

Study unit 5

The Protection of Layout Designs of Integrated Circuits

Overview

In this unit you will be able introduced to the international protection of the layout designs of integrated circuits. We will explain the basic manufacturing process, and the requirements for protection.

<i>Learning outcomes</i>	<p>After completion of this study unit, you should be able to c</p> <ul style="list-style-type: none"><input type="checkbox"/> Understand the basic legal requirements for the protection of the layout design of integrated circuits<input type="checkbox"/> understand the relationship between the international instruments for the protection of IC design, and between these instruments and national law<input type="checkbox"/> understand the interdependence between individual national laws and the provisions of international instruments
--------------------------	---

Setting the scene

Tony has designed a watch that can take short voice messages. Toni's design activities take place in the workshop at Mac Engines.

In our ongoing story you will follow Toni=s design activities that follow. He will also approach you for legal advice when difficulties arise.

What is an integrated circuit topography?

Discussion

introduction

The first question that should be addressed, is what is integrated circuit topography? AAn integrated circuit@ refers to what is more commonly known as a Achip@, Amask work@ or Aintegrated circuit@, the small device found in most electronic watches, washing machines and other household appliances. Latman defines a Achip@ as a collection of transistors formed on a single Aintegrated@ structure (see Alan Latman, Robert A Gorman and Jane C Ginsburg *Copyright for the Nineties Cases and Materials*

3rd edition (eds Robert A Gorman and Jane C Ginsburg) (1989) 235).

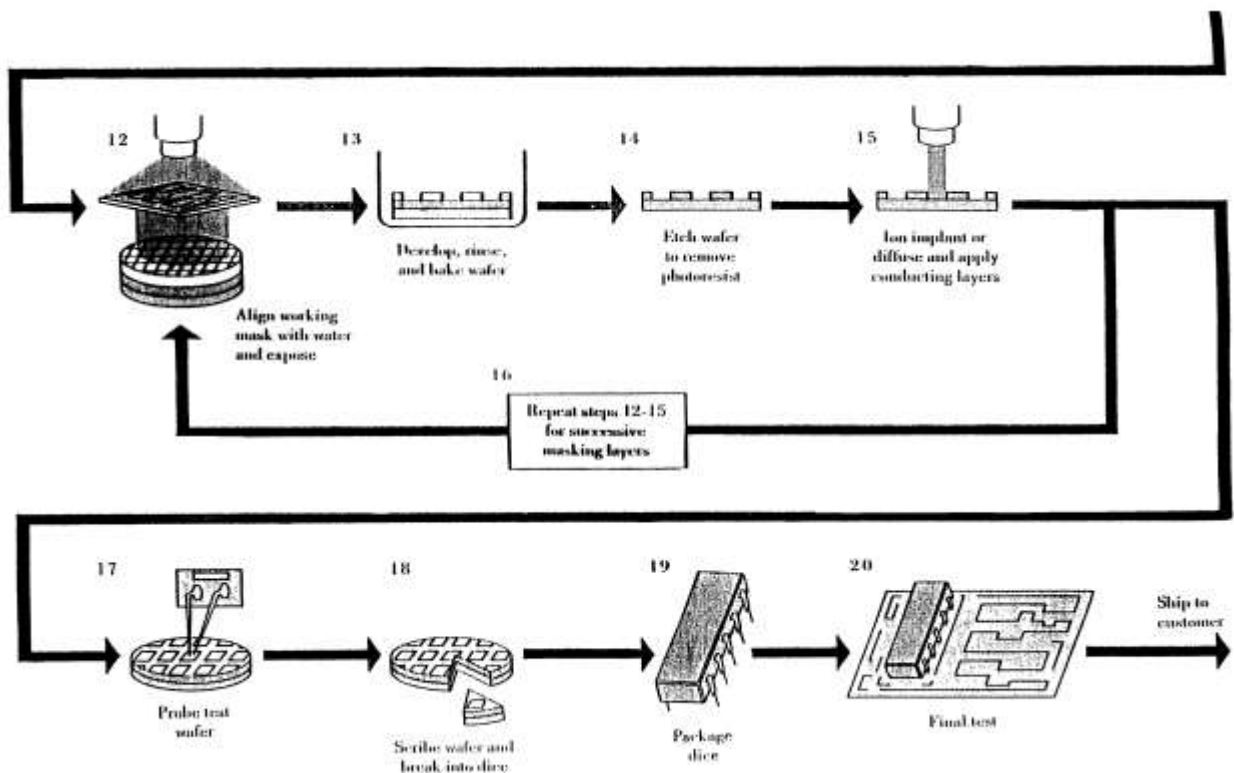
A “topography” is simply the layout design of the elements of the integrated circuit.

The manufacturing process

*layers of
semi-conducting
material*

A semiconductor chip has been described as essentially consisting of the concentration of electronic circuitry in very small components for the performance of given tasks. Semiconductor chips are formed from very thin layers of semiconducting material with insulators of various compositions that combine to form the components required to make up the designing patterns of electronic circuitry. The configuration of the layers is determined by directing a pattern of light on to a photosensitive surface, either through a mask or via so-called direct writing techniques. The layers are doped in predetermined places with traces of other elements, and sandwiched together with insulating and metallic layers to achieve a three-dimensional array of circuitry of great complexity (see Tapper *Computer Law* (1989) 40).

The manufacturing process may be illustrated as follows:



	<i>Activity 5.1</i>
	Describe the manufacturing process of a semiconductor chip in your own words:

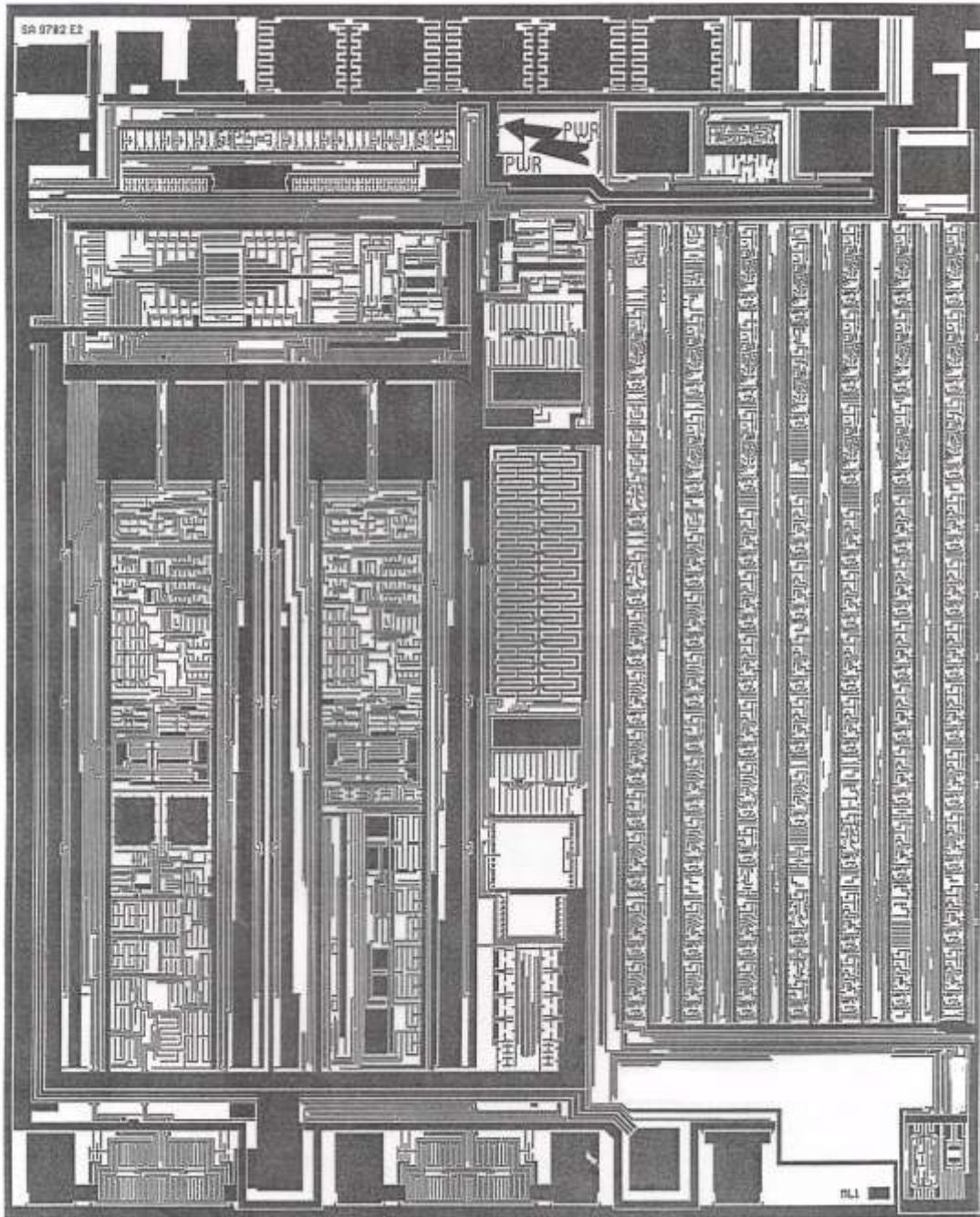
Discussion

What is a semiconductor chip?

functions

The implemented semiconductor chip can perform logic functions using digital switching techniques involving storage and gating functions, or so-called analogue functions of amplification and modulation using electronic and optical techniques. Under a microscope the chip=s intricate terrain often looks uncannily like miniaturised streets, plazas and buildings of a great metropolis (see Robert Hart “The Legal Protection of Integrated Circuits” [1989] 1 (4) *Intellectual Property in Business* 12 (Hart 1989a) at 12-13).

Layout Design



Legal Protection

*copyright/design
law inadequate*

The most logical form of protection for integrated circuit topographies is the copyright or design protection of the layout designs as artistic works. However, this is clearly inadequate to protect the intricate designs. Furthermore, many countries do not afford copyright protection or design protection to functional features of works. The US played a leading role in devising the semiconductor chip protection outside its national Copyright Act by enacting the Semiconductor Chip Act (USSCPA). It was thus against this background, and the overwhelming international support for the *sui generis* approach of the USSCPA, that WIPO considered the drafting of a separate treaty with the objective of extending the principle of national treatment to this new domain, namely the IPIC Treaty. The IPIC Treaty has been widely accepted and adopted.

TRIPS Obligations

IPIC Treaty

Article 35 of the TRIPS Agreement provides that members agree to provide protection to layout-designs in accordance with articles 2 to 7, 12 and 16(3) of the IPIC Treaty, with the exception of article 6(3).

The IPIC Treaty

Legal Form of Protection

*object of
protection*

Article 4 of the IPIC Treaty provides that each contracting party shall be free to implement its obligations through a special law of topographies or its law on copyright patents, utility models, industrial designs, unfair competition or any other law or combination of any of those laws. Hart (1989a at 12-13) criticizes this provision and points out that protection should not be used to protect topographies because the law implementing the IPIC Treaty should be related to the layout-design of the semiconductor products and not to their functional arrangements and performance. The same argument may be raised against the protection of integrated circuit topographies as functional designs under South Africa's 1993 Act.

Sui generis

minimum standards

It is noted that it is almost a natural option to establish a *sui generis* regime for the protection of layout-designs as the term and other rights of the creator must be kept within reasonable limits. As the contracting party is obliged to comply with the treaty=s minimum standards, the final result may not be too different from the application of a *sui generis* approach (see Carlos M Correa ALegal Protection of the Layout Designs of Integrated Circuits: The WIPO IPIC Treaty@ [1990] 6 *European Intellectual Property Review* 196 (Correa 1990) at 199).

The IPIC Treaty provides in Article 12 that shall not affect the obligations that any contracting party may have under the Paris Convention or the Berne Convention.

Definitions

IC defined

The alternative terms Alayout-design@ and Atopography@ are included throughout the articles of the IPIC Treaty as no clear preference emerged. It is noted that the rather out-mode term Amask work@ used in the USSCPA and South Africa=s 1993 Act falls within either term. An integrated circuit is defined as a product in final or intermediate form, in which the elements, at least one of which is an active element, and some or all of the interconnections are integrally formed in and/or on a piece of material, and which is intended to perform an electronic function (see art 2(i)). The definition only envisages one active element.

active elements

The phrases “final or intermediate form” and “intended to perform” address the problem of protection of intermediate products such as “gate arrays” and “Programmable Logic Devices” that cannot be considered finished products. A layout-design (topography) is defined in Article 2(ii) as the three-dimensional disposition however expressed, of the elements, at least one of which is an active element, and of some or all of the interconnections of an integrated circuit, or such a three-dimensional disposition prepared for an integrated circuit intended for manufacture. The only requirement for the purposes of this definition is that the disposition of the active elements (for example transistors,

diodes and thyrestors), the interconnections and any passive elements (for example resistors, capacitors, and inductors), are three-dimensional (see Hart 1989a 15).

"as such"

The layout-design or topography is therefore protected as such, and not only after fixation in a semiconductor chip product as provided in the USSCPA (see s 902(a)(1) of the USSCPA) Hart notes that this is an important issue in Europe where there are special design houses that prepare layout-designs or topographies of an application-specific integrated circuit for a customer, which is implemented by a separate semiconductor foundry (at 1989a 15). It is thus very important that the layout-design be protected as such. Furthermore, the protection of unincorporated designs would benefit countries, which have design capabilities but not the necessary facilities to manufacture chips (see Correa 1990 197).

Subject matter of protection

*whether or not
incorporated*

Article 3(1)(c) allows those countries whose legislation is limited to semiconductor integrated circuits to ratify the IPIC Treaty. Article 3(1)(b) provides that the rights of the holder of the right in respect of integrated circuits apply whether or not the integrated circuit is incorporated in an article. This provision ensures that integrated circuits incorporated into larger pieces of equipment, such as television sets, will, if imported into a country in contravention of the rights of the right holder in that country, be actionable by the right holder. It would therefore seem that an obligation to prohibit the importation and sale has been created (see Frederick M Abbott [AWorld Intellectual Property Organization: Treaty on Intellectual Property in Respect of Integrated Circuits](#) [1989] 28 International Legal Materials (Abbott 1989) at 1483).

Requirements for protection

originality

Article 3(2) of the IPIC Treaty provides that layout-designs are protectable if they are original in the sense that they are the result of their creator's own intellectual effort and not commonplace. Note that the USSCPA legislative history indicates that [Aoriginal](#) means not copied. Article 3(2)(b) of the IPIC Treaty provides that a layout-design that consists of a combination of elements and interconnections that are commonplace shall be protected only if the combination, considered as a whole, fulfils the originality requirement. The accepted view is that although the individual elements of

topography are unavoidably old, the combination of such elements, should be a new as whole (see Richard H Stern "Chip Topography Protection in the USA" in *The Law of Information Technology in Europe 1992: A Comparison With the USA* (eds A P Meijboom and C Prins) (1991) at157-158)

National Treatment

no discrimination

Article 5 provides for national treatment and prohibits discrimination against foreign nationals. This is an important principle of the IPIC Treaty and the main impetus for its creation. This principle has serious repercussions for those countries that wish to become members of the Treaty, as only the Japanese Act had not initially put reciprocity requirements on those who wish to obtain protection. The United States and the European announced the abolishment of the reciprocity principle and extended full protection to all members of the WTO with effect from 1 January 1996 (see National Desk A Presidential Proclamation on Implementation of Uruguay Roundtable Provisions@ 1995 *Newswire* (1995-03-24) and Union (see European Union 94/824/EC L349). Obligations under the TRIPS Agreement will play a decisive and momentous role in ensuring that comprehensive protection for topographies becomes the international norm.

Exclusive rights

scope of protection

The scope of protection of layout-designs is expounded in Article 36 of the TRIPS Agreement. It is based upon copyright principles, involving the right to authorise the reproduction, importation, selling, and distribution of the layout design for commercial purposes. According to Article 6(1) the holder of the right shall have the right to reproduce the protected layout-design and the right of importation and distribution for commercial purposes. It is provided that a layout-design may not be reproduced without authorisation "in its entirety or any part thereof", except the act of reproducing any part that does not comply with the originality requirement of article 3(2). The right holder thus has the exclusive right to make a total or partial reproduction of the layout-design on a mask, on a computer tape, on paper, or by means of manufacturing a chip.

extent of reproduction

Neither the USSCPA, nor the EU Topography Directive, nor the Japanese Act contains a qualification upon reproduction as far as parts are concerned. The UK Regulations refer to

reproduction in whole or substantial part. The IPICT Treaty has possibly provided means of protecting new cells created by a cell library by providing protection for topography or any part thereof. The basic rights are based upon copyright principles (see Hart 1989a 16).

Reverse engineering

international agreement

International consensus has been reached that reverse engineering is a *sine qua non* for semiconductor chip protection. Article 6(2)(a) of the IPICT Treaty provides for the reproduction of a layout-design is permitted where it is for private purposes or for the sole purpose of evaluation, analysis, research or teaching (see art 6(2)(a)). Questions may arise as to the interpretation of the phrase *private purposes*. Concern is voiced that this exception may be misused to legalise in-house copying for the provision of spare parts for large capital goods installations. The reproduction at a university laboratory for purposes of training would be deemed legal, as it would be classified as research or teaching (see Correa 1990 198).

own intellectual effort

An important limitation on the reverse engineering exception exists: Article 6(2)(a) of the IPICT Treaty provides for the where a second topography is created on the basis of an evaluation or analysis of the first topography, such second topography must comply with the requirements of originality as set out in Article 3(2). The protection is only against copying - more specifically slavish copying and not that based upon *own intellectual effort*. Compare this position to that of section 906(a)(2) of the USSCPA, namely that parts of the first topography may be copied into the second topography as long as it includes additional original topography.

independent creation

Article 6(2)(c) provides that an original and independently created identical layout-design forms a complete defense against infringement. The same defense would apply if the layout-design were substantially similar (see Correa 1990 198; John M Kernochan "Some Observations on the Protection of Semiconductor Chip Design" [1987] 13 *Rutgers Computer & Technology Law Journal* 291 at 292).

Innocent infringement

The innocent infringement provision contained in Article 6(3) presented a major obstacle to the Japanese delegation at the Diplomatic Conference, as provision is not made for

reasonable or equitable royalty after notification of infringement. Although Article 6(3) of the IPIC Treaty provides for non-exclusive, non-voluntary licences, the TRIPS Agreement expressly limits this in accordance with the rules relating to compulsory licensing as contained in Article 31(a)-(k).

innocent importation

Article 37 of the TRIPS Agreement states that no party shall consider unlawful the importation or sale of unlawfully reproduced integrated circuit designs where the person performing such acts did not and had no reasonable grounds to know, when acquiring the integrated circuit or article incorporating such an integrated circuit, that it incorporated an unlawfully reproduced layout design. But after the time that such person received sufficient notice, that person may perform any of the acts with respect of the stock on hand, but shall be liable to pay the right holder a sum equivalent to a reasonable royalty.

Registration and duration of protection

registration

Article 7(2) of the IPIC Treaty provides that a contracting party may commence protecting a layout-design either upon first commercial exploitation or once registration has been applied for. The filing of a copy or drawing of the layout-design should accompany the application for registration and where the integrated circuit has been commercially exploited a sample of the integrated circuit along with information defining the electronic function it is to perform. Members may adopt provisions to provide for the exclusion of parts of the copy or drawing that relate to the manner of manufacture of the integrated circuit.

term

Article 38.1 of the TRIPS Agreement states that where Members require registration the minimum period of protection of lay-out designs shall be ten years counted from the date of filing an application for registration or from the first commercial exploitation anywhere in the world. In Members not requiring registration as a condition for protection, layout-designs shall be protected for a term of no less than 10 years from the date of the first commercial exploitation wherever in the world it occurs (see art 38.2) Furthermore, notwithstanding the above, a Member may provide that protection shall lapse 15 years after the creation of the layout-design. Article 7(b) of the IPIC Treaty provides that where the filing of an application for registration is required, such filing must be effected within a period not longer than two years from the first time the right

was exploited ordinarily commercially anywhere in the world.

This is an improvement on the IPIC Treaty provisions, which provide for a period of protection of eight years either from date of creation or application for registration. In many cases topography may only be commercially exploited two years from the date of creation. A case in point is the telecommunications industry, where applications of specific integrated circuits have to go through lengthy proving trials with the telecommunications authorities before they are accepted for use. The period of protection may then be as little as five or six years (see Hart 1989a 18).

The Designs Act of 1993

The protection of integrated designs were accommodated in the Designs Act as functional designs.

TRIPS Obligations

South Africa was motivated to adopt the 1993 Act to enable her to accede to become a member of the WTO. In December 1994 South Africa became a member of the WTO and its obligations under the TRIPS Agreement require it to protect integrated circuits and certain related works that come into being in their design and production by 1 January 1996. The main focus of this section is whether the provisions of the 1993 Act comply with the TRIPS Agreement as far as the protection of layout-designs is concerned.

South Africa has decided not to follow the international lead. The 1993 Act introduces specific protection for integrated circuits, defined and protected as functional designs. As will be illustrated *post*, some of the functional design provisions are not suitable for the protection of topographies or mask works.

Subject-matter of Protection

definitions

As we have explained in Study Unit 3 above, the 1993 Act provides that a design means an aesthetic design or a functional design. A functional design means any design applied to any article, whether for the pattern or the shape or the configuration thereof, or for any two or more of those purposes, and by whatever means it is applied, having features which are necessitated by the function which the article to which the design is applied, is to perform. Section

1(1)(xi) provides that a functional design includes an integrated circuit topography, a mask work and a series of mask works.

The term integrated circuit is defined in section 1(xii) as:

an article, in final or intermediate form, containing electrical, electro-magnetic or optical elements or circuitry which is capable of performing an electrical or optical function, and in which at least part of the electrical, electro-magnetic or optical elements and circuitry are integrally formed, in accordance with a pre-determined topography in a semi-conductor material

An integrated circuit topography is defined in section 1(xiii) as:

functional design which consists of the pattern, shape or configuration of the three-dimensional disposition of the electrical, electro-magnetic or optical elements and circuitry of an integrated circuit

mask work

A mask work is defined as functional design which consists of a pattern of an image, however fixed or encoded, having or representing at least part of an integrated circuit (see s 1(xv), and a series of mask works is defined as: related group of mask works which together represent the three-dimensional disposition of the electrical, electro-magnetic or optical elements and circuitry of an integrated circuit (see s 1(xxv).

final or intermediate

The definition of the object of protection is wide enough to accommodate future techniques such as X-ray beam lithography and the digital recording of images. Furthermore, the definition of a mask work seems to incorporate layers of a mask not yet fixed on semiconducting material, for example where it is only available on the so-called data-base-tape and final or intermediate forms of a chip. These definitions are based on those in the IPIC Treaty.

microcode

A functional design is defined as a design having features which are necessitated by the function which the article to which the design is applied, is to perform. Functionally dictated patterns thus form part of the object of protection. Although the copyright protection of a computer program exists independently from the mask work it is stored in, it may be argued that this feature of the 1993 Act has provided a vehicle for the protection of microcode (microcode may be defined as a sequence of microinstructions forming micro programs).

*design elements
vs function*

The correct view is thus that chip topography protection should extend to the protectable design elements of the mask work and not to the underlying ideas or functions. The mere fact that the 1993 Act defines an integrated circuit topography and a mask work as functional designs is a contrary to the general principle that the protection of semiconductor-chip designs should include the design elements of the chip layout and not the function of the product.

Requirements for Protection

requirements

An integrated circuit topography or mask work or series of mask works are registrable as functional designs if they are new and not commonplace in the art in question (see s 14(1)(b)(i)-(ii)), and made by an industrial process (see s 24(4)). The phrase of commonplace in the art in question has not been expounded in the 1993 Act.

novelty

Section 14(2) provides that a design shall be deemed to be new if it is different from or if it does not form part of the state of the art immediately before the date of application for registration or the release date, whichever is the earlier: Provided that where the release date is the earlier, such a design shall only be considered to be new if it has been lodged within six months of such release date.

state of the art

The state of the art comprises all matter which has been made available to the public anywhere in the world, whether by written description, use or in any other way; and all matter contained in an application for a design in the Republic or a convention country, which has subsequently been registered in the Republic in accordance with the provisions of section 44 (see s 14(3) and the discussion in Study Unit 3 above). Topography must not be commonplace among creators of layout-designs and manufacturers of integrated circuits at the time of their creation.

Activity 5.2

- ☐ Give your opinion on whether the absolute novelty standard required by South African design law is suitable for the protection of topographies.
- ☐ Is this provision in compliance with the TRIPS Agreement?

Read tutorial letter 201 for feedback on this activity.

Discussion

Exclusive Rights

scope of protection

Section 20 provides that the effect of registering an integrated circuit topography, mask work or series of mask works as a functional design is to exclude others for the duration of the registration from the making, importing, using or disposing of any article included in the class in which the design is registered, and embodying the design or a design not substantially different from the registered design, so that the registered proprietor shall have and enjoy the whole profit and advantage accruing by reason of the registration.

monopoly rights

The monopoly rights section 20(1) grants a mask work owner are too strong as the chip industry is only interested in protection against photolithographic copying (see Shih 1986 132). These monopoly rights may be contrasted with the exclusive rights to authorise or prohibit the reproduction or commercial exploitation and importation of her topography in other jurisdictions (see Article 5 of the EU Topography Directive and s 905 of the USSCPA). Furthermore, the IPIC Treaty provides for protection against reproduction of the topography or original parts thereof, importing and selling, or otherwise distributing for commercial purposes, a protected layout-design or an integrated circuit in which a protected layout-design is incorporated (see Article 6(i) & (ii) of the IPIC Treaty).

independent creation

In the case of the design of cell libraries there is at least a theoretical chance of innocent coincidence of topographies (Stern op cit at 160). Under the 1993 Act the defense of independent creation will fail. Article 6(2)(c) of the IPIC Treaty provides that the holder of the right may not exercise his right in respect of an identical original layout-design that was independently created by a third party. Again South Africa is not in compliance with her obligations in terms of the TRIPS Agreement.

Limitations on Exclusive Rights

exhaustion of rights

Section 20(2) provides that the purchaser of an article embodying a registered design shall have the right to use and dispose of that article. This is in compliance with the exhaustion of rights contained in Article 6(5) of the IPIC Treaty. Furthermore, the 1993 Act makes provision for a compulsory licence where it can be shown that the rights in a registered design have been abused (see s 21).

reverse engineering

The limitation of the IPIC Treaty on the scope of protection, namely reverse engineering was not initially incorporated into the 1993 Act. The Intellectual Property Laws Amendment Act introduces a provision on reverse engineering. Section 72 of the Act provides for the amendment of section 20 of the principal Act by the insertion of sub-sections 3(a) and (b) which provides as follows:

notwithstanding sub-section ((1)... the rights of the registered proprietor shall not be infringed by any person who makes an article embodying the design or a design not substantially different from the registered design, for the sole purpose of evaluation, analysis, research or teaching.

rights of 3rd party

Unfortunately, the rights of a third party who creates a second topography on the basis of evaluation or analysis of the protected layout-design has not been addressed. Disparate views are held on the question of the rights of such third party (see Stern *op cit* at 167). The vexed question is whether a third party may incorporate a part of, or the whole topography she reverse engineered, or not.

Spare Parts Exception

exclusion of spare parts

Section 14(6) of the 1993 Act provides that in the case of an article which is in the nature of a spare part for a machine, vehicle or equipment, no feature or pattern, shape or configuration of such article shall afford the registered proprietor of a functional design applied to any one of the articles in question, any rights in terms of the 1993 Act in respect of such features. The wording of section 14(6) raises a

number of issues.

use in spare parts

The meaning of spare parts is examined in Study Unit 3. Please read that material again. Many examples may be cited where integrated circuit topographies form spare parts for a machine, vehicle or equipment. An obvious case in point is the chips forming the hardware of computers, or mask works used in the electronic display panels of certain up-market motor vehicles. It may even be said that it would be difficult to think of the use or application of integrated circuit topographies or mask works which are not in the nature of parts and subsequent spare parts for machines, vehicles or equipment!

Activity 5.3

Draw a table depicting your analysis of the extent to which the 1993 Designs Act is in compliance with the TRIPS Agreement as far as the protection of integrated circuit topographies is concerned.

Feedback

Read tutorial letter 201 for feedback on this activity.

Conclusion

You should now understand why integrated circuit designs are protected in a sui generis manner and be able to appreciate the role and importance of the protection of integrated circuit designs.