft	ICAP/4	12.500	1 set	Ditto	−
	7	○		Tools for wirecut mac.			606	3role		−
	7	○		Parts for prototype	various	various	2.240	various	For Parts of prototype	−
	7	○		Parts for prototype	various	various	500	various	Ditto	−
	8	○		Parts for prototype	various	various	890	various	Ditto	−
	8	○		Tools for machining	NIKKEN	various	760	various		−
	10	○		PLC(for prototype)	SIEMENS	S-100	1.463	4set	Ditto	−
	11	○		ABAQUS soft(second)	IBM	various	45.950	1 set	For Design analizing 3 dimen.	−
	11	○		PLD Compiler	ALTERA	KIT	6.780	1 set	For Design electronics	−
	11		○	Tool presetter	NIKKEN	TCP-40N	8.385	1 set	For Measurering of tools NC mac.	15-00608
1998	1	○		Graphic terminal	IBM	43P-132	14.000	1 set	For Design analizing 3 dimen.	15-00604
		○		Ink jet pllotter	Hew. Pakard	450C	3.780	1 set	For Design	
				Total(US$)			1.067.880			

Expenses of Japanese Side

(UNIT; Thousand Yen)

JAPANESE FISCAL YEAR	1993	1994	1995	1996	1997	TOTAL
PROVISION OF MACHINE AND EQUIPMENT	73,851	8,652	13,375	9,883	10,404	116,165
LOCAL EXPENSES	0	360	2,789	3,000	2,430	8,579
TOTAL	73,851	9,012	16,164	12,883	12,834	124,744

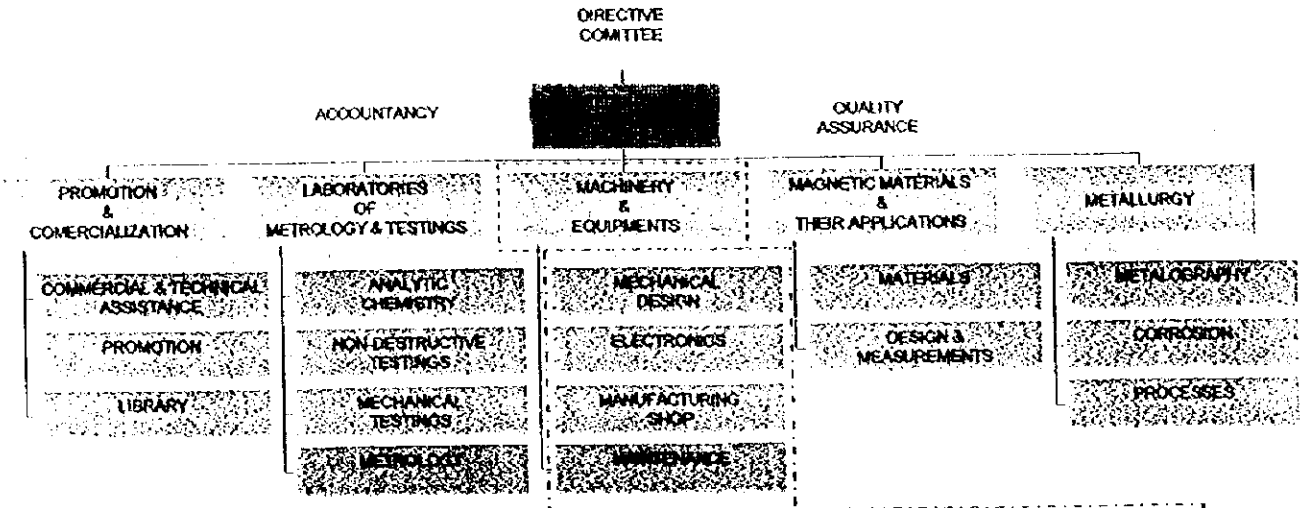

ORGANIGRAMA INTI
Consejo Directivo
Comisión Asesora
Secretaría General
Secretaría Privada
Presidencia
Unidad Auditoría Interna
Auditor
Gerencia General
Gerencia de Desarrollo
Gerente
Gerencia de Calidad y Ambiente
Gerente
Gerencia de Asistencia Regional
Gerente
Gerencia de Comercialización
Gerente
Gerencia de Recursos Humanos
Gerente
Gerencia de Administración Hacienda y Finanzas
Gerente
Gerencia de Cooperación Económica e Institucional
Gerente
Auditor Adjunto
Subgerencia de Proyectos Especiales
Subgerente
Subgerente de Calidad
Subgerente de Ambiente
Subgerente
Subgerente
Subgerencia de Servicios de Apoyo
Subgerencia de Laboratorios de Referencia
Subgerente
Subgerente
Subgerencia de Asuntos Legales
CITEI
CEQUIPE
CEMEC
CIT
CITIC
CITENEM
CITIP
CIEPS
CITECA
CEFIS
CECON
CEIAL
CIRSOC
CIPURE
CISCOE
CIIA
Del. Reg. Noreste
Del. Reg. Noreste
Del. Reg. Patagonia N.
Del. Reg. Patagonia Sur
CEIGRA
CITEMA
CITEC
CEMROS
CEMCUYO
CEMES
CEMSUR
CEMRAF-CITIL
CEMCOR-CIMM
CIATI
CICELPA
CIME
Gerenciamiento Estatal.
Gerenciamiento Estatal con Participación Privada.
Gerenciamiento Privado con Participación Estatal.

ANNEX 8-1

[illegible]

CEMCOR - CIMM

ORGANIZATION CHART



MACHINERY & EQUIPMENT:

MECHANICAL DESIGN: **J. Álvarez**
G. Molina(1)
O. Elaskar (2)
N. Trebino (3)
D. Marco (Scholarship)
P. Martínez (Scholarship)

ELECTRONICS: R. Muñoz
J. Melo
C. Reale
N. Brambilla
A. Ferro
G. Purro
G. Colsani
F. Jerez

MANUFACTURING SHOP: C. Mazzucco
A. González
C. Vázquez

MAINTENANCE: A. Bonet
L. Loza
V. Novillo
V. Ruano

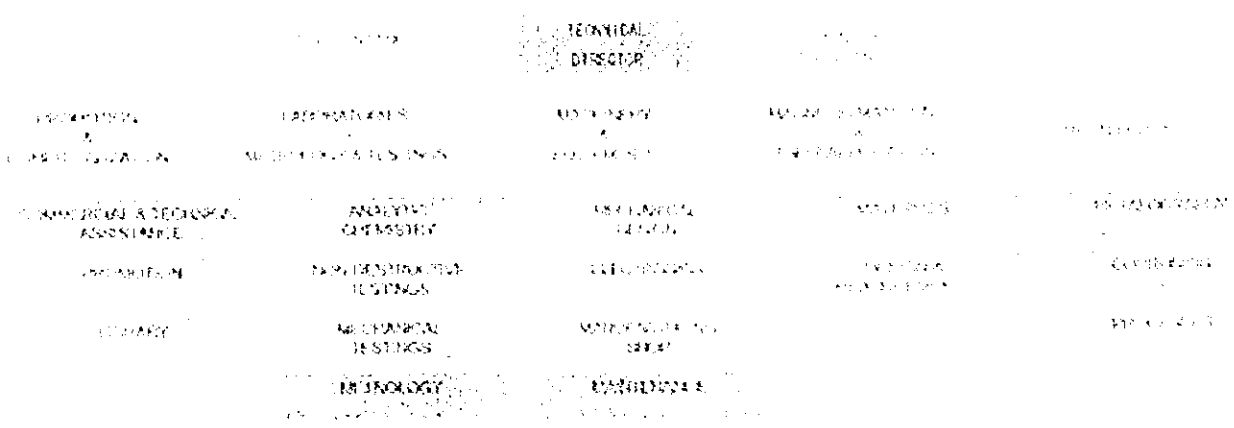
(1) (2) (3) resignations

DIRECTIVE COMITTEE:

INDUSTRIAL METALLURGICAL CHAMBER OF CÓRDOBA (PRESIDENCE)
NATIONAL INSTITUTE FOR INDUSTRIAL TECHNOLOGY
SCHOOL OF ENGINEERING (CÓRDOBA NATIONAL UNIVERSITY)
MINISTRY OF PRODUCTION AND WORK OF CÓRDOBA GOVERNMENT

CEMCOR - CIMM

ORGANIZATION CHART



LIST OF ARGENTINE COUNTERPARTS

NAME:	Elvio José LENTA
POSITION:	Director
QUALIFICATION:	Engineer in Mechanics and Electricity Córdoba National University
EMPLOYMENT DATE:	63/01/10
REMARKS:	

NAME:	José Jorge ALVAREZ
POSITION:	Head of Machinery and Equipment Division
QUALIFICATION:	Engineer in Mechanics and Electricity Córdoba National University
EMPLOYMENT DATE:	80/04/01
REMARKS:	

NAME:	Gustavo José MOLINA
POSITION:	Design Engineer
QUALIFICATION:	Engineer in Mechanics and Electricity Córdoba National University Master in Applied Science - University of Ottawa - Canada
EMPLOYMENT DATE:	86/06/01
REMARKS:	Resign position on 96/08/26 - Move to USA to continue studying

NAME:	Rodolfo VELASCO
POSITION:	Design Engineer
QUALIFICATION:	Engineer in Mechanicas - National Technological University
EMPLOYMENT DATE:	93/06/01
REMARKS:	Resign position on 95/04/01 - Move to private industry

NAME:	Omar Darío ELASKAR
POSITION:	Design Engineer
QUALIFICATION:	Engineer in Aeronauticas - Córdoba National University
EMPLOYMENT DATE:	94/01/01
REMARKS:	Resign position on 97/11/01 - Move to private industry

NAME:	Natalio TREBINO
POSITION:	Design Engineer
QUALIFICATION:	Engineer in Mechanics and Electricity Córdoba National University
EMPLOYMENT DATE:	95/07/01
REMARKS:	Resign position on 97/05/01 - Move to private industry

NAME:	David MARCO
POSITION:	Assistant Mechanics Section
QUALIFICATION:	Student of Mechanical Engineer
EMPLOYMENT DATE:	97/02/01
REMARKS:	

NAME: Pablo MARTINEZ
POSITION: Part time Assistant Mechanics Section
QUALIFICATION: Student of Mechanical Engineer
EMPLOYMENT DATE: 97/08/01
REMARKS:

NAME: Guillermo BULACIO BOSSIO
POSITION: Part time Assistant Mechanics Section
QUALIFICATION: Student of Mechanical Engineer
EMPLOYMENT DATE: 97/12/15
REMARKS:

NAME: Martín VERA
POSITION: Part time Assistant Mechanics Section
QUALIFICATION: Student of Mechanical Engineer
EMPLOYMENT DATE: 97/12/15
REMARKS:

NAME: Roberto Luis MUÑOZ
POSITION: Head of Electronic Section
QUALIFICATION: Engineer in Electronics and Electricity
Córdoba National University
EMPLOYMENT DATE: 79/08/01
REMARKS:

NAME: Jorge Alberto MELO
POSITION: Electronical Engineer
QUALIFICATION: Engineer in Electronics and Electricity
Córdoba National University
EMPLOYMENT DATE: 75/02/01
REMARKS:

NAME: Nancy Leonor BRAMBILLA
POSITION: Electronical Engineer
QUALIFICATION: Engineer in Electronics and Electricity
Córdoba National University
EMPLOYMENT DATE: 90/03/01
REMARKS:

NAME: César REALE
POSITION: Electronical Engineer
QUALIFICATION: Engineer in Electronics and Electricity
Córdoba National University
EMPLOYMENT DATE: 90/03/01
REMARKS:

NAME: Alberto FERRO
POSITION: Technician
QUALIFICATION: Student of Electronical Engineering
EMPLOYMENT DATE: 94/08/01
REMARKS:

NAME:	Fernando JEREZ
POSITION:	Part time Assistant
QUALIFICATION:	Student of Electronical Engineering
EMPLOYMENT DATE:	96/08/01
REMARKS:	

NAME:	Carlos Alberto MAZZUCCO
POSITION:	Manufacturing Engineer
QUALIFICATION:	Engineer in Mechanics and Electricity Córdoba National University
EMPLOYMENT DATE:	95/02/01
REMARKS:	

NAME:	Juan Américo GONZALEZ
POSITION:	Technician
QUALIFICATION:	
EMPLOYMENT DATE:	78/04/01
REMARKS:	

NAME:	Ciro VAZQUEZ
POSITION:	Technician
QUALIFICATION:	Technician in mechanics
EMPLOYMENT DATE:	95/02/01
REMARKS:	

NAME:	Alberto BONET
POSITION:	Maintenance Engineer
QUALIFICATION:	Engineer in Electronics and Electricity Córdoba National University
EMPLOYMENT DATE:	73/01/01
REMARKS:	

NAME:	Luis Marcial LOZA
POSITION:	Maintenance Technician
QUALIFICATION:	Technician in electronics
EMPLOYMENT DATE:	74/12/01
REMARKS:	

NAME:	Victor NOVILLO
POSITION:	Maintenance assistant
QUALIFICATION:	
EMPLOYMENT DATE:	87/02/02
REMARKS:	

NAME:	Victor RUANO
POSITION:	Maintenance assistant
QUALIFICATION:	
EMPLOYMENT DATE:	78/04/01
REMARKS:	

ANNEX 10

Machinery and Equipment purchased by Argentine Side

1) Engineering workstation IBM RS-6000 360.

2) Pen Plotter Hewlett-Packard 7576A.

3) Profile Projector Mitutoyo PJ 300.

4) ABAQUS Software (Academic License).

5) Tools and other equipment for machining workshop.

ANNEX II

Expenses of Argentine Side
(Unit: Pesos)

FISCAL YEAR	1993	1994	1995	1996	1997	TOTAL
Personnel (Salary)	85000	93000	130000	122000	114000	544000
Equipment	50000	3000	0	0	0	53000
Infraestructure and Consumptions	2500	10100	4000	5100	15800	37500
TOTAL	137500	106100	134000	127100	129800	**634500**

Annex 12 Matrix of Output

Field of technology		Before the Cooperation	Activities carried out during the Cooperation	Effects and problems
1. Machining	(1) Machining programming techniques	CIMM had manual lathes and mills, however, it didn't have a NC lathe, a Machining center and other NC machinery. So, CIMM had no experience of NC machining programming.	NC lathe, Machining center and NC electric discharge machine were provided by JICA. And Japanese experts conducted OJTfor NC machining programming of each machine.	The provided machinery is expected to be a powerful tool for modernizing of the machining techniques in CIMM. The first stage in NC machining programming has been mastered.
	(2) Machine-operation and machining techniques	CIMM had no experience of manufacturing by means of NC machining.	Besides actual training in the operation & machining of the provided machinery, Japanese experts gave advice about machining material, cutting conditions, small tools, fixtures, instruments and occupational safety.	CIMM has fully mastered the techniques for machine operation & machining.
2. CADfor mechanical design		CIMM had no CATIA/ABAQUS CAD system. However CIMM has a track record of structure analysis.	CIMM is utilizing CATIA & ABAQUS well for design. As for ABAQUS, CIMM invited a technical instructor at CIMM's own expense, because JICA could not send an instructor. As for CATIA, CIMM's counterpart could receive training in Japan.	As practical experience increases, CIMM will master these software. Once these software are used in combination with EWS in CIMM, it is supposed to become an effective tool for automated machine design and nonlinear structure analysis.
3. Diagnosis of small and medium size companies		Companies near CORDOBA had asked CIMM to carry out total company diagnosis such as machining or productivity improvement. It was difficult for CIMM to respond to them, because CIMM had not a modern manufacturing shop inside.	Japanese experts & CIMM visited about 20 small and medium size companies near CORDOBA. After discussion with persons in charge, Japanese experts & CIMM's staff advised them how to improve processes, performance, machine lay outs and environment in shops.	CIMM has a good grasp of cost reduction, productivity and reliability improvement. However previous techniques are not yet applied to the business organically. Companies need to develop them into a total manufacturing management system.
4. Mechanical design		Compared with manufacturers, CIMM has little experience in designing machinery, satisfying customers, and dealing with shop problems. CIMM has good basic engineering, such as mechanics, strength of materials and heat transfer, however, CIMM had not enough experience in vibration, fatigue, accuracy, machining, assembly and cost reduction that were required in actual business.	JICA advised lectured on the following. (1) Design engineering (theory & practice of dynamics, theory of materials and heat transfer engineering) (2) Analysis of automobile disk brakes (3) Basic theory and application of tribology (4) Design control and quality assurance (5) Manual setting and standardization (6) Fitting tolerance and criteria selection of components (7) An example of developing a heavy type painting robot (8) Prototype machine development (positioning, accuracy, control and cost reduction) (9) Method to evaluate the investment performance of FMS.	(1) CIMM seems to have been remarkably improved in practical performance through design technique, design process, and prototype development. (Including total link-ups, accuracy, quality and manufacturing) (2) CIMM lost a part of the technology transferred by losing a counterpart engineer. (3) Design technique accumulates in designers themselves through actual design work. As design technique development takes much time, CIMM needs to gain more success and failures through actual design work from now on.
5. Electronic circuit technology		CIMM had CADfor electronic circuit design and lay out, however, each data had no compatibility. Technology in CIMM was good enough for in-house designing of traffic behavior counter & PVD controller, however CIMM was lacking in reliability and manufacturing technique.	JICA carried out or advised as follows (1) State-of-the-art CAD.(electronic circuit design, simulation, pattern design) (2) Seminars on EDA, thermal design, and DSP (3) Electrical design for prototype manipulator (4) Micro-computer circuit design for the controller of a breathing equipment (5) Reliability design and manufacturing	(1) CIMM has almost mastered operation of provided equipment (CAD, PLD compiler and digital oscilloscope), which are tools for electronic circuit design. The provided equipment are effective tools for modernization of electronic techniques in CIMM. (2) As development of electronic circuit technology takes much time, CIMM needs to pile up more success and failures through actual design from now on.

Annex 13

Development of the Prototype

1. History of "Development of the Prototype".
   * The planning of "Development of Prototype" started in March of 1996. After basic study, <the wire length measuring machine> was chosen as a target equipment to be developed.
   * However, it was found in the further market research that there were very little needs in developing <the wire length measuring machine>. Because of this, the target equipment was changed to <the loading and unloading parts device for CNC lathe>, for which a great market was detected.
   * It was completed in January of 1998, satisfying the specifications to a great extent.

2. Selection of a target equipment for a prototype.
   <The loading and unloading parts device for CNC lathe> was chosen as a target equipment for a prototype from the following points of view.
   (1) Lots of manual control equipment have been introduced in small & medium size companies in Argentina so far, however, they are expected to be replaced by NC machines in order to keep strong competitiveness in future.
   (2) CIMM can make much use of both techniques obtained in the Cooperation and equipment provided for developing the target equipment, besides CIMM can test the prototype product by means of NC machine provided by JICA.
   (3) The prototype product can be effectively used by CIMM to assist outside companies and advertise CIMM's capability to them.

3. Detailed process of "Development of the Prototype".
   * Master plan is shown in Reference 1.
   * Formation of group for development is shown in Reference 2.
   * Specifications are shown in Reference 3.
   * Final product is explained in Reference 4.

4. Overall management of development by Follow meeting.

(1) The member of the meeting

Chairman : Director of CIMM

Other member : Chief for each technical field of Design, Mechanics and Electricity.

: Japanese experts

: Other persons, who were assigned to specific works in development, attended the meeting when necessity arose.

(2) The role of the meeting

* To see if the development goes well.
* To find problems or difficulties, if any.
* To solve and manage them.
* To record the discussion in the minutes.
* To let all staffs involved in the development know clearly the current status and their roles.

(3) Materials usually discussed in the meeting.

Master plan and Detailed plan, Drawings, The minutes of the previous meetings, and so on.

5. What kind of problems took place, and what actions were taken ?

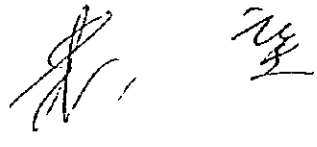
(1) There were financial difficulties in CIMM in buying something like parts for the prototype. Japanese experts helped CIMM by supporting the expense through JICA.

(2) The schedule of design stage was delayed because of insufficient manpower due to resignation of personnel from CIMM. On the other hand, the delay from total schedule was minimized by overtime work and recovery in manufacturing stage etc.

(3) When the structural problem was found, a short term Japanese expert supported CIMM and cleared the problem.

6. Good effect of "Development of the Prototype".

(1) Final product of prototyping was completed only two months behind schedule, and satisfies the target specifications and quality to a great extent. It can be regarded as one of the good effect.



(2) CIMM had a significant experience in developing industrial products by both the formation of Follow meeting and overall management of development through the meeting.

(3) CIMM concentrated on "Development of Prototype" as much as possible in spite of financial and organizational difficulty.
An example of that was overtime work to recover the delay of development.
That is also a significant experience in developing industrial products in future.

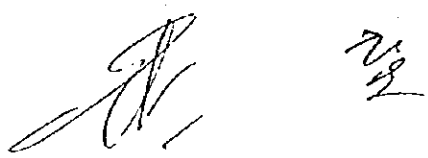
7. Lessons

(1) More attention should have been paid to selection of target equipment. If market research and discussion were conducted enough, the alteration of target equipment would not have taken place.

(2) The development cost and sales price should be estimated more exactly in planning stage.

(3) The information like master plan, detailed plan, work assignment etc. should be notified quickly and surely to individuals and groups involved.

(4) The design review should be added. Before designers issue the final drawings, it is important for persons concerned to discuss about easiness to machine, assemble, and test correctly and also about ability to purchase at lower prices, reliability, cost, and delivery. In order to prevent problems, the drawings should be corrected before the final issue.



MASTER PLAN FOR MINI-PROJECT PROTOTYPE:
RESCHEDULING 97/5/29 ▬ RESCHEDULING 97/6/24 ▬

N°	Description	Months	Dec 96	Jan 97	Feb 97	Mar 97	Apr 97	May 97	Jun 97	Jul 97	Aug 97	Sep 97	Oct 97	Nov 97	Dic 97
1	Acquisition Information Market Research Cost Target	1.5													
2	Basic Specifications	0.5													
3	Design 3.1 Concept Design 3.2 Preliminary Design 3.3 Detailed Design	 1 1.5 2.0													
4	Manufacturing 4.1 Planning 4.2 Machining 4.3 Purchase external parts 4.4 Assembly	 0.5 2.5 2.0 1.5													
5	Protoype mounting on M/C	1.0													
6	Protoype tests 6.1 Preliminary tests 6.2 Test with actual parts	 1.0 1.0													
7	Feedback 7.1 Redesign 7.2 Manufacture and assy. 7.3 Tests	 0.5 0.5 0.5													

Reference 1

MINI-PROJECT PROTOTYPE GROUPS ORGANIZATION

Project Manager: Ing. Jorge Alvarez

ENGINEERING TEAM

MECHANICS
Group Manager: Ing. Jorge Alvarez
JICA consultants: Ing. Shigeru Kawana
Ing. Akira Murakami
Staff: Ing. Omar Elaskar
Ing Natalio Trebino
Ing. Carlos Mazzucco (part time)
Student (part time)
Student (part time)

ELECTRIC
Group Manager: Ing. Roberto Muñoz
JICA consultant: Ing. T. Nakamura
Staff: Ing. Jorge Melo
Ing. César Reale
Ing. Nancy Brambilla
Sr. Alberto Ferro
Student (part time)

MACHINING AND ASSEMBLY

Group Manager: Ing. Carlos Mazzucco
JICA consultant: Ing. Y. Matsuzaki
Staff: Sr. Américo González
Sr. Ciro Vázquez
Student (part time)

LOADING AND UNLOADING MACHINE - GENERAL SPECIFICATIONS

ARTICULATED ARM

ITEM	SPECIFICATIONS	REMARKS
Structure	Vertical	
Mounting method	Floor standing type	
Mounting position	Front type	
Degree of motion freedom	4 axes	Not including grippers
Driving method	Pneumatic actuators - Secuencial	
Electric control	Programmable logic contrôl	
Operating range		
Elevation arm	0 - 90°	
Rotating arm	0 - 90°	
Aproacching mov.	0 - 60 mm	
Changing wrist	0 - 180°	
Grips	± 6 mm	Double action
Load Weight (max)	7,00 Kg	
Type of parts to be handled	Rotational symmetry parts max dia. 200 mm L/D ratio: 0,2 to 0,5.	
Grippers	Pneumatically operated - Qty. 2	Grips to be adapted to each different part
Cycle time	30 seg	
Type of lathe to be attached	CNC lathe - Turning diameter 300 mm Lenght 400 mm	Mori Seiki SL-25 Okuma S 25
Machine weight	Estimated: 150 Kg	
Overall dimensions	1200 (W) x 850 (D) x 1300 (H)	
Power supply	AC 220 V- single phase - 50 Hz	
Compressed air supply	5 - 6 bar	Clean and dry air

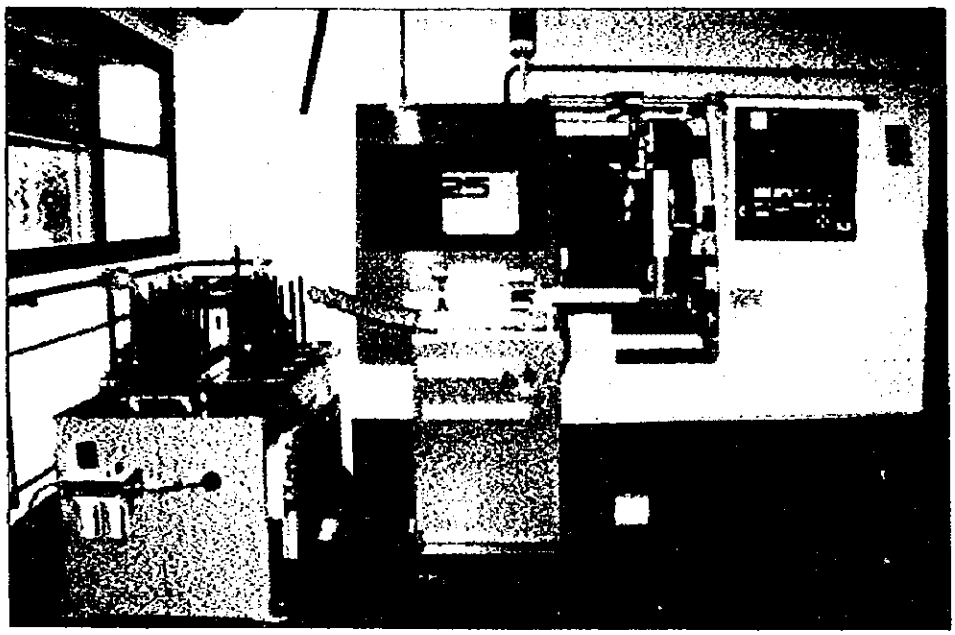
CARROUSEL FOR PARTS STORAGE

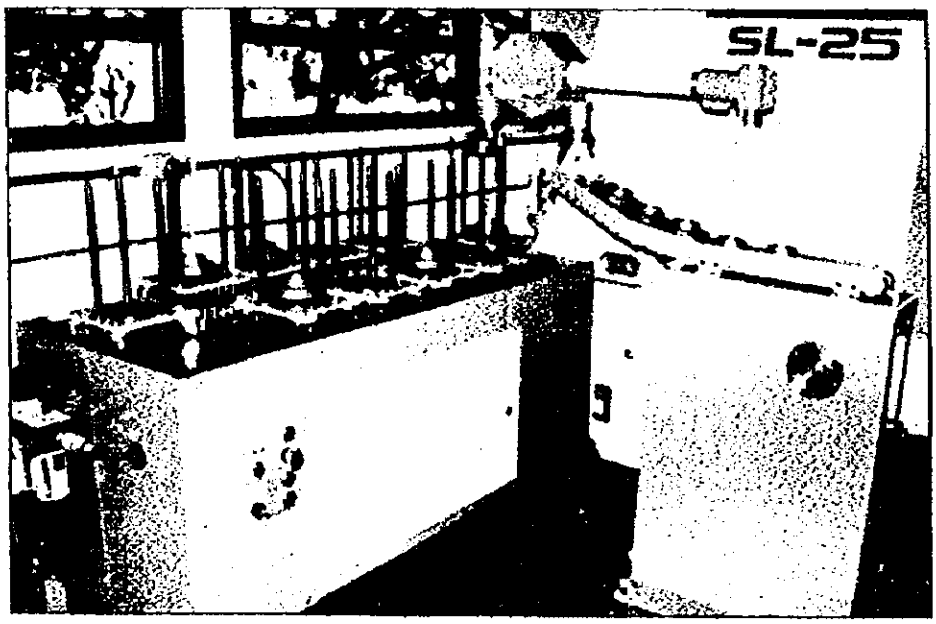
ITEM	SPECIFICATIONS	REMARKS
Structure	Table type	
Mounting method	Floor standing type	
Driving method	Rotation indexed per one stand with position fixing cylinder	
Quantity of stands	10	
Parts per stand	3 to 6	Depending on length
Position method of parts	Elevator type pneumatically operated	
Machine weight	Estimated: 100 Kg	
Overall dimensions	1350(W) x 550(D) x 1000 (H)	
Power supply	(Connected to articulated arm)	
Compressed air supply	5 - 6 bar	Clean and dry air

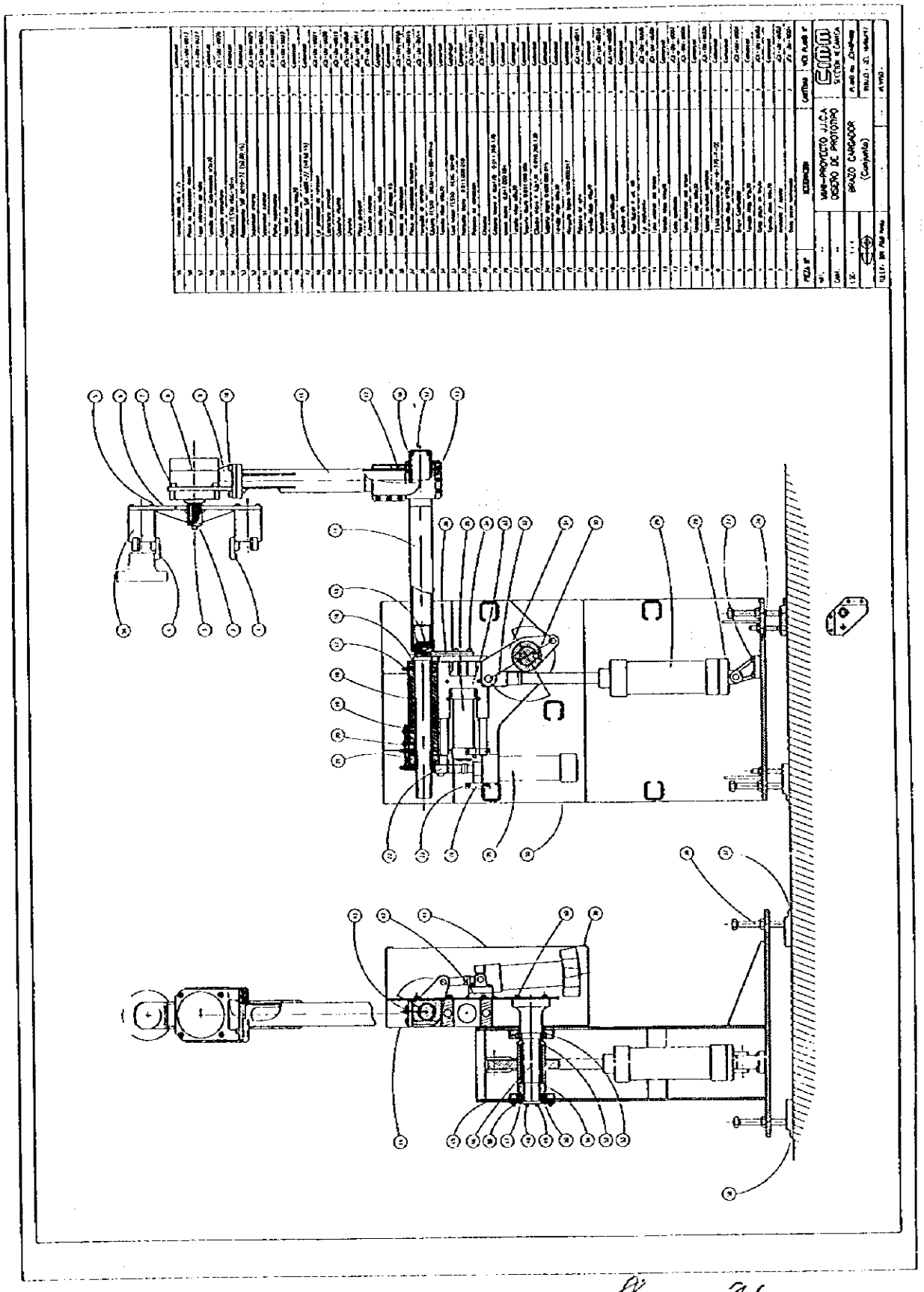
Reference 4

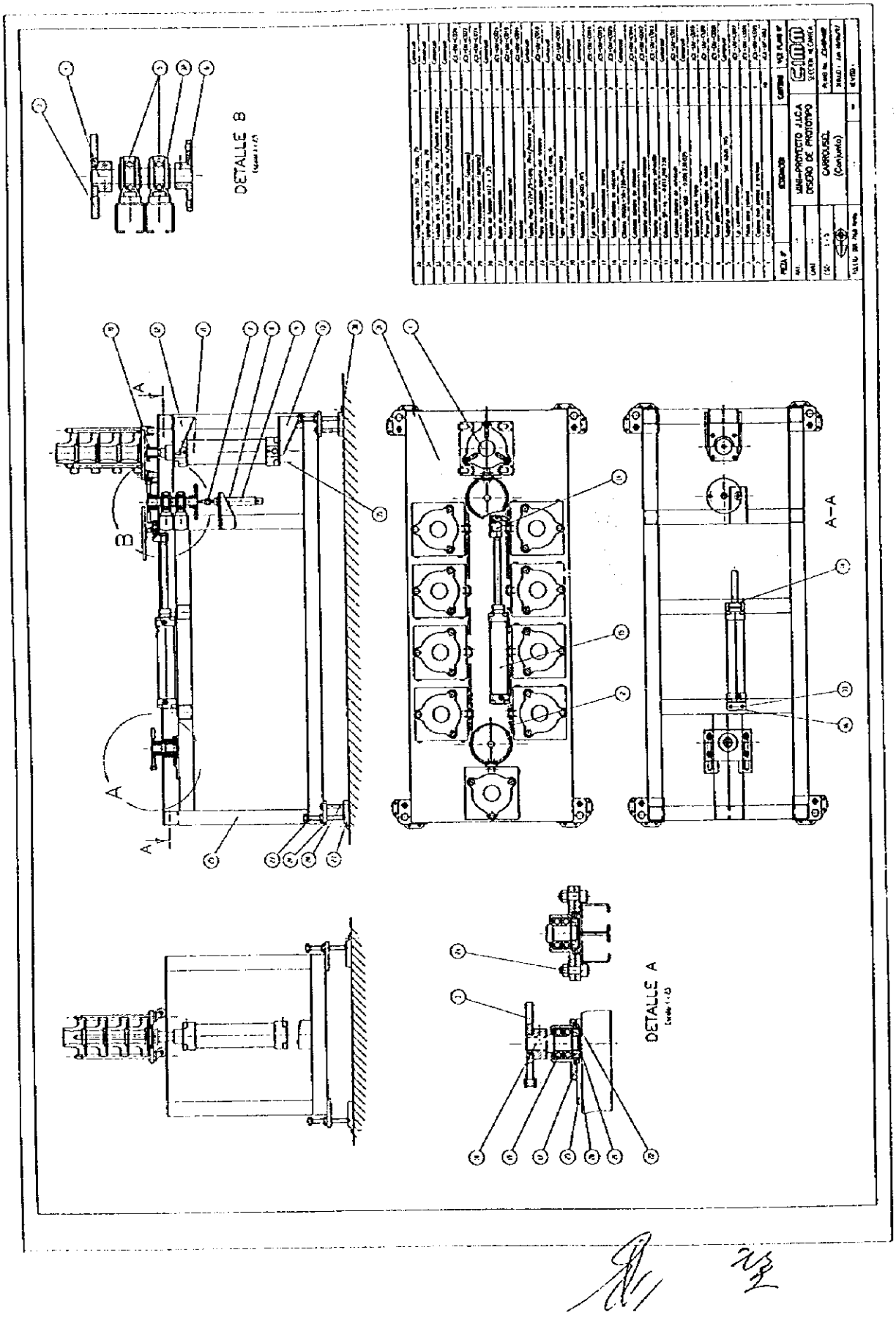
Development of Prototype

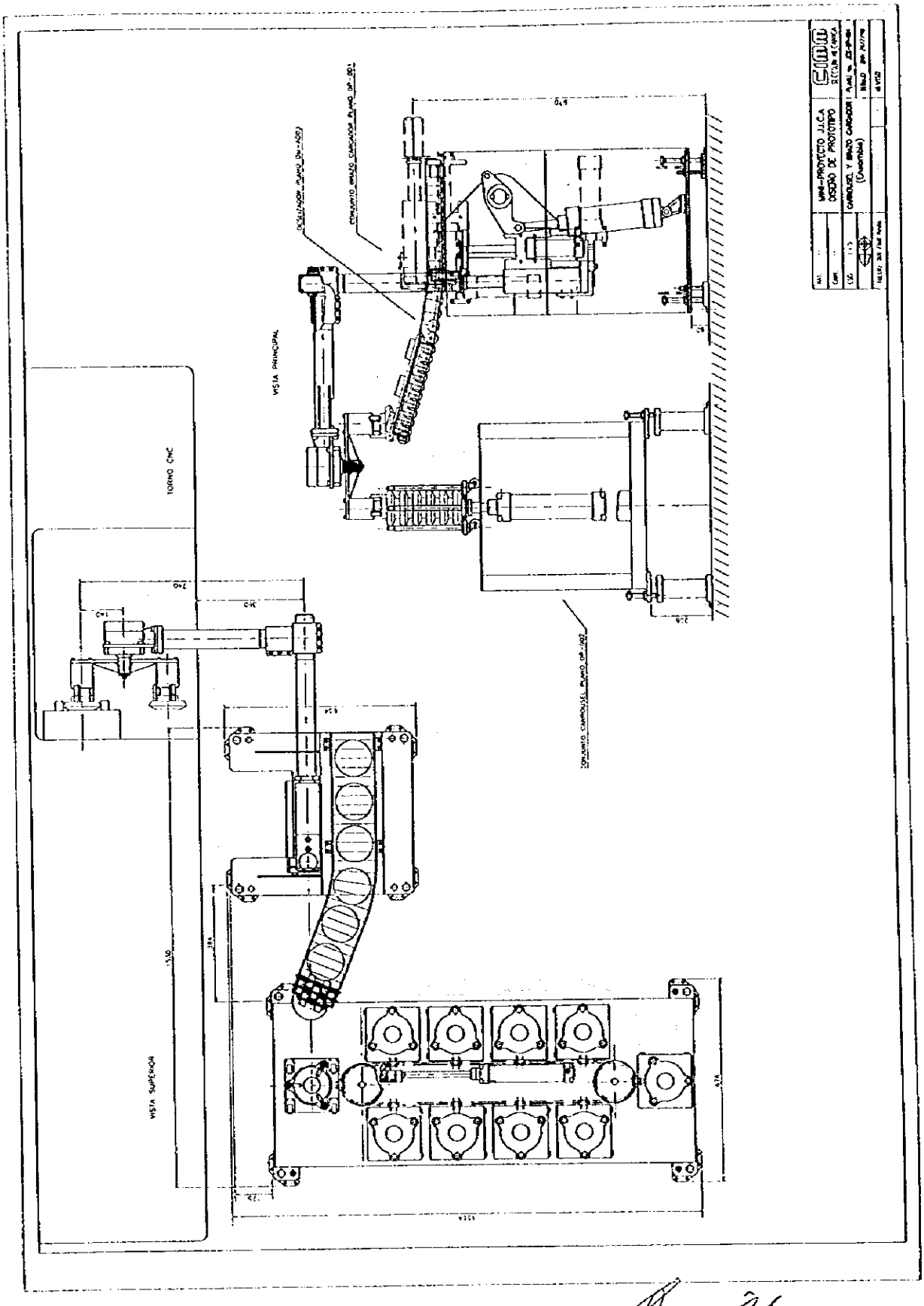
Details of final product








DETALLE B
A
B
A
A
A–A
DETALLE A


VISTA PRINCIPAL
TORNO CNC
VISTA SUPERIOR

Annex 14 Modifications of the Original Plan of the MINI-PROJECT

(Only modified items are shown below.)

Categories		Descriptions in the Minute of Meeting for the MINI-PROJECT	Original requests	Background of modifications	Activities actually carried out	Effects of modifications
MECHANICAL DISIGN	Long-term experts	One person for the whole period of three years		A long-term expert was dispatched for two years. After that, instead of another long-term expert, a few short-term experts were expected for specific technical fields.	For the last one year, short-term experts were dispatched for each of the following topics. * Machinery design * Manufacturing systems for small companies.	CIMM has been satisfied with the results.
	Short-term experts	Mechanical design (Finite element method)	ABAQUS	JICA could not send an expert for such special software product as ABAQUS, so CIMM proposed to invite an expert from the USA on its own expenses.Because of this,both sides agreed to change the topic to "Advice for Development of the Prototype".	A short-term expert consulted about Development of the Prototype.	There are very few problems, because CIMM can master ABAQUS on it's own in the future.
		Mechanical design (Assembling unit)		CIMM had already mastered the technique in the field.	Canceled	
		Computer software program	CATIA	JICA could not send an expert for such special software product as CATIA.	Canceled	There are very few problems, because a CIMM's engineer had been trained on CATIA in Japan.
INDUSTRIAL AUTOMATION	Short-term experts	Automation	New trend of industrial automation.	Through the discussion to clarify the objective of cooperation, the following techniques were desired, in addition to the original requests. (1). Techniques about design of electronic circuits, new elements like DSP, etc. (2). Design techniques of electronic circuits and patterns, by means of OrCADsoftware provided by JICA. (3). Operation of such equipment provided by JICA as PLD compilers and digital oscilloscope.	A short-term expert covered all the modified topics.	CIMM obtained a variety of practical techniques. Now those are regarded no less useful to CIMM than the knowledge of new trends in industrial automation.
TRIBOLOGY	Short-term experts	Tribology		The field of automation was preferred to tribology, because CIMM could not allocate enough manpower for tribology at that moment.	A short-term expert was dispatched for automation techniques.	
	C P training in Japan		Tribology	It was difficult for CIMM to assign a proper person to be trained in the field of tribology at that moment.	Canceled	
OTHERS (Those had not been planned at the beginning)	Short-term experts		Production system	This topic was not planned at the beginning, however, CIMM had been urged to assist small and medium size companies in this field.	A short-term expert was dispatched for the topic.	The activity had much influence on both CIMM and small companies.
				JICA and CIMM agreed it was necessary and useful for JICA headquarters to consult and discuss with CIMM about the further promotion of the MINI-PROJECT,although it was not planned at the beginning.	A short-term expert was dispatched in the formality of "Computer software".	The discussion was useful for the mutual understanding and effective cooperation between both.

Reference Documents

1) MINUTES CONCERNING MINI-PROJECT TYPE TECHNICAL COOPERATION FOR THE UPDATING OF TECHNOLOGY IN DESIGN AND MANUFACTURING FOR INDUSTRIAL MACHINES IN THE ARGENTINE REPUBLIC

2) MEMORANDUM OF MEETING FOR THE STUDY ON MINI-PROJECT TYPE TECHNICAL COOPERATION FOR THE UPDATING OF TECHNOLOGY IN DESIGN AND MANUFACTURING FOR INDUSTRIAL MACHINES IN THE ARGENTINE REPUBLIC

MINUTES CONCERNING
MINI-PROJECT TYPE TECHNICAL COOPERATION
FOR THE UPDATING OF TECHNOLOGY IN DESIGN AND
MANUFACTURING FOR INDUSTRIAL MACHINES IN THE ARGENTINE REPUBLIC

In response to the request of the Government of the Argentine Republic concerning the Mini-Proyect-Type Technical Cooperation for the Updating of Technology in Design and Manufacturing for Industrial Machines (hereinafter referred to as "the Project"), the resident representative of Japan International Cooperation Agency (hereinafter referred to as "JICA") in the Argentine Republic had series of discussions on the Project with the officials concerned of the Government of the Argentine Republic for the purpose of working out the details of the technical cooperation program.

As a result of the discussions, both parties agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Córdoba, March 10, 1995

福田昇三

Mr. Shozo FUKUDA
Resident Representative
JICA Argentine Office
Japan

Ms. Silvia PORTNOY
President
National Institute of Industrial
Technology
Argentine Republic

ATTACHMENT

1. PROJECT TITLE :

MINI-PROJECT-TYPE TECHNICAL COOPERATION FOR THE UPDATING OF TECHNOLOGY IN DESIGN AND MANUFACTURING FOR INDUSTRIAL MACHINES

2. PERIOD OF COOPERATION :

Three years
From May 1, 1995 to April 30, 1998.

3. PROJECT SITE :

INSTITUTO NACIONAL DE TECNOLOGIA INDUSTRIAL
CENTRO DE INVESTIGACION DE MATERIALES Y METROLOGIA
Av. Vélez Sarsfield 1561
CORDOBA - REPUBLICA ARGENTINA

4. APPLICATION OF AGREEMENT :

This Project is to be carried out pursuant to THE AGREEMENT ON TECHNICAL COOPERATION BETWEEN THE GOVERNMENT OF JAPAN AND THE GOVERNMENT OF THE ARGENTINE REPUBLIC, signed on 11th, October, 1979.

5. OBJECTIVES OF THE PROJECT :

The general objective of this project is to improve CIMM's capacity to assist the machinery industry in its efforts to adequate to the current context, for which increased productivity, better quality and competitive products are a must.

By the implementation of this Project, appropriate technologies in the machinery and components design, and manufacturing fields, will be transferred to CIMM, and in particular to its Machinery and Equipment Division, allowing it :

(1) To increase its capabilities in machine design and prototyping, and modern techniques in manufacturing processes, including CAD/CAM and automation.

(2) To increase its capabilities in technical assistance service to machinery and component industries from Cordoba and the central region of the country.

6. BACKGROUND AND JUSTIFICATION OF THE PROJECT.

(1) INDUSTRY SITUATION

Argentine mechanical industry, both in small and mid-size enterprises, started under the imports substitution pattern. Therefore, technology was implemented without enough technological capacity of its own. Changes for the adaptation of this pattern were relevant but they were not backed up by either technological or scientific research.

On the other hand, the system of closed economy did not contribute to generate strong links between the productive sector and the local sectors of science and technology which are essential for the survival and steady growth of enterprises, just as is the case in the economy of developed countries.

The industry of machinery and equipment, which developed in Cordoba and in the Central Region of Argentina, is now going through a period of crisis which may endanger its survival, even though this region is somehow technologically better than other areas of our country.

The industry of machinery can be divided into three areas of interest :

Parts for automotive industry, farming machinery and capital goods.

Each one of this industries has different characteristics, depending on the kind of products they manufacture.

The automotive parts industry is a captive industry that depends on requirements from terminals. So, the designs and standards of quality, and in many cases the specific technologies, are provided by the big companies. But they are in trouble with the reduced margins of comercialization they are allowed, so they must improve their manufacturing systems in order to reduce costs.

On the other hand, the farming machinery industry exhibits products that fulfil reasonably the function, but suffer from poor designs on the point of view of manufacturability and costs. The products are conceived only for the domestic market, but in the future, they must think of the international ones, because of the opening of the economy in our country, that put this industry in a situation of defenceless against the potential imports of similar products.

Finally, the industry of capital goods makes mainly machine-tools with acceptable designs and a reasonable degree of specialization, and also exports a part of its production. This industry has the goal to improve quality and adjust manufacturing costs in order to be able to compete in a better position at international levels.

The project has these industries as target and the main goal of it is to provide direct support through technical assistance, courses, information services, standards, etc. All this assistance should help industry to improve from the technological point of view in order to be able to participate at international level.

The possibility of helping our industry all the way from the original idea of the product design, to manufacturing processes would contribute to improve its situation in the domestic market or to find a place in the international market to get a profit from the comparative advantages of Argentina.

(2) CIMM's SITUATION.

Personnel :

At present CIMM's personnel consists of 34 professionals, 18 technicians, 7 clerical workers and 1 assistant, who carry out work within the different sections. Furthermore, 10 advanced students are selected every year as part-time student assistants in the different laboratories, where they get training and certain degree of technological expertise before graduation. These are paid positions.

The Project will be mainly carried out mainly in the Machinery and Equipment Division, the personnel of which is described in paragraph 13.

Experience :

Within the field of the present Project, CIMM offers assistance to many industries for the design of mechanical parts and assemblies, electronic design, special equipment and devices, automation through microprocessors and PLC's and prototype construction. Industries are also given assistance in manufacturing processes, dimensional and DC electric metrology and quality assurance.

Building facilities :

The Center performs its activities in its own building inaugurated in December 1992. This building was specifically conceived for laboratories and attention of clients. Laboratories have large and improved facilities in which special care has been taken for worker's safety and comfort. An auditorium and better offices for the reception of clients have been added as well. The total area of the building is of 3700 m^2.

Equipment facilities :

A computation facility is installed at CIMM, consisting of a workstation for mechanical design end engineering calculations. There are also a fabrication shop, and electronic and dimensional metrology

laboratories. These facilities will be vastly improved by means of the arrival of Japan's Government donation consisting of a CNC machining center, a CNC lathe, a CNC wire cut machine, a CAD/CAM system, and testing and metrology equipments. The electronic laboratory has the basic equipment required to work in microprocessors and PLC's, and DC metrology, but more pieces of equipment will be required to carry out the Project.

7. SCOPE OF TECHNICAL COOPERATION.

(1) Development of the capability of CIMM's staff in the followings.

- MECHANICAL DESIGN including :

a) Mechanical design theory and practice.
b) Optimization techniques for mechanical components.
c) Tolerances and tolerance stack up analysis.
d) Mechanical design criteria based on wearing and lubrication tribology.
e) Analytical modeling and simulation.
f) Application of finite element methods in Mechanical Design.

- MANUFACTURING PROCESSES AND TECHNIQUES including:

a) Construction of prototypes of mechanical components and assemblies.
b) Evaluation of tools and devices to develop machining processes for specific components.
c) Numerical control machining.
d) Application of CAD/CAM techniques.
e) Manufacturig management techniques.
f) Quality assurance in manufacturing.

(2) Introduction and fundamental training of CIMM's staff in the following.

- INDUSTRIAL AUTOMATION including:

a) State of the art and new trends in industrial automation.
b) New trends in microprocessors and microcontrollers oriented to industrial automation design.
c) Manipulator and Robot programming and their applications to industrial automation.
d) State of the art and new trends in artificial vision.

(3) ACTIVITIES.

Three stages are to be covered in every one of the Modules, namely:

TRAINING :

Training of personnel in the use of new techniques. This training will be carried out by means of the reception of Japanese experts and the dispatch of personnel to Japan. Eventually, personnel coming from the private industry could be invited to join the programme. The dispatch of personnel to Japan is limited to the employees of CIMM.

EXTENSION :

Visits to industries and meetings at CIMM to be held among managers and technical staff for demonstration of acquired capabilities.

ASSISTANCE :

Some works will be carried out for client industries and, eventually, new techniques will be transferred to them.

The tentative schedule is attached in ANNEX I.

8. MEASURES TO BE TAKEN BY THE GOVERNMENT OF JAPAN.

In accordance with the laws and regulations in force in Japan and through the normal procedures under its Technical Cooperation Scheme, the Government of Japan will take the following measures through JICA:

(1) Dispatch of Japanese experts.

To provide at its own expense services of the Japanese experts for the purpose of technical cooperation in the fields referred to in paragraph 10.

(2) Provision of machinery, equipment and other materials.

To provide at its own expense such machinery, equipment and other materials necessary for the implementation of the Project as listed in Annex III.

(3) Training of counterpart staff in Japan.

To receive at its own expense the Argentinian staff of the Project for technical training in Japan.

9. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE ARGENTINE REPUBLIC.

In accordance with the laws and regulations in force in Argentina, the Government of the Argentine Republic will take the following measures at its own expense:

(1) Provision of facilities.

To provide the facilities as indicated in ANNEX II .

(2) Provision of laboratories and equipment.

To supply or replace, machinery, equipment, instruments, vehicles, tools, spare parts andother materials necessary for the implementation of the project other than those provided through JICA under paragraph 8 (2) above.

(3) Running expenses

To meet running expenses necessary for the implementation of the Project.

(4) Assignment of counterparts

To assign at least one counterpart staff to each Japanese expert.

(5) Provision of urban transportation services

To provide urban transportation facilities for the Japanese short-term experts.

(6) In accordance with the laws and regulations in force in Argentina, the Government of Argentina will take necessary measures to meet:

1) Expenses necessary for the transportation of the equipment within Argentina as well as for the instalation, operation and maintenance thereof.
2) Customs duties, internal taxes and any other charges imposed on the equipment in Argentina.

10. FIELDS TO WHICH JAPANESE EXPERTS ARE TO BE ASSIGNED.

(1)	Machinery design and manufacturing (in functions since March 1994)	1 (one)
(2)	Mechanical design	1 (one)
(3)	Mechanical design (short term)	2 (two)
(4)	Computer soft programs for manufacturing (short term)	1 (one)
(5)	Tribology (short term)	1 (one)
(6)	Automation (short term)	1 (one)

Note :

(1) A team leader will be designated from the above experts.

(2) Short-term experts may be additionally assigned when seemed necessary and agreed by both JICA and CIMM.

11. ASSIGNMENT OF ARGENTINIAN COUNTERPART STAFF.

(1) Project manager (engineer) (also will work in mechanical design)	1 (one)
(2) Mechanical Design (engineers)	4 (four)
(3) Mechatronics and automation (engineers)	5 (five)
(4) Manufacturing Processes (engineers)	2 (two)
(technicians)	5 (five)

Administrative and supporting staff will be additionally assigned by the Argentinian side.

12. ADMINISTRATION OF THE PROJECT

- The Technical Director of the Center will bear the institutional responsibility for the implementation of the Project.

- The Project Manager at the Center will be responsible for the administrative and managerial matters of the Project.

- The Japanese experts will give necessary technical guidance and advice to the Argentinian counterpart staff on matters relating to the Project.

- The Resident Representative of JICA in Argentina will undertake the role of an advisor and coordinator for successful implementation of the Project.

13. MUTUAL CONSULTATION.

There will be mutual consultation between both sides on any major issues arising from, or in connection with this document.

14. MEASURES TO PROMOTE UNDERSTANDING AND SUPPORT TO THE PROJECT

For the purpose of promoting the support of the people of Argentina to the Project, the Government of Argentina shall take appropriate measures to make the Project widely known to the people of Argentina.

15. LANGUAGE

This Minutes is done in the English and Spanish languages. In case of any divergence of interpretation, the English text shall prevail.

ANNEX I

PROJECT IMPLEMENTATION SCHEDULE.

ANNUAL WORK PLAN (by calendar years)

Project Period 95.5.1 - 98.4.30	1995	1996	1997	1998
PROJECT ACTIVITIES				
1. MECHANICAL DESIGN				
a) Mechanical design theory and practice				
b) Optimization techniques for mechanical components				
c) Tolerances and tolerances stack-up analysis				
d) Mechanical design criteria based on wearing and lubrication tribology				
e) Analytical modeling and simulation				
f) Application of finite element methods in mechanical design				
2.MANUFACTURING PROCESSES AND TECHNIQUES				
a) Construction of prototypes of mechanical components and assemblies				
b) Evaluation of tools and devices to develop machining processes for specific components				
c) Numerical Control machining				
d) Application of CAD/CAM techniques				
e) Manufacturing management techniques				
f) Quality assurance in manufacturing				
3. INDUSTRIAL AUTOMATION				
a) State of the art and new trends in industrial automation				
b) New trends in microprocessors and microcontrollers oriented to industrial automation				
c) Manipulators and Robots' programming and their application to industrial automation				
d) State of the art and new trends in artificial vision				

ANNEX II : PROJECT INPUT

Project Period 95.5.1 to 98.4.30	1995	1996	1997	1998
JAPANESE CONTRIBUTION				
1. Expert Assignment Plan				
(Long-term experts)				
1) Machinery design and manufacturing (in function since March 1994)				
2) Mechanical design				
(Short-term experts) (*)				
1) Mechanical design (Finite element method. Optimization)				
2) Mechanical design (Assembling, units design)				
3) Computer soft programs				
4) Tribology				
5) Automation				
2. Equipment Provision Scheme				
* Wokstation for engineering calculations and design with software and accesories				
* Tools and tool setting equipment for NC machines				
* Design and inspection devices for electronic circuits with software				
* Other necessary machinery, equipment, software and materials which may be mutually agreed upon				
3. Counterpart Training Scheme (One or two Argentine counterparts to be received in Japan annually) (**)				
ARGENTINE CONTRIBUTION				
1. Provision of Facilities and Equipment				
* Office room and laboratories				
* Laboratory equipment				
* Running expenses coverage				
2. Staffing counterpart				
* Project manager				
* Mechanical Design				
* Mechatronics and automation				
* Manufacturing Processes				

NOTES: (*) The periods and duration of short-term expert dispatch will be determined later in consultation with the Argentine side.

(**) The periods and duration for the reception of the Argentine counterparts for training will be determined later in consultation with the Argentine side.

ANNEX III : LIST OF MACHINERY, EQUIPMENT AND MATERIALS.

1. Wokstation for engineering calculations and design with software and accesories.
2. Tools and tool setting equipment for NC machines.
3. Design and inspection devices for electronic circuits with software.
4. Other necessary machinery, equipment, software and materials which may be mutually agreed upon.

MEMORANDUM OF MEETING

FOR

THE STUDY ON MINI-PROJECT TYPE TECHNICAL COOPERATION

FOR THE UPDATING OF TECHNOLOGY

IN DESIGN AND MANUFACTURING FOR INDUSTRIAL MACHINES

IN THE ARGENTINE REPUBLIC.

AGREED UPON BETWEEN

NATIONAL INSTITUTE OF INDUSTRIAL TECHNOLOGY/

MATERIALS AND METROLOGY RESEARCH CENTER

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

March 10, 1995

Córdoba,

Argentine Republic

Mr. Elvio J. LENTA

Director

Materials and Metrology Research

Center

Argentine Republic

Mr. Hiroshi AMANO

Leader of the Japanese Mission

Japan International Cooperation

Agency

Japan

In response to the request of the Government of the Argentine Republic, the Government of Japan dispatched the Japanese Mission (hereinafter referred to as "the Mission") for the Mini-Project-Type Technical Cooperation for the Updating of Technology in Design and Manufacturing for Industrial Machines in the Argentine Republic (hereinafter referred to as "the Project"), from March 7 to March 10, 1995, to discuss the Minutes.

For this purpose, the Mission had series of discussions with the officials concerned of the National Institute of Industrial Technology / Materials and Metrology Research Center (hereinafter referred to as "INTI/CIMM") during its stay in the country. The list of attendants is attached in ANNEX A.

This document is to supplement to the Minutes signed between INTI/CIMM and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on March 10, 1995, summarizing the main results of the said discussions as follows.

The main agenda that follows is presented according to the Minutes of the Project.

- Point 1. It was suggested to change the original title of the Project, in order to include the word "design".It was proposed the following title:
"Mini-Project Type Technical Cooperation for the Updating of Technology in Design and Manufacturing for Industrial Machines", which was accepted. It was decided to include a list of the main industrial machines to be covered by the Project, to provide a better scope of its coverage.

- Point 5 (1). It was pointed out that JICA experts can give advise to the INTI/CIMM staff about market, design, production and applications of prototypes.

- Point 5 (2). It was mentioned that this point includes assistance on quality assurance and management.

- Point 7 (1) MECHANICAL DESIGN a). It was said that this point should refer to the theory of mechanical design as based besides quality considerations, and design review.
- Point 7 (1) MECHANICAL DESIGN b). The scope of this point refers to the optimization of

mechanical components from the point of view of rational methodology, i.e., focusing on cost, performance, reliability, manufacturability, expected life, etc.

- Point 7 (1) MANUFACTURING PROCESSSES AND TECHNIQUES d). With respect to this point, it was agreed that the best solution will be to send an argentinian counterpart to Japan, in order to be trained in the application of the FANUC Software, which was already supplied. In relation to the linking of that software to the CNC machine, the Japanese counterpart suggested that INTI/CIMM should contact the FANUC representative in Argentina, at its own expense.

- Point 7 (2) INDUSTRIAL AUTOMATION. Accepted without modifications. It was explained that the subjects of this point cover a very broad area and that a deep treatment of them, would exceed the time asigned to the Project. Once the training of the first year in Japan is finished, a discussion will be held between INTI/CIMM and JICA, about the program of the following years, to define the training in Japan and the subject of the Japanese short term expert.

- Point 9 MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE ARGENTINE REPUBLIC. The tentative budget for mini-project was presented by INTI/CIMM which is attached in ANNEX F.

- Annex III : LIST OF MACHINERY , EQUIPMENT AND MATERIALS.

The prior list was divided in the three following paragraphs :

1) Workstation for engineering calculations and design with software and accesories.

2) Tools and tool setting equipment for NC machines.

3) Design and inspection devices for electronic circuits with software.

4) Other necessary machinery, equipment, software and materials which may be mutuallly agreed upon.

It was pointed out that the specifications of the equipments involved in point 3, will be defined after the argentine counterpart has completed his training about this subject in Japan.